Final Staff Assessment and
Draft Environmental Impact Statement
and
Draft California Desert Conservation Area Plan Amendment

IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

Application For Certification (07-AFC-5)
San Bernardino County



U.S. BUREAU OF LAND MANAGEMENT
and
CALIFORNIA ENERGY COMMISSION

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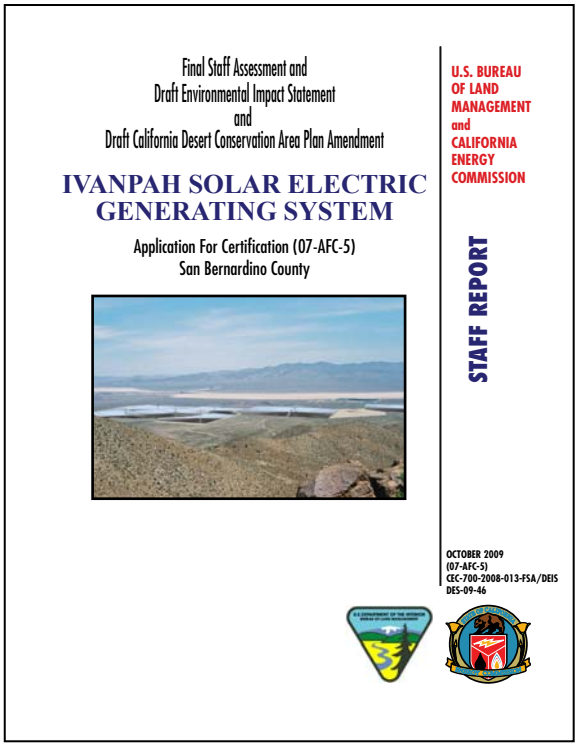
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Abstract

Final Staff Assessment/Draft Environmental Impact Statement
Ivanpah Solar Electric Generating System (07-AFC-5)

Lead Agency:	**(Federal)**	**United States Department of the Interior Bureau of Land Management Needles Field Office**
	(State)	**The California Energy Commission Siting, Transmission and Environmental Protection Division**
Project Location:		**San Bernardino County, California**
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Comment Due Date:		**Comments related to the project are due to BLM and the Energy Commission by close of business on February 11, 2010.**

Project Summary: The Ivanpah Solar Electric Generating System (ISEGS) project is a proposal to construct a 400- megawatt concentrated solar power tower, thermal-electric power plant. The ISEGS project would be located on approximately 4, 073 acres of public land approximately 5 miles southwest of Primm, NV in San Bernardino County, California. The project would be constructed as three individual power plants that share a common administration building, and a shared construction logistics area. The solar power tower project would include seven 469-foot tall power towers and installation of 214,000 heliostats (mirrors) surrounding the power towers. Each of the three power plants would contain a power block with a steam turbine generator. The applicant's power tower technology uses dry cooling to minimize use of groundwater required for the project. Generator interconnection lines would tie each power plant into a new substation and the Southern California Edison transmission lines passing through the project boundary.



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IVANPAH SOLAR ELECTRIC GENERATING SYSTEMS (ISEGS)

FINAL STAFF ASSESSMENT, DRAFT ENVIRONMENTAL IMPACT ASSESSMENT AND DRAFT CALIFORNIA DESERT CONSERVATION AREA PLAN AMENDMENT

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EXECUTIVE SUMMARY

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INTRODUCTION

The proposed action evaluated within this Final Staff Assessment (FSA)/Draft Environmental Impact Statement (DEIS) is the construction and operation of the Ivanpah Solar Electric Generating System (ISEGS) project, a proposed solar-thermal electricity generation facility located on public lands managed by the Bureau of Land Management (BLM) in San Bernardino County, California. The FSA/DEIS represents a joint environmental review document developed by the California Energy Commission (Energy Commission) and BLM to evaluate potential impacts associated with the proposed action. The DEIS also functions as the environmental evaluation of a proposed amendment to BLM's California Desert Conservation Area (CDCA) Plan, which would identify the ISEGS project within the Plan.

Solar Partners I, LLC; Solar Partners II, LLC; Solar Partners IV, LLC; and Solar Partners VIII, LLC, which are subsidiaries of BrightSource Energy, Inc. (applicant or BrightSource Energy), filed an Application for Certification (AFC) (07-AFC-5) for the proposed Ivanpah Solar Electric Generating System (ISEGS). The proposed ISEGS project and related facilities are under the Energy Commission's jurisdiction and cannot be constructed or operated without the Energy Commission's certification. As the proposed project would be located on public land, BrightSource Energy has also filed an application to BLM for a land use Right-of-Way pursuant to the Federal Land Policy and Management Act (FLPMA). Under FLPMA Title V (Rights-of-Way), the Secretary of Interior is authorized to grant rights-of-way for the purpose of allowing systems for generation, transmission, and distribution of electric energy. BrightSource Energy has also applied to the U.S. Department of Energy (DOE) for a loan guarantee pursuant to Title XVII of the EPAct. The application for a loan guarantee for Ivanpah 1 was made in November 2008, and the application for Ivanpah 2 and 3 was made in February 2009. BrightSource Energy has also applied to the U.S. Treasury Department for Payments for Specified Energy Property in Lieu of Tax Credits under §1603 of the American Recovery and Reinvestment Act of 2009 (Public Law 111-5). This program offers a grant (in lieu of investment tax credit) to receive funding for 30% of the total capital cost at such time as a project achieves commercial operation (currently applies to projects that begin construction by December 31, 2010 and begin commercial operation before January 1, 2017).

This FSA/DEIS examines engineering, environmental, public health and safety aspects of the proposed project, based on the information provided by the applicant and other sources available at the time the FSA/DEIS was prepared. The FSA/DEIS contains analyses similar to those normally contained in an Environmental Impact Report (EIR) required by the California Environmental Quality Act (CEQA), as well as analyses required as part of an EIS prepared under the National Environmental Policy Act (NEPA).

When considering a project for licensing, the Energy Commission is the lead state agency under CEQA, and its process is functionally equivalent to the preparation of an

EIR. Similarly, BLM is the lead agency for the NEPA review of the proposed Right-of-Way and associated CDCA Plan Amendment. In August, 2007, the CEC and BLM California Desert District (CDD) entered into a Memorandum of Understanding (MOU) to jointly develop the environmental analysis documentation for solar thermal projects which are under the jurisdiction of both agencies. The purpose of the MOU is to avoid duplication of staff efforts, share staff expertise and information, promote intergovernmental coordination, and facilitate public review. Under the guidelines of the MOU, the Energy Commission developed the Preliminary Staff Assessment (PSA), which was published on December 9, 2008. The PSA was available for a 30-day public comment period. This document represents the Energy Commission's FSA, as well as the BLM's DEIS.

In support of its certification process, the Energy Commission staff has the responsibility to complete an independent assessment of the project's engineering design and its potential effects on the environment, the public's health and safety, and whether the project conforms with all applicable laws, ordinances, regulations and standards (LORS). The staff also recommends measures to mitigate potential significant adverse environmental effects and conditions of certification for construction, operation and eventual closure of the project, if approved by the Energy Commission. This FSA is not the decision document for these proceedings nor does it contain findings of the Energy Commission related to environmental impacts or the project's compliance with local/state/federal legal requirements. The FSA/DEIS will serve as staff's testimony in evidentiary hearings to be held by the Committee of two Commissioners who are overseeing this case. The Committee will hold evidentiary hearings and will consider the recommendations presented by staff, the applicant, all parties, government agencies, and the public prior to proposing its decision. The Energy Commission will make a final decision, including findings, after the Committee's publication of its proposed decision.

In support of its Right-of-Way and CDCA Plan Amendment processes, the BLM has the responsibility to evaluate the environmental impacts of the proposed action, the No Action alternative, and other alternative actions that may meet the purpose and need for the proposed project. The FSA/DEIS is available for a 90-day public comment period. Following completion of that period, BLM will review and develop responses to comments provided by the public and other agencies. The responses to the comments, and other information identified during this period, will be incorporated into a Final EIS (FEIS), which will make a recommendation regarding the preferred alternative. A Notice of Availability (NOA) of the FEIS will be published when the FEIS becomes available for public review. The FEIS will be available for public review for 30-days before the BLM issues a Record of Decision (ROD). The decision regarding the ROW grant is appealable to the Interior Board of Land Appeals upon issuance of the ROD.

PROJECT LOCATION AND DESCRIPTION

The applicant has proposed to locate the ISEGS project in the Mojave Desert, near the Nevada border in San Bernardino County, California, on land administered by the Bureau of Land Management (BLM). The proposed project site is located 4.5 miles southwest of Primm, Nevada and 0.5 mile west of the Primm Valley Golf Club which is

located just west of the Ivanpah Dry Lake. Access to site is from the Yates Well Road Interchange on I-15 via Colosseum Road.

The proposed ISEGS project is a solar concentrating thermal power plant, which is comprised of fields of heliostat mirrors focusing solar energy on boilers located on centralized power towers. Each mirror will track the sun throughout the day and reflect the solar energy to the receiver boiler. In each plant, one Rankine-cycle reheat steam turbine receives live steam from the solar boilers and reheats steam from the solar reheater. The solar field and power generation equipment would be put into operation each morning after sunrise and insolation build-up, and shut down in the evening when insolation drops. Electricity would be produced by each plant's solar receiver boiler and the steam turbine generator.

The applicant proposes to develop the ISEGS project in three phases which are designed to generate a total of 400 MW of electricity. The first two phases of the project, Ivanpah 1 and 2, are designed to provide 100 MW of electricity and would occupy approximately 914 acres and 921 acres respectively; the 200 MW phase, Ivanpah 3, would require occupy approximately 1,836 acres. All three phases would be share an administration building, an operation and maintenance building, and substation which would be located in between Ivanpah 1 and 2 requiring an additional area of approximately 25 acres. Linear facilities, including re-routing of Colosseum Road, and natural gas, water, and transmission lines would require an additional 56 acres. Another 321 acres is needed for construction staging activities. ISEGS total project footprint amounts to approximately 4,073 acres (approximately 6.4 square miles).

SOLAR POWER PLANT EQUIPMENT AND FACILITIES

HELIOSTATS

Each heliostat would be configured with two mirrors hung in the portrait position. Each mirror would be 7.2 feet high by 10.5 feet wide, providing a reflective surface of 75.6 square feet (7.04 m²) per mirror or 14.08 m² per heliostat (See **Project Description Figure 4 – Double Mirror Heliostat**). The heliostats would be connected with communication cables strung aboveground between each heliostat. The communications cables would transmit signals from a computer-programmed aiming control system that would direct the movement of each heliostat to track the movement of the sun (CH2ML2009f). The number of heliostats described under the Optimized Project Design (55,000 each for Ivanpah 1 and 2, and 104,000 for Ivanpah 3) represents the maximum number of heliostats that would be constructed; however, all of them may not be constructed.

SOLAR POWER TOWERS

The site design would include one power tower for each Ivanpah 1 and 2 and five towers within Ivanpah 3, with heights of 459 feet each. The central power tower of Ivanpah 3 would include the power block with one steam turbine-generator (STG) supplied superheated steam by the five power tower boilers. Steam from the four quadrant solar power tower boilers would be conveyed by above-ground pipeline.

Each solar power tower would be a metal structure designed specifically to support the boiler and efficiently move high-quality steam through a STG at its base. The power tower support structure would be about 120 meters high (approximately 393 feet). The receiving boiler (which sits on top of the support structure) would be 20 meters tall (approximately 66 feet) including the added height for upper steam drum and protective ceramic insulation panels (See **Project Description Figure 5 – Power Block and Power Tower Elevations**). Additionally, a Federal Aviation Administration (FAA)-required lighting and a lightning pole would extend above the top of the towers approximately 10 feet. The height of the power towers allows heliostats from significant distances to accurately reflect sunlight to the receiving boiler. The receiving boiler is a traditional high-efficiency boiler positioned on top of the power tower. The boiler converts the concentrated energy of the sun reflected from the heliostats into superheated steam. The boiler's tubes are coated with a material that maximizes energy absorbance. The boiler has steam generation, superheating, and reheating sections and is designed to generate superheated steam at a pressure of 160 bars and a temperature of 550 degrees Celsius (°C).

POWER BLOCK

Each solar power plant (Ivanpah 1, 2 and 3) would have a power block located in the approximate center of the power plant area. The power block would include a solar power tower, a receiver boiler, a steam turbine-generator (STG) set, air-cooled condensers, and other auxiliary systems. Each of the three solar-thermal plants would include the following equipment and facilities in their power block:

- natural gas-fired start-up boiler;
- the air emission control system for the combustion of natural gas in the start-up boiler;
- steam turbine generator;
- air-cooled condenser;
- auxiliary equipment (feed water heaters, a de-aerator, an emergency diesel generator, diesel fire pump, etc.);
- a raw water tank with a 250,000 gallon capacity, to supply water for plant use and fire fighting; and a
- water treatment system.

RELATED EQUIPMENT AND FACILITIES

NATURAL GAS PIPELINE

The solar heat used in the boiler (steam) process would be supplemented by burning natural gas to heat a partial load steam boiler when solar conditions are insufficient. Each power plant within the project would include a small package, natural gas-fired start-up boiler to provide additional heat for plant start-up and during temporary cloud cover. Natural gas would be supplied to the site through a new, proposed six-mile long distribution pipeline ranging from 4 to 6 inches in diameter. From the Kern River Gas Transmission pipeline, the pipeline would extend 0.5 miles south to the northern edge of

Ivanpah 3. The line would then run east along the northern edge, and then south along the eastern edge, of Ivanpah 3 to a metering station near the southeast corner of Ivanpah 3. From there, a supply line would extend northwest into the Ivanpah 3 power block. The main pipeline would continue along the eastern edge of Ivanpah 2 to another metering station at its southeastern corner. Again, a branch supply line will extend northwestwards into the center of the Ivanpah 2 power block. From that station, the pipeline would follow the paved access road from Colosseum Road past the administration/warehouse building to the Ivanpah 1 power block. A new tap metering station of approximately 100 feet by 150 feet in area would be located at the Kern River Gas Transmission Line.

AIR POLLUTION CONTROL

Air pollution emissions from the combustion of natural gas in the start-up boiler would be controlled using best available control technology. Each boiler would be equipped with low-Nitrogen Oxide (NOx) burners for NOx control. Carbon Monoxide (CO) would be controlled using good combustion practices such as burner and control adjustment based on oxygen continuous monitoring, operator training and proper maintenance. Particulate and Volatile Organic Compounds (VOC) emissions will be minimized through the use of natural gas as the fuel.

WATER SUPPLY AND DISCHARGE

The facilities would require a water source to support operations, including process water consisting of make-up water for the steam system and wash water for the heliostats, and potable water for domestic water needs. Groundwater would be supplied from one of two wells that would be constructed at the northwest corner of Ivanpah 1, just outside the perimeter fence but within the construction logistics area. Each of the three power blocks would be connected to the groundwater wells by underground water pipelines. The applicant estimates project water consumption would not exceed a maximum of 100 acre-feet per year for all three solar plants combined, which would primarily be used to provide water for washing heliostats (mirrors) and to replace boiler feed water blow-down.

The quality of groundwater would be improved using a treatment system for meeting the requirements of the boiler make-up and mirror wash water. Water treatment equipment would consist of activated carbon filters, de-ionization media, and a mixed-bed polisher. Each power plant would have a 250,000 gallon raw water storage tank. Approximately 100,000 gallons would be usable for plant process needs and 150,000 gallons would be reserved for fire protection. Demineralized water would be stored in a 25,000-gallon demineralized water storage tank. Boiler feedwater make-up water would be stored in another 25,000-gallon tank.

FIRE PROTECTION

The fire protection system would be designed to protect personnel and limit property loss and plant downtime in the event of a fire. The primary source of fire protection water would be the 250,000 gallon raw water storage tank to be located in each power block. Approximately 100,000 gallons would be usable for plant process needs and 150,000 gallons would be reserved for fire protection. All fire protection systems would

be focused on the power blocks, administration/warehouse building, and other areas of active operations. The project would not include any specific facilities to address potential wild fires.

ACCESS ROADS AND MAINTENANCE PATHS

Access to the project site would occur from the Yates Well Road exit from I-15 to Colosseum Road. Colosseum Road, currently a dirt road, would be paved to a 30-foot wide, two lane road for a distance of 1.9 miles from the Primm Valley Golf Club to the facility entrance. Because the current route of Colosseum Road would be incorporated into the Ivanpah 2 plant site, the road would be re-routed around the southern end of Ivanpah 2 before re-joining the current road to the west of the proposed facility.

Within the heliostat fields, maintenance paths would be established concentrically around the power blocks to provide access for heliostat washing and maintenance. The paths would be established between every other row of heliostats. An additional maintenance path would be established on the inside perimeter of the boundary fence. Within each unit, a diagonal dirt road would be established to provide access to the concentric maintenance paths and the power blocks.

Off-road, recreational vehicle trails currently authorized by BLM which run through the proposed project site would be re-located outside of the project boundary fence.

CONSTRUCTION LOGISTICS AREA, SUBSTATION, AND ADMINISTRATIVE COMPLEX

The applicant proposes using a temporary construction logistics area for staging contractor equipment and trailers, assembly yards, storage of materials, equipment laydown and wash area, construction personnel parking, and assembly areas for heliostats. The construction logistics area would be located between Ivanpah 1 and 2 and would comprise approximately 377.5 acres. Following project construction, the majority of the area would undergo site closure, rehabilitation, and revegetation as described in the Draft Closure, Revegetation, and Rehabilitation Plan (CH2ML2009q).

FENCING

The project area would be surrounded by security fence, which would be constructed of 8-foot tall galvanized steel chain-link, with barbed wire at the top as required. The security fence would surround the outer perimeter of each power plant, the substation, and the administrative complex. Tortoise barrier fence would also be installed in accordance with the Recommended Specifications for Desert Tortoise Exclusion Fencing (USFWS 2005). The tortoise fence would consist of 1-inch horizontal by 2-inch vertical galvanized welded wire. The fence would be installed to a depth of 12 inches, and would extend 22 to 24 inches above the ground surface and integrated with the security fence.

In addition to use of the proposed right-of-way area, the applicant proposes some project-related activities to occur outside of the project fence, on land not included within the proposed right-of-way area. These would include inspection and maintenance of the fence, underground utility repairs, maintenance of drainage systems, and possible installation of new stormwater drainage systems. In addition to these activities, a

roadway would need to be maintained outside of the project fence to allow vehicle and equipment access for these activities.

TRANSMISSION SYSTEM INTERCONNECTION AND UPGRADES

The ISEGS project would deliver power from Ivanpah 1, 2 and 3 via three separate 115-kilovolt (kV) transmission generation tie lines to a new Ivanpah substation that would be owned and operated by Southern California Edison and located in the common construction logistics area between Ivanpah 1 and 2. The new Ivanpah substation would be about 850 feet by 850 feet and located on a little over 16 acres. Each of the power plants would have a switchyard with a step-up transformer to increase the 13.8 kV generator output voltage to 115 kV. Each switchyard would connect to SCE's Ivanpah Substation. The existing Eldorado-Baker-Cool Water-Dunn Siding-Mountain Pass 115-kV line would loop in and out through the newly built Ivanpah Substation to interconnect the project to the SCE transmission grid.

In order to accommodate the total anticipated 1,400 MW load generation by ISEGS and five other planned renewable energy generation projects in the region, the California Independent System Operator (California ISO) has identified approximately 36 miles of transmission line within California and Nevada that would need to be upgraded from 115 kV to 220 kV. SCE is in the process of developing a project to upgrade the transmission system, which includes removing the existing 115-kV transmission lines and constructing a new double-circuit 220-kV transmission line between the existing Eldorado Substation in Nevada and the proposed new Ivanpah Substation in California. SCE has filed an application for a Certificate of Public Convenience and Necessity from the California Public Utilities Commission (CPUC) for the transmission line upgrade. They have also filed an application for a ROW from the BLM. The CPUC will serve as the lead agency for CEQA compliance for the approximately five-mile portion of the transmission line work within California. BLM will serve as the lead agency for National Environmental Policy Act compliance.

TELECOMMUNICATIONS FACILITIES

The proposed Ivanpah Substation would also require that new telecommunication infrastructure be installed to provide protective relay circuit and a supervisory control and data acquisition (SCADA) circuit, together with data and telephone services. The telecommunication path from Ivanpah Substation to the local carrier facility interface at Mountain Pass area consists of approximately eight miles of fiber optic cable to be installed overhead on existing poles and through new underground conduits to be constructed in the substation and telecom carrier interface point. The fiber cable would be installed on the existing 12-kV distribution line poles.

PROJECT DESIGN AND MANAGEMENT APPROACH

STORMWATER MANAGEMENT APPROACH

The proposed project site is located on an alluvial fan that acts as an active stormwater conveyance between the Clark Mountain Range to the west and the Ivanpah Dry Lake to the east. The applicant's proposed stormwater design and management system is a Low-Impact Development (LID) design concept which attempts to minimize disruption to

natural stormwater flow pathways. The elements of the applicant's design approach include minimizing the areas of direct removal of vegetation, minimizing the areas of grading and leveling, and minimizing the amount of active management of stormwater in engineered channels, ponds, and culverts.

PROJECT CONSTRUCTION

The applicant anticipates ISEGS construction would be performed in the following order: 1) the Construction Logistics Area; 2) Ivanpah 1 (the southernmost site) and other shared facilities; 3) Ivanpah 2 (the middle site); and 4) Ivanpah 3 (the 200-MW plant on the north). However, it is possible that the order of construction may change. The shared facilities will be constructed in connection with the first plant construction, whether it is Ivanpah 1, 2, or 3. Prior to construction, geotechnical testing, heliostat installation tests, and heliostat load tests would be performed in each of the three units. Construction is planned to take place over approximately 48 months, with the applicant's desire that it could begin during the first quarter of 2010 and be completed during the fourth quarter 2013.

Project construction would be performed in accordance with plans and mitigation measures that would assure the project conforms with applicable LORS and would avoid significant adverse impacts. These plans that are to be developed by the applicant, for which some have already been prepared in draft and reviewed by staff to support this environmental analysis, and the necessary mitigation measures, are specified in the Conditions of Certification as appropriate of each technical area of this FSA/DEIS. Of the plans already prepared in draft by the applicant, those that have contributed most significantly to define the proposed plan of development including construction procedures are as follows:

- Draft Contractor Health and Safety Standards (CH2ML 2009g)
- Administrative Draft ISEGS Construction Stormwater Pollution Prevention Plan (CH2ML 2009d)
- Preliminary Draft Plan, Revision 2, Drainage, Erosion, and Sediment Control Plan (CH2ML 2009e)
- Draft Raven Management Plan, ISEGS (CH2ML 2008v)
- Draft Desert Tortoise Translocation/Relocation Plan for ISEGS (CH2ML 2009c)
- Application for Incidental Take Permit Under Section 2081 of the Fish and Game Code (CH2ML2009i)
- Draft Biological Assessment for the ISEGS Project (CH2ML 2008u)
- Streambed Alteration Agreement Application (CH2ML 2009j)
- Weed Management Plan for ISEGS, Eastern Mojave Desert (CH2ML 2008o)

FACILITY OPERATION AND MAINTENANCE

The proposed project would be designed for an operational life of 50 years. During this period, project operations would be supported by a variety of operational, maintenance, and monitoring activities. Within the power blocks, operations would include transmission of water and natural gas into the power block, and operation of the natural

gas-fired start-up boiler, the air emission control system for the combustion of natural gas in the start-up boiler, a steam turbine generator, an air-cooled condenser, and auxiliary equipment (feed water heaters, a de-aerator, and an emergency diesel generator, diesel fire pump).

Within the heliostat fields, operations would include routine washing of mirrors on a rotating basis, every two weeks. Washing would utilize water accessed from the groundwater supply wells, following treatment in the water treatment system. Washing would be done using a truck-mounted pressure washer. Maintenance would also include clipping of vegetation that could interfere with mirror movement to a height of 12 – 18 inches, management of weeds as specified in the Applicant's Weed Management Plan (CH2ML2008o), and use of soil binder and weighting agents to minimize dust accumulation on the mirrors and fugitive dust as could occur by wind or vehicle traffic.

WASTE MANAGEMENT

Non-hazardous solid wastes generated during construction would include approximately 280 tons of scrap wood, concrete, steel/metal, paper, glass, scrap metals and plastic waste (BSE2007a, § 5.14.4.1.1). All non-hazardous wastes would be recycled to the extent possible and non-recyclable wastes would be collected by a licensed hauler and disposed in a Class III solid waste disposal facility. Hazardous wastes would be recycled to the extent possible and disposed in either a Class I or II waste facility as appropriate. All operational wastes produced at ISEGS would be properly collected, treated (if necessary), and disposed of at either a Class I or II waste facility as appropriate. Wastes include process and sanitary wastewater, nonhazardous waste and hazardous waste, both liquid and solid. A septic system for sanitary wastewater would be located at the administration building/operations and maintenance area, located between Ivanpah 1 and 2. Portable toilets would be placed in the power block areas of each the three solar facilities and pumped by a sanitary service provider. Process wastewater from all equipment, including the boilers and water treatment equipment would be recycled.

HAZARDOUS WASTE MANAGEMENT

Hazardous materials used during facility construction and operations would include paints, epoxies, grease, transformer oil, and caustic electrolytes (battery fluid). Several methods would be used to properly manage and dispose of hazardous materials and wastes. Waste lubricating oil would be recovered and recycled by a waste oil recycling contractor. Chemicals would be stored in appropriate chemical storage facilities. Bulk chemicals would be stored in large storage tanks, while most other chemicals would be stored in smaller returnable delivery containers. All chemical storage areas would be designed to contain leaks and spills in concrete containment areas.

PROJECT DECOMMISSIONING

Following the operational life, estimated at 50 years, the project owner would perform site closure activities to meet federal and state requirements for the rehabilitation and revegetation of the project site after decommissioning. The procedures to be used for project decommissioning and restoration are defined in the Applicant's Draft Closure, Revegetation, and Rehabilitation Plan (CH2ML2009q). Under this plan, all aboveground structures and facilities would be removed to a depth of three feet below

grade, and removed offsite for recycling or disposal. Concrete, piping, and other materials existing below three feet in depth would be left in place. Areas that had been graded would be restored to original contours. Succulent plant species would be salvaged prior to construction, transplanted into windrows, and maintained for later transplanting following decommissioning. Shrubs and other plant species would be revegetated by the collection of seeds, and re-seeding following decommissioning. Decommissioning would be subject to many of the same environmental protection plans as are required for construction.

PUBLIC AND AGENCY COORDINATION

Both the Energy Commission's CEQA-equivalent process and the BLM's NEPA process provide opportunities for the public and other agencies to participate and consult in the scoping of the environmental analysis, and in the evaluation of the technical analyses and conclusions of that analysis. The following subsections describe the status of these outreach efforts.

Agency Coordination

The Energy Commission certification is in lieu of any permit required by state, regional, or local agencies and by federal agencies to the extent permitted by federal law (Pub. Resources Code, § 25500). However, both the Commission and BLM typically seek comments from and work closely with other regulatory agencies that administer LORS that may be applicable to the proposed project. The following paragraphs describe the agency coordination that has occurred through this joint SA/EIS process.

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers (USACE) has jurisdiction to protect water quality and wetland resources under Section 404 of the Clean Water Act. Under that authority, USACE reviews proposed projects to determine whether they may impact such resources, and/or be subject to a Section 404 permit. Throughout the FSA/DEIS process, the Energy Commission, BLM, and the applicant have provided information to the USACE to assist them in making a determination regarding their jurisdiction and need for a Section 404 permit. The USACE rendered a final opinion on May 28, 2009 concluding that the project does not affect waters of the U.S., and thus does not require such a permit.

National Park Service

The National Park Service manages the Mojave National Preserve (MNP), which is located near the proposed project area. Because of the proximity of the MNP, the Park Service has been invited to participate in scoping meetings and public workshops, and has been provided the opportunity review and provide comment on the PSA and FSA/DEIS.

U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (USFWS) has jurisdiction to protect threatened and endangered species under the Endangered Species Act (ESA). Formal consultation with the USFWS under Section 7 of the ESA is required for any federal action that may

adversely affect a federally-listed species. The desert tortoise (*Gopherus agassizii*), which occurs in the proposed project area, is a federally-listed threatened species, and therefore formal consultation with the USFWS is required. This consultation has been initiated through the preparation and submittal of a Biological Assessment (BA) which describes the proposed project to the USFWS. Following review of the BA, the USFWS is expected to issue a Biological Opinion (BO) which will specify mitigation measures that must be implemented for the protection of the desert tortoise.

State Water Resources Control Board/Regional Water Quality Control Board

The Lahontan Regional Water Quality Control Board (RWQCB) has the authority to protect both surface water and groundwater resources at the proposed project location. Throughout the FSA/DEIS process, the Energy Commission, BLM, and the applicant have invited the RWQCB to participate in public scoping and workshops, and have provided information to assist the agency in evaluating the potential impacts and permitting requirements of the proposed project. The RWQCB has responded by providing comments that have been evaluated and incorporated into the FSA/DEIS analysis. The agency has also made a determination that the proposed project would impact waters of the state, and has specified conditions to satisfy requirements of a dredge and fill permit/waste discharge requirements. These requirements have been included as a recommended Condition of Certification/Mitigation Measure in the **Soil and Water** section.

California Department of Fish and Game

The California Department of Fish and Game (CDFG) has the authority to protect water resources of the state through regulation of modifications to streambeds, under Section 1602 of the Fish and Game Code. The Energy Commission, BLM, and the applicant have provided information to CDFG to assist in their determination of the impacts to streambeds, and identification of permit and mitigation requirements. The applicant filed a Streambed Alteration Agreement with CDFG on June 2, 2009. The requirements of the Streambed Alteration Agreement will be included as a recommended Condition of Certification/Mitigation Measure.

CDFG also has the authority to regulate potential impacts to species that are protected under the California Endangered Species Act (CESA). On May 22, 2009, the applicant filed an application for authorization for incidental take of the desert tortoise under Section 2081(b) of the CESA. The requirements of the Incidental Take Permit have been included as a recommended Condition of Certification/Mitigation Measure.

County of San Bernardino

On March 18, 2008, the BLM California Desert District entered into an MOU with the County of San Bernardino to coordinate environmental reviews for renewable energy projects on public land within the County. Under this MOU, BLM invites the County to become a cooperating agency for EISs, and provides opportunities for County staff to review and participate in technical discussions and analyses. For the proposed project, the County has elected to become a cooperating agency. BLM continues to provide the County with project-related documentation for their review and evaluation, and the County has provided guidance for protection of groundwater resources which has been incorporated into the **Soil and Water** Section of this document.

Public Coordination

Both the Energy Commission's CEQA-equivalent process and the BLM's NEPA process provide opportunities for public participation in the scoping of the environmental analysis, and in the evaluation of the technical analyses and conclusions of that analysis. For the Energy Commission, this outreach program is primarily facilitated by the Public Adviser's Office (PAO). As part of the coordination of the environmental review process required under the Energy Commission/BLM California Desert District MOU, the agencies have jointly held public meetings and workshops which accomplish the public coordination objectives of both agencies. This is an ongoing process that to date has involved the following efforts.

Libraries

The AFC was sent to the main county libraries in San Bernardino, Barstow, Fresno, and Eureka; the main branches of the San Diego and San Francisco public libraries; the University Research Library at UCLA; the California State Library, and the Energy Commission's library in Sacramento.

Outreach Efforts

The PAO's public outreach is an integral part of the Energy Commission's AFC review process. The PAO reviewed information provided by the applicant and also conducted its own outreach efforts to identify and locate local elected and certain appointed officials, as well as "sensitive receptors" (including schools, community, cultural and health facilities and daycare and senior-care centers, as well as environmental and ethnic organizations). There were not any sensitive receptors identified within a six-mile radius of the proposed site for the project.

Notices for workshops and hearings have been and will continue to be distributed to those agencies, individuals, and businesses that are currently on or request to be placed on the project's mailing list. Notices were distributed for the Informational Hearing and Site Visit, which was conducted on January 4, 2008, in Primm, Nevada. An additional Informational Hearing was held, also in Primm, on January 25, 2008.

Coincident with the PAO's outreach efforts, BLM solicited interested members of the public and agencies through the NEPA scoping process. BLM published a Notice of Intent to develop the EIS and amend the CDCA Plan in the Federal Register, Vol. 72, No. 214, page 62671, on November 6, 2007. The Energy Commission's January 4, 2008 Informational Hearing also acted as the Public Scoping meetings for the EIS, as required by NEPA. On January 9, 2009, BLM published notice of an extension of the public scoping period, and plans to hold an additional joint public scoping meeting on January 25, 2008.

Throughout the process, the Energy Commission and BLM have held additional joint Issue Resolution workshops which were announced and made available to the public. These workshops were held on June 23, 2008 in Primm, Nevada, and on July 31, 2009 in Sacramento, California. A PSA Workshop was held in Primm, Nevada on January 9, 2009. The Energy Commission has also continued to accept and consider public comments, and has granted petitions to intervene to six interested groups including

Defenders of Wildlife, Sierra Club, Basin and Range Watch, and Center for Biological Diversity (June 2, 2009), California Native Plant Society, and Western Watersheds.

Those agencies and individuals that have provided comments concerning the project have been considered in staff's analysis. This FSA/DEIS provides agencies and the public with an opportunity to review the Energy Commission staff's analysis of the proposed project. Comments received on this FSA/DEIS will be taken into consideration in preparing the subsequent project documents, including the FEIS.

The AFC, the PSA, this FSA/DEIS, and other project documents are located on the Energy Commission's website at http://www.energy.ca.gov/sitingcases/ivanpah/index.html.

ENVIRONMENTAL JUSTICE

Executive Order 12898, "Federal Actions to address Environmental Justice in Minority Populations and Low-Income Populations," focuses federal attention on the environment and human health conditions of minority communities and calls on federal agencies to achieve environmental justice as part of this mission. The order requires the USEPA and all other federal agencies (as well as state agencies receiving federal funds) to develop strategies to address this issue. The agencies are required to identify and address any disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and/or low-income populations.

The purpose of the screening analysis is to determine whether a minority or low-income population exists within the potentially affected area of the proposed site. For all siting cases, Energy Commission staff conducts an environmental justice screening analysis in accordance with the "Final Guidance for Incorporating Environmental Justice Concerns in USEPA's National Environmental Policy Act (NEPA) Compliance Analysis" dated April 1998, which defined minority populations as either:

- the minority population of the affected area is greater than 50% of the affected area's general population; or
- the minority population percentage of the area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis.

California Statute, Section 65040.12 (c) of the Government Code, defines "environmental justice" to mean "fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies." In light of the progress made by federal environmental agencies on environmental justice, the Energy Commission has examined federal guidelines pursuant to its desire to follow environmental justice principles for the environmental review of this project.

The steps recommended by these guidance documents to assure compliance with the Executive Order are: (1) outreach and involvement; (2) a screening-level analysis to determine the existence of a minority or low-income population; and (3) if warranted, a

detailed examination of the distribution of impacts on segments of the population. Though the Federal Executive Order and guidance are not binding on the Energy Commission, staff finds these recommendations helpful for implementing this environmental justice analysis. Staff has followed each of the above steps for the following 11 sections in the FSA/DEIS: Air Quality, Hazardous Materials, Land Use, Noise, Public Health and Safety, Socioeconomics and Environmental Justice, Soils and Water, Traffic and Transportation, Transmission Line Safety/Nuisance, Visual Resources, and Waste Management.

According to the Census 2000 data there were 36 people within six miles of the proposed project site which resided within California. With 10 people (27.8 percent) of the total California residents classified as minority (see **SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE FIGURE 1**), no census blocks within a six-mile radius of the proposed ISEGS site contain minority populations greater than 50 percent. The 2000 Census block data did not identify any California residents living below the designated poverty level within a six-mile radius of the project site.

No minority communities or low income communities are located within or adjacent to the proposed project areas. The proposed action would not impact distinct Native American cultural practices or result in disproportionately high or adverse human health or environmental effects on minority communities.

STAFF'S ASSESSMENT

Each technical area section of the FSA/DEIS contains a discussion of the project setting, impacts, and where appropriate, mitigation measures and conditions of certification. The FSA/DEIS includes the staff's assessment of:

- the environmental setting of the proposal;
- impacts on public health and safety, and measures proposed to mitigate these impacts;
- environmental impacts, and measures proposed to mitigate these impacts;
- the engineering design of the proposed facility, and engineering measures proposed to ensure the project can be constructed and operated safely and reliably;
- project closure;
- project alternatives;
- compliance of the project with all applicable laws, ordinances, regulations and standards (LORS) during construction and operation;
- environmental justice for minority and low income populations, when appropriate; and
- proposed mitigation measures/conditions of certification.

SUMMARY OF PROJECT RELATED IMPACTS

The analysis of project-related direct and indirect impacts within this FSA/DEIS shows that, with the exception of Biological Resources and Visual Resources, the ISEGS project's potential impacts would be mitigated to a less than significant level. With respect to Biological Resources, the staff believes that the impact of the project on special-status plant species is a significant cumulative impact that cannot be reduced to less-than-significant levels. With respect to Visual Resources, staff believes the direct impacts to Visual Resources are significant and unmitigable. Staff's analysis has also identified cumulative impacts which are significant and unmitigable in the areas of Biological Resources (i.e. special-status plant species), Land Use, Traffic and Transportation, and Visual Resources. Staff's analysis also shows that the ISEGS project would not comply with all of the applicable laws, ordinances, regulations, and standards (LORS) that pertain to the San Bernardino County General Plan that are considered in the areas of Land Use and Visual Resources.

The following table summarizes the potential environmental impacts and LORS compliance for each technical section. Following the table is a discussion of the conclusions with respect to all resource areas. Please see the appropriate section of this document for more detailed discussions of the environmental settings, impacts, and proposed mitigation measures and Conditions of Certification for each resource area.

Technical Area	Complies with LORS	Direct & Indirect Impacts Fully Mitigated	Cumulative Impacts Fully Mitigated
Air Quality	Yes	Yes	Yes
Biological Resources	Yes	**No**	**No**
Cultural Resources and Native American Values	Yes	Yes	Yes
Facility Design	Yes	Yes	Yes
Geology, Paleontology, and Minerals	Yes	Yes	Yes
Hazardous Materials Management	Yes	Yes	Yes
Land Use	**No**	Yes	**No**
Livestock Grazing	Yes	Yes	Yes
Noise and Vibration	Yes	Yes	Yes
Public Health and Safety	Yes	Yes	Yes
Power Plant Efficiency	Not Applicable	Not Applicable	Yes
Power Plant Reliability	Not Applicable	Not Applicable	Yes
Recreation	Yes	Yes	Yes
Socioeconomic and Environmental Justice	Yes	Yes	Yes
Soil and Water Resources	Yes	Yes	Yes
Traffic and Transportation	Yes	Yes	**No**
Transmission Line Safety/Nuisance	Yes	Yes	Yes
Transmission System Engineering	Yes	Yes	Yes
Visual Resources	**No**	**No**	**No**
Waste Management	Yes	Yes	Yes
Wild Horses and Burros	Yes	Yes	Yes
Worker Safety and Fire Protection	Yes	Yes	Yes

AIR QUALITY

With respect to potential impacts on air quality, the Staff has made the following conclusions about the proposed project:

- The project would not have the potential to exceed PSD emission levels during direct source operation and the facility is not considered a major stationary source with potential to cause significant NEPA air quality impacts. However, without adequate fugitive dust mitigation, the project would have the potential to exceed the General Conformity PM10 applicability threshold during construction and operation, and could cause potential localized exceedances of the PM10 NAAQS during construction. This potential exceedance of federal air quality standards would be

considered a direct, adverse significant impact under NEPA. This impact would be less than significant with the proposed construction and operation mitigation measures controlling fugitive dust. Recommended Conditions of Certification **AQ-SC1** through **AQ-SC4**, for construction, and **AQ-SC7**, for operation, will mitigate these potentially significant NEPA impacts.

- The project would comply with applicable District Rules and Regulations, including New Source Review requirements, and staff recommends the inclusion of the Districts FDOC conditions as Conditions of Certification **AQ-1** through **AQ-39** and the addition of staff recommended Condition of Certification **AQ-SC9** to ensure that the emergency engines meet applicable model year emission standards.
- The project's construction activities would likely contribution to significant CEQA adverse PM10 and ozone impacts. Staff recommends **AQ-SC1** to **AQ-SC5** to mitigate the potential impacts.
- The project's operation would not cause new violations of any NO_2, SO_2, PM2.5 or CO ambient air quality standards, and therefore, the project direct operational NOx, SOx, PM2.5 and CO emission impacts are not CEQA significant.
- The project's direct and indirect, or secondary emissions contribution to existing violations of the ozone and PM10 ambient air quality standards are likely CEQA significant if unmitigated. Therefore, staff recommends **AQ-SC6** to mitigate the onsite maintenance vehicle emissions and **AQ-SC7** to mitigate the operating fugitive dust emissions to ensure that the potential ozone and PM10 CEQA impacts are mitigated to less than significant over the life of the project.
- Staff recommends **AQ-SC10** to formalize the applicant's stipulation that "Heat input from natural gas will not exceed 5 percent of the heat input from the sun, on an annual basis", which also generally corresponds the amount of operation included in the applicant's air dispersion modeling impact analysis.
- The project would be consistent with the requirements of SB 1368 and the Emission Performance Standard for greenhouse gases (see **Appendix Air-1**).

BIOLOGY

The Ivanpah Solar Electric Generating System (ISEGS) project would have major impacts to the biological resources of the Ivanpah Valley, substantially affecting many sensitive plant and wildlife species and eliminating a broad expanse of relatively undisturbed Mojave Desert habitat. Approximately 4,073 acres of occupied desert tortoise habitat would be permanently lost and a minimum of 25 desert tortoises would need to be translocated west of the ISEGS project site. These actions would require state and federal endangered species "take" authorization. In addition to direct loss of habitat, the project would fragment and degrade adjacent habitat, and could promote the spread of invasive non-native plants and desert tortoise predators such as ravens. These impacts would directly and adversely affect habitat for a threatened species (the desert tortoise), and would likely be highly controversial. Based on these factors, the proposed project would result in impacts that would be significant with respect to NEPA significance criteria in 40 CFR 1508.27.

Other special-status wildlife species potentially impacted by the project because of loss of breeding and/or foraging habitat include burrowing owl, loggerhead shrike, Crissal thrasher, golden eagle, and American badger. The project would also affect approximately 2,000 ephemeral drainage segments on the ISEGS site, potentially resulting in direct or indirect impacts to the wildlife functions and values provided by 198 acres of waters of the state.

The ISEGS project site supports a diverse flora including numerous special-status plant species. Eight special-status plant species, only one of which is considered sensitive by the Bureau of Land Management (BLM), would be directly impacted by construction of ISEGS. Energy Commission staff consider impacts to five of these (Mojave milkweed, desert pincushion, nine-awned pappus grass, Parish's club-cholla, and Rusby's desert-mallow) to be significant according to California Environmental Quality Act (CEQA) guidelines because the project would eliminate a substantial portion of their documented occurrences in the state. Depending on the degree of avoidance that the applicant can achieve, Energy Commission staff's proposed avoidance and minimization measures may reduce impacts to three of these species (desert pincushion, nine-awned pappus grass, and Parish's club-cholla) to less-than-significant levels. However, impacts to Mojave milkweed and Rusby's desert-mallow would remain significant in a CEQA context even after implementation of the special-status plant impact avoidance and minimization measures described in Energy Commission staff's proposed conditions of certification.

The BLM and Energy Commission staffs (hereafter jointly referred to as staff unless otherwise noted) have concluded that without mitigation the ISEGS project would be a substantial contributor to the cumulatively significant loss of Ivanpah Valley's biological resources, including the threatened desert tortoise and other special-status species. Impact avoidance and minimization measures described in staff's analysis and included in the conditions of certification would help reduce impacts to sensitive biological resources. However, compensatory measures are necessary to offset project-related losses, and to assure compliance with state and federal laws such as the federal and state endangered species acts and regulations protecting waters of the state. In the case of special-status plants, impacts would remain significant according to CEQA standards despite compensatory mitigation for other biological resources.

Compensatory mitigation for desert tortoise typically involves balancing the acreage of habitat loss with acquisition of lands that would be initially improved, protected and maintained to support healthy populations of desert tortoise. The compensation is achieved by improving the carrying capacity of the acquired acreage (for example, by habitat restoration, fencing, road closures) so that more desert tortoise will survive and reproduce on these lands, thus offsetting over time the decrease in numbers of tortoise resulting from the habitat loss.

To fully offset impacts, the California Endangered Species Act (CESA) requires a full mitigation finding, which usually contemplates a mitigation ratio greater than 1:1 for compensation lands (i.e., acquisition or preservation of one acre of compensation lands for every acre lost). On past energy projects considered by the Energy Commission, the California Department of Fish and Game (CDFG) has required a 3:1 ratio to meet the CESA full mitigation standard for good quality habitat such as that found at the ISEGS

project site. The higher ratio reflects the limits to increases in carrying capacity that can be achieved on the acquired lands, even with implementation of all possible protection and enhancement measures. The BLM applies a 1:1 compensation ratio because they generally pursue desert tortoise recovery goals not through parcel by parcel acquisitions and management, but rather through implementation of region-wide management plans and land use planning as described in the Northern and Eastern Mojave (NEMO) Desert Management Plan (BLM 2002) and the Desert Tortoise Recovery Plan (USFWS 1994).

Energy Commission staff proposes compensation to achieve full mitigation at a 3:1 ratio for loss of desert tortoise habitat and for other CEQA significant impacts for the BrightSource ISEGS project. This compensation ratio is consistent with past Energy Commission projects and with Incidental Take Permits (ITPs) issued by CDFG in the region. The 3:1 ratio has also been proposed by the applicant (Ellison, Schneider & Harris LLP 2009). At least two thirds of the 3:1 mitigation could be achieved by acquisition of no less than 8,146 acres of land in the Mojave Desert providing adequate habitat and capable of increasing the carrying capacity for desert tortoise. The remaining third of the 3:1 compensatory mitigation would be developed in accordance with BLM's desert tortoise mitigation requirements as described in the NEMO. BLM's 1:1 mitigation plan has not yet been finalized, but is likely to include acquisition of private lands within the Desert Wildlife Management Area (DWMA) portion of the Eastern Mojave Recovery Unit and in the Mojave National Preserve, and with additional management and enhancement projects that would benefit the desert tortoise. The specifics of the desert tortoise acquisition and enhancement actions would be developed by BLM in collaboration with Energy Commission staff, CDFG and the U.S. Fish and Wildlife Service (USFWS) in accordance with guidance from desert tortoise recovery plans (USFWS 2004, 2008a).

For the desert tortoise habitat compensation to be biologically effective, and thus mitigate CEQA impacts to desert tortoise to less-than-significant levels, and meet the full mitigation requirements of CESA, the acquired lands must (1) be protected in perpetuity, and (2) a funding mechanism must be established to undertake initial habitat improvements, and to sustain long-term management and habitat enhancement. Funding comes from an endowment provided by the applicant to create enough income to cover annual stewardship costs on the acquired lands, as well as a buffer to offset inflation. Funding for initial habitat improvements is also required for those actions needed immediately upon acquisition of the property to secure it and remove hazards. Energy Commission staff's proposed Condition of Certification **BIO-17** describes the funding security needed for land acquisition and long-term protection and management for the acquired mitigation lands.

Energy Commission staff developed the proposed Condition of Certification **BIO-17** based largely on CDFG recommendations from past Energy Commission projects, but CDFG has not yet provided formal guidance describing their requirements for satisfying CESA in writing other than to convey orally to staff that they would concur with a combined 3:1 mitigation package for desert tortoise for this project. Staff is not making any assumptions as to whether CDFG would agree with the Energy Commission staff's calculation of security costs (acquisition costs, initial habitat improvement, and long-term management endowment). However, based on the July 23, 2009 letter from the BLM to CDFG, staff believes CDFG would concur with including BLM's proposed

mitigation approach as part of the complementary mitigation package to satisfy CESA's full mitigation standard if the provisions described by BLM in that letter were in place (BLM 2009e).

Energy Commission staff have concluded that the 2:1 compensatory mitigation, as described in staff's proposed Condition of Certification **BIO-17**, combined with the BLM 1:1 mitigation described conceptually above, would meet CESA's full mitigation standard pending resolution of the few issues described below. Staff considers the combination of these two mitigation approaches to be a complementary and complete mitigation package that would achieve full mitigation and would satisfy federal and state requirements for mitigating impacts to desert tortoise. However, a few issues need to be resolved before finalizing this complementary BLM-Energy Commission mitigation package:

- In Perpetuity Protection: Mitigation lands must be protected in perpetuity to satisfy Energy Commission and CDFG requirements. For BLM mitigation, acquisition of private lands within the DWMAs and the Mojave National Preserve would satisfy this requirement because the surrounding protective land uses would prevail. As described in the July 23, 2009 letter, BLM would provide some sort of assurances for long-term protection if these lands are to be counted as fulfilling part of CESA's full mitigation standard. To address this issue BLM has recently proposed development of deed restriction language and a Memorandum of Understanding between BLM and CDFG to offer protection to BLM-managed mitigation lands.
- Enhancement Actions: Staff has yet to develop a specific program of enhancement actions other than land acquisition that would fulfill BLM's 1:1 mitigation requirements and CESA's full mitigation standard. Proposed enhancement actions on BLM lands such as fencing and habitat restoration would need to be fully analyzed and disclosed to satisfy NEPA requirements. BLM will collaborate with Energy Commission staff, CDFG and USFWS in the development of the specific desert tortoise enhancement actions.
- Process for Mitigation Compliance: Staff needs to integrate CDFG and BLM mitigation processes and develop a mechanism that provides final selection and acknowledgement of enhancement actions on BLM lands. For land acquisitions, BLM, CDFG and the Energy Commission have well developed and transparent procedures to track expenditures and acquisitions. A similar mechanism is needed to verify fulfillment of enhancement actions such as fencing or habitat restoration on BLM lands. Prior to implementation of the enhancement measures, BLM and Energy Commission staff will work together to develop a process that allows tracking and verification of enhancement actions for desert tortoise.

Energy Commission staff has determined that if these issues are resolved, the proposed land acquisitions and enhancement activities described above would satisfy requirements of the California Endangered Species Act to fully mitigate impacts to desert tortoise. Except for the special-status plant impacts described earlier, this mitigation would also reduce CEQA impacts to less-than-significant levels. Staff anticipates resolution of these outstanding issues by working closely and cooperatively with USFWS, CDFG, and the applicant to finalize a mitigation and enhancement plan that would fully offset impacts to desert tortoises.

CULTURAL RESOURCES

The BLM and Energy Commission staff concludes that the Ivanpah Solar Energy Generating System (ISEGS) project would have no significant direct or indirect impacts on known, NRHP- or CRHR-eligible archaeological, ethnographic, or built-environment resources. Staff also concludes that the implementation of proposed Conditions of Certification **CUL-1** through **CUL-7** and **CUL-10** would reduce to less than significant, direct or indirect impacts to any such resources that are found during the course of the construction, operation, maintenance, closure, or decommissioning of the project. Staff further concludes that without mitigation, the effect of the Ivanpah Solar Energy Generating System (ISEGS) project on the Hoover Dam-to-San Bernardino transmission line, a historically significant built-environment resource, would be cumulatively considerable and would contribute to a significant cumulative effect on the environment. The adoption and implementation of Conditions of Certification **CUL-8** and **CUL-9** (mitigation measures) would render the potential effect of the proposed project on the resource less than cumulatively considerable.

Conditions of Certification **CUL-1** through **CUL-7** and **CUL-10** take into account the extensive and thorough field investigations that Bright Source (applicant) undertook for the present analysis and underwrites the recommendation of staff that the applicant be given substantial relief from routine monitoring requirements. The adoption and implementation of Conditions of Certification **CUL-1** through **CUL-7** and **CUL-10** ensure that the applicant would be able to respond quickly and effectively to what staff concludes is the highly improbable event that archaeological sites are found on the surface of the project area or buried beneath it during construction-related ground disturbance.

FACILITY DESIGN

The BLM and Energy Commission staff concludes that the design, construction, and eventual closure of the Ivanpah Solar Electric Generating System (ISEGS) project and its linear facilities would likely comply with applicable engineering laws, ordinances, regulations, and standards. The staff has evaluated the proposed engineering LORS, design criteria, and design methods in the record, and concludes that the design, construction, and eventual closure of the project will likely comply with applicable engineering LORS. The proposed conditions of certification will ensure that ISEGS is designed and constructed in accordance with applicable engineering LORS. This would be accomplished through design review, plan checking, and field inspections that would be performed by the Chief Building Official (CBO) or other Energy Commission delegate. Staff would audit the CBO to ensure satisfactory performance. Though future conditions that could affect decommissioning are largely unknown at this time, it can reasonably be concluded that if the project owner submits a decommissioning plan as required in the **General Conditions** portion of this document prior to decommissioning, decommissioning procedures would comply with all applicable engineering LORS.

GEOLOGY, PALEONTOLOGY, AND MINERALS

The proposed ISEGS site is located in a moderately active geologic area on the west side of Ivanpah Valley, east of the Clark Mountain Range in the eastern Mojave Desert of Southern California. The main geologic hazards at this site include ground shaking;

liquefaction; settlement due to compressible soils, subsidence associated with shrinkage of clay soils, hydrocompaction, or dynamic compaction; and the presence of expansive clay soils. These potential hazards can be effectively mitigated through facility design by incorporating recommendations contained in a design-level geotechnical report as required by the California Building Code (2007) and Condition of Certification **GEO-1.** Conditions of Certification **GEN-1, GEN-5,** and **CIVIL-1** in the **Facility Design** section, should also mitigate these impacts to a less than significant level.

The proposed project is currently not used for mineral production, nor is it under claim, lease, or permit for the production of locatable, leasable, or salable minerals. Sand and gravel resources are present at the site and could potentially be a source of salable resources; however, such materials are present throughout the regional area such that the ISEGS should not have a significant CEQA or NEPA impact on the availability of such resources.

Paleontological resources have been documented within 45 miles of the project, but no significant fossils were found during field explorations on the solar plant sites or near the sub-station and ancillary facilities; however, pack rat middens with plant remains were found in the carbonate bedrock outcrop west of Ivanpah 3. If encountered, potential impacts to paleontological resources contained in these materials due to construction activities will be mitigated through worker training and monitoring by qualified paleontologists, as required by Conditions of Certification **PAL-1** through **PAL-7**.

The BLM and Energy Commission staff concludes that the potential for significant adverse cumulative impacts to the project from geologic hazards during its design life and to potential geologic, mineralogical, and paleontological resources from the construction, operation, and closure of the proposed project, is not significant with respect to CEQA or NEPA. It is staff's opinion that the ISEGS can be designed and constructed in accordance with all applicable laws, ordinances, regulations, and standards (LORS), and in a manner that both protects environmental quality and assures public safety, to the extent practical. Conditions of Certification referred to herein serve the purpose of both the Energy Commission's Conditions of Certification for purposes of the California Environmental Quality Act (CEQA) and BLM's Mitigation Measures for purposes of the National Environmental Policy Act (NEPA).

HAZARDOUS MATERIALS MANAGEMENT

The BLM and Energy Commission staff concludes that hazardous material use, storage, and transportation would not pose a significant impact with respect to CEQA or NEPA. Staff's analysis also shows that there would be no significant cumulative impact. With adoption of the proposed conditions of certification, the proposed project would comply with all applicable LORS. Other proposed conditions of certification address the issues of site security matters.

Staff recommends that the Energy Commission impose the proposed conditions of certification, presented below, to ensure that the project is designed, constructed, and operated in compliance with applicable LORS, and would protect the public from significant risk of exposure to an accidental release of hazardous materials. If all

mitigation proposed by the applicant and by staff are implemented, the use, storage, and transportation of hazardous materials would not present a significant risk to the public.

Staff concludes that there is insignificant potential for hazardous materials release to have significant impact beyond the facility boundary, and therefore concludes there is also insignificant potential for significant impact to the environment. Staff proposes six conditions of certification, as follows. **HAZ-1** ensures that no hazardous material would be used at the facility except as listed in the AFC, unless there is prior approval by the Energy Commission Compliance Project Manager. **HAZ-2** ensures that local emergency response services are notified of the amounts and locations of hazardous materials at the facility, **HAZ-3** requires the development of a Safety Management Plan that addresses the delivery of all liquid hazardous materials during the construction, commissioning, and operation of the project would further reduce the risk of any accidental release not specifically addressed by the proposed spill prevention mitigation measures, and further prevent the mixing of incompatible materials that could result in the generation of toxic vapors. Site security during both the construction and operation phases is addressed in **HAZ-4** and **HAZ-5. HAZ-6** ensures that the applicant complies with all Federal LORS regarding use, management, spills, and reporting of hazardous materials on Federal lands.

LAND USE

The criteria for evaluating Land Use impacts include an assessment of whether a proposed project will conflict with any applicable land use plan. The key land use plan affecting this project is the BLM's California Desert Conservation Area (CDCA) Plan of 1980, as amended (BLM 1980). In the CDCA Plan, the location of the proposed Ivanpah Solar Electric Generating System (ISEGS) facility includes land that is classified as Multiple-Use Class L (Limited Use). The Plan states that solar power facilities may be allowed within Limited Use areas after NEPA requirements are met. This Environmental Impact Statement acts as the mechanism for complying with those NEPA requirements.

Because solar power facilities are an allowable use of the land as it is classified in the CDCA Plan, the proposed action does not conflict with the Plan. However, the Plan also requires that newly proposed power facilities that are not already included within the Plan be added to the Plan through the Plan Amendment process. The ISEGS facility is not currently included within the Plan, and therefore a Plan Amendment is required to include the facility as a recognized element with the Plan. The proposed Plan Amendment, and the corresponding analysis of the proposed Plan Amendment with respect to the analysis requirements contained within Chapter 7 of the Plan, is provided within Section A of this Environmental Impact Statement. The amendment decision would occur after publication of the Final Environmental Impact Statement.

Large portions of the land area for Ivanpah 1, 2, and 3 and the administrative complex/logistics area are located within existing Utility Corridors D and BB. The land area for Ivanpah 3 would cover approximately 60% of the 2-mile width of Corridor D. Although the land area for Ivanpah 1 and 2, and the logistics construction area overlap and would limit much of the available area within Corridor BB, future linear facilities

could still be routed through the portions of Corridor BB that are within the temporary construction logistics area that will only be used during the construction phase of the project.

Impacts of the ISEGS project would combine with impacts of present and reasonably foreseeable projects to result in a contribution to cumulative impacts in the Ivanpah Valley area related to land use which would be significant with respect to CEQA as well as NEPA significance criteria in 40 CFR 1508.27. Impacts of the ISEGS project would also combine with the potential impacts of reasonably foreseeable renewable energy projects in the southern California Mojave desert to result in significant and unmitigable regional cumulative impacts related to land use.

In addition, staff concludes that the project would not conform with applicable goals and policies of the San Bernardino General Plan Conservation and Open Space Elements as follows:

1. Conservation Element Goal D/CO 1, calling for preservation of scenic vistas in the County. Staff found that the project would have adverse effects on scenic vistas as described in the Visual Resources section of the document.

2. Open Space Element Goal OS 5, calling for the County to maintain and enhance the visual character of scenic routes in the County; and Policy OS 5.2, which states that "Development along scenic corridors will be required to demonstrate through visual analysis that proposed improvements are compatible with the scenic qualities present." The visual analysis of the project found that it would not be compatible with the scenic qualities present in the viewshed of portions of Highway I-15 designated as a County scenic route.

LIVESTOCK GRAZING

The BLM and Energy Commission staff concludes that the proposed project would not have any significant impacts on the Clark Mountain Allotment, upon which the proposed project would be located. Because the public land at the proposed project location has been used as a grazing allotment, approval of the proposed project would require a modification of the grazing lease and reduction of total permitted Animal Unit Months (AUMs) and acreage based upon forage found on the project footprint. BLM estimates that the total number of AUMs associated with the 4,073 acre project would be 70 AUMs. There are currently 1,428 AUMs leased on the entire Clark Mountain Allotment. Approval of the proposed project would involve fencing of the entire project footprint, thus eliminating any potential use of the 70 AUMs on the project site for grazing during the lifespan of the proposed facility. With respect to National Environmental Policy Act (NEPA) guidelines for significance, these impacts would be adverse in the proposed project area, but would be limited to that area, and would not affect grazing resources in the remainder of the allotment, and thus would not be a significant adverse impact. Speed limits of 10 miles per hour (mph) on unpaved roads and 25 mph on stabilized roads imposed for fugitive dust control as would be required under **Air Quality Conditions of Certification AC-SC3 and AQ-SC7** are expected to be effective in also protecting grazing livestock from vehicle strike. Fencing of project construction areas and of permanent facilities used during operations would also be required as a component of the Construction and Operation Site Security Plans as would be specified

under **Hazardous Materials Conditions of Certification HAZ-4 and HAZ-5** respectively. The speed limit and fencing mitigation measures that would apply during construction and operation on the project site would minimize hazards to cattle when they are grazing near this portion of the allotment and result in a less than significant impact.

Cumulative impacts on this allotment, as well as the overall availability of land for grazing, may result from the combination of this proposed project with other proposed land uses that would require reduction of total permitted AUMs, including other solar energy projects and the proposed DesertXpress rail line. With respect to NEPA, the overall impact of the proposed projects in the area on the Clark Mountain Allotment may be considerable if the proposed Desert Xpress line is constructed and the rail line cuts off livestock access to portions of the allotment. However, the contribution of the proposed ISEGS project to that cumulative impact is relatively small.

NOISE AND VIBRATION

The BLM and Energy Commission staff conclude that the Ivanpah Solar Electric Generating System (ISEGS) can be built and operated in compliance with all applicable noise and vibration laws, ordinances, regulations, and standards and, if built in accordance with the conditions of certification proposed below, would produce no CEQA or NEPA-significant adverse noise impacts on people within the affected area, either direct, indirect, or cumulative.

PUBLIC HEALTH AND SAFETY

The BLM and Energy Commission staff have analyzed potential public health risks associated with construction and operation of the ISEGS and do not expect any adverse cancer, short-term, or long-term health effects to any members of the public, including low income and minority populations. Therefore, project toxic emissions are not considered to be significant under CEQA or NEPA. Staff also concludes that its analysis of potential health impacts from the proposed ISEGS uses a highly conservative methodology that accounts for impacts to the most sensitive individuals in a given population, including newborns and infants. According to the results of staff's health risk assessment, emissions from the ISEGS would not contribute significantly or cumulatively to morbidity or mortality in any age or ethnic group residing in the project area.

POWER PLANT EFFICIENCY

The Ivanpah Solar Electric Generating System (ISEGS), if constructed and operated as proposed, would generate 400 megawatts (MW) (maximum net output) of electricity. This project would consist of two 100 MW plants (Ivanpah 1 and Ivanpah 2) and one 200 MW plant (Ivanpah 3), employing advanced solar power and modern steam turbine technologies. The ISEGS would use solar energy to generate up to 95 percent of its capacity, and natural gas to generate up to five percent of its capacity.

The project would decrease reliance on fossil fuel, and would increase reliance on renewable energy resources. It would not create significant adverse effects on fossil fuel energy supplies or resources, would not require additional sources of energy supply,

and would not consume fossil fuel energy in a wasteful or inefficient manner. No efficiency standards apply to this project. The BLM and Energy Commission staff concludes that this project would present no significant adverse impacts on fossil fuel energy resources.

The ISEGS, if constructed and operated as proposed would occupy over nine acres per MW of power output, a figure about double that of some other solar power technologies. Employing a less land-intensive solar technology, such as the Compact Linear Fresnel Reflector technology or linear parabolic trough technology, would potentially reduce land-related impacts by approximately 50 percent. However, staff recognizes there is a wide range of environmental issues to analyze to compare the merits and impacts of one technology compared to another. This is done in more detail in the **Alternatives** section of this document. In conclusion, ISEGS would utilize solar energy potential from a site that is currently not being harnessed for power production. Thus from an efficiency perspective, ISEGS would not result in a less efficient utilization of the site's solar energy potential than is occurring currently.

POWER PLANT RELIABILITY

The applicant predicts an equivalent availability factor of 92 to 98 percent, which staff believes is achievable. Based on a review of the proposal, staff concludes that the plant would be built and operated in a manner consistent with industry norms for reliable operation. This should provide an adequate level of reliability. No conditions of certification are proposed.

RECREATION

The proposed project location itself is not specifically permitted, used, or designated for any recreational activity. The proposed location represents a small portion of the overall area available for recreation in the Mojave Desert, and although the proposed project would require re-direction of access roads to recreation areas, the magnitude of this re-direction is expected to be small. However, the issue of recreational resources is still directly applicable to the proposed project because part of the attraction of the area, historically, has been driven by easy vehicular access to an unspoiled desert viewscape. While the presence of the proposed facility would likely attract some tourists who are interested in unusual and large-scale industrial operations, the impact on the quality of outdoor recreational experience would diminish the experience of campers, hikers, hunters, and other recreational users. These impacts are not expected to be significant as a recreation impact under the primary CEQA thresholds of significance because they do not increase the level of use which could damage recreational facilities, and do not require the construction or expansion of recreational facilities which could impact the environment. Under NEPA and CEQA, the project's direct impacts are not considered significant because ISEGS would not disrupt recreation opportunities, and the project's indirect impacts by itself would not substantially diminish the quality of outdoor recreation experiences.

Staff has proposed Condition of Certification **REC-1** to conform with Public Resources Code §25529 that would require the applicant to establish an area for public use by the development of a Solar / Ecological Interpretive Center within the Construction Logistics Area.

SOCIOECONOMICS AND ENVIROMMENTAL JUSTICE

The BLM and Energy Commission staff concludes that the two 100-megawatt (MW) (nominal) solar electric generating plants, known as Ivanpah 1 and 2, and the one 200-MW (nominal) plant, known as Ivanpah 3, referred to collectively as the Ivanpah Solar Electric Generating System (ISEGS), would not result in significant adverse direct or indirect socioeconomics impacts with respect to either CEQA or NEPA. In addition, the ISEGS would not contribute to a cumulative socioeconomic impact on the area's population, employment, housing, police, schools, or hospitals because the proposed project's construction and operation workforce currently resides in the regional or local labor market area and construction would be short term. Gross public benefits from the proposed project include capital costs, construction and operation payroll, and property and sales taxes. Furthermore, the construction and operation of the proposed ISEGS would not result in any disproportionate impacts to low-income or minority populations.

SOIL AND WATER RESOURCES

With the information provided to date, the BLM and Energy Commission staff concludes that no impacts to soil or water resources would result from the construction and operation of the proposed Ivanpah Solar Electric Generating System (ISEGS) project that cannot be mitigated to a less than significant level. Where necessary, staff has proposed mitigation measures to reduce identified impacts to levels that are less than significant. The mitigation measures, as well as specifications for laws, ordinances, regulations and standards (LORS) conformance, are included herein as conditions of certification. Staff's conclusions based on analysis of the information submitted to-date are as follows:

1. The proposed project would be located on an alluvial fan where flash flooding and mass erosion could impact the project. Project-related changes to the alluvial fan hydrology could result in impacts to adjacent land users and the Ivanpah playa. The applicant completed a hydrologic study and modeling of the alluvial fan. Based on this work and subsequent confirmatory and sensitivity modeling conducted by the BLM, scour analyses have been performed to support development of a project design that can withstand flash flood flows with minimal damage to site structures and heliostats. In addition, a Drainage, Erosion, and Sedimentation Control Plan (DESCP) has been developed to mitigate the potential storm water and sediment project-related impacts. However, the calculations and assumptions used to evaluate potential storm water and sedimentation impacts are imprecise and have limitations and uncertainties associated with them. Given the uncertainty associated with the calculations, the magnitude of potential impacts that could occur without applying mitigation measures cannot be determined, and therefore these impacts constitute an unknown risk. The potential impacts could adversely affect habitat for a threatened species (the desert tortoise), as well as recreational use of Ivanpah Playa. Should these impacts occur, they would likely be highly controversial. Based on these factors, the proposed project could result in impacts that would be

significant with respect to NEPA significance criteria in 40 CFR 1508.27. Therefore, Condition of Certification **SOIL&WATER-5** has been developed that defines monitoring, inspection, and damage response requirements, as well as standards and procedures for re-considering the proposed storm water management approach if needed in the future.

2. The proposed project would use an air-cooled condenser for heat rejection and would recycle process wastewater from all plant equipment, including boilers and water treatment equipment, to the extent practicable. Recycling the wastewater would maximize reuse of process water and conserve freshwater. Use of this technology would significantly reduce water use and is consistent with water policy and the constitutional requirement that State water resources be put to beneficial use to the fullest extent possible.

3. Impacts to groundwater supply and quality would be less than significant. In the Ivanpah Valley Groundwater Basin (IVGB), two substantial components of the basin's water balance are groundwater recharge through precipitation and groundwater loss through well pumping. Both precipitation and pumping in the basin will vary over the 50-year life of the proposed project. To ensure that the project's proposed use of groundwater does not significantly impact the beneficial uses and users of the groundwater in the basin, staff believes the applicant should be required to comply with San Bernardino County's Desert Groundwater Management Ordinance. The applicant would thus be required to develop a monitoring program and identify what changes are occurring in basin water levels. Staff believes the monitoring program should also be designed to incorporate data from monitoring of groundwater pumping related to the Primm Valley Golf Club's groundwater use. Substantial changes to groundwater levels caused by the proposed project and other pumping in the basin would be documented by this monitoring and reporting program in accordance with Condition of Certification **SOIL&WATER-6**.

Completion of staff's analysis of the proposed project is subject to the following:

- Satisfactory completion of the heliostat pole installation testing by the applicant to either confirm or update its current installation plans followed by further evaluation by staff of whether there would be any impacts related to the method of construction or failure of the heliostats due to storm water flows.

TRAFFIC AND TRANSPORTATION

The BLM and Energy Commission staff concludes that neither construction nor operation of the project would have a CEQA or NEPA-significant adverse impact on the local or regional road network, except for northbound Interstate 15 (I-15) on Friday afternoons and evenings related primarily to motorists enroute to Las Vegas. Vehicle trips generated during construction and operation of the project would contribute to an adverse direct and cumulative impact, which would be significant with respect to CEQA and NEPA, on northbound I-15 on Fridays between the hours of 12 p.m. and 10 p.m. during construction and operation.

To reduce project impacts on area traffic and to facilitate safety during construction, the applicant has proposed to limit the amount of project-related traffic generated on area

roadways on Friday afternoons. To mitigate the ISEGS impact on area traffic to the extent possible during construction and operation to a less-than-significant level, and in particular on northbound I-15 on Friday afternoons, staff has incorporated the applicant's proposal along with other mitigation into Condition of Certification **TRANS-1**. Staff has determined that, with the implementation of the Traffic Control Plan required by proposed Condition of Certification **TRANS-1**, construction and operation of the ISEGS would not cause a direct significant impact on northbound I-15 on Friday afternoons, but would contribute to a cumulatively considerable significant impact on northbound I-15 on Friday afternoons. Therefore, even with TRANS-1, a significant cumulative impact remains. Condition of Certification **TRANS-2** is recommended to ensure the repair of physical damage to area roadways caused during project construction. Because the project has the potential to result in exposure of aircraft pilots, motorists, and hikers to solar radiation reflected from project heliostats and/or power tower receivers, Conditions of Certification **TRANS-3** and **TRANS-4** are recommended to ensure that potential glare from the project is minimized to the maximum extent possible and does not pose a health and safety risk. In addition, because the project would place structures greater than 200 feet in height in the vicinity of military flight training routes and air traffic from the proposed Southern Nevada Supplemental Airport, staff has proposed Condition of Certification **TRANS-5** to ensure the project complies with FAA recommendations for lighting of tall structures. Condition of Certification **TRANS-6** which would require notifying the FAA of potential air hazards from turbulence at an altitude of 1,350 feet above the ground surface above the ISEGS site during daylight hours.

TRANSMISSION LINE SAFETY AND NUISANCE

Since U.S. Bureau of Land Management (BLM) and California Energy Commission staff (hereafter jointly referred to as staff) do not expect the proposed transmission lines to pose an aviation hazard according to current FAA criteria, staff does not consider it necessary to recommend location changes on the basis of a potential hazard to area aviation.

The potential for nuisance shocks would be minimized through grounding and other field-reducing measures that would be implemented in keeping with current SCE guidelines (reflecting standard industry practices). These field-reducing measures would maintain the generated fields within levels not associated with radio-frequency interference or audible noise.

The potential for hazardous shocks would be minimized through compliance with the height and clearance requirements of CPUC's General Order 95. Compliance with Title 14, California Code of Regulations, section 1250, would minimize fire hazards while the use of low-corona line design, together with appropriate corona-minimizing construction practices, would minimize the potential for corona noise and its related interference with radio-frequency communication in the area around the route.

Since electric or magnetic field health effects have neither been established nor ruled out for the proposed ISEGS and similar transmission lines, the public health significance of any related field exposures cannot be characterized with certainty. The only conclusion to be reached with certainty is that the proposed lines' design and

operational plan would be adequate to ensure that the generated electric and magnetic fields are managed to an extent the CPUC considers appropriate in light of the available health effects information. The long-term, mostly residential magnetic exposure of health concern in recent years would be insignificant for the proposed line given the absence of residences along the proposed route. On-site worker or public exposure would be short term and at levels expected for SCE lines of similar design and current-carrying capacity. Such exposure is well understood and has not been established as posing a substantial human health hazard.

Since the proposed project line would be operated to minimize the health, safety, and nuisance impacts of concern to staff and would remain in its present route without nearby residences, staff considers the proposed design, maintenance, and construction plan as complying with the applicable laws. With implementation of the conditions of certification proposed below, any such impacts would be less than significant with respect to CEQA and NEPA.

TRANSMISSION SYSTEM ENGINEERING

The proposed Ivanpah Solar Electric Generating System (ISEGS or "Project") outlet lines and termination are acceptable and would comply with all applicable laws, ordinances, regulations, and standards (LORS). The analysis of project transmission lines and equipment, both from the three power plants up to the point of interconnection with the existing transmission network as well as upgrades beyond the interconnection that are attributable to the project, have been evaluated by BLM and Energy Commission staff. The staff recommends the following mitigation measures:

- Mitigation of base case thermal overloads caused by Ivanpah #1 and #2 power plants, would require the replacement of the existing 115/220 kV transformer bank at the Eldorado substation and the upgrade from 115 to 220 kV of a 36 mile long segment of Eldorado-Baker-Cool Water-Dunn Siding-Mountain Pass transmission line between the new Ivanpah and existing Eldorado Substations. Ivanpah #3 would require the addition of a 115/220 kV transformer at the new Ivanpah substation.

- Mitigation of thermal overloads caused by the Ivanpah #3 under N-1 contingency analysis, would require modification of the existing Special Protection System (SPS) to reflect the topology change associated with the additional facility upgrades triggered by the Ivanpah #3 power plant.

VISUAL RESOURCES

BLM and Energy Commission staff (hereafter jointly referred to as staff) have analyzed visual resource-related information pertaining to the proposed Ivanpah Solar Electric Generating System (ISEGS) and conclude that the proposed project would result in a substantial adverse impact to existing scenic resource values as seen from several Key Observation Points in the Ivanpah Valley and Clark Mountains, including:

- The Primm Valley Golf Course;
- Middle-ground-distance viewpoints on Highway I-15;
- Viewpoints in the Mojave National Preserve on the east face of Clark Mountain; and

- Viewpoints in the Stateline Wilderness Area, including the Umberci Mine and vicinity.

Staff also concludes that the visual analysis and resulting findings, obtained using the CEC staff methods typically used in Staff Assessment visual analysis, were essentially consistent with findings that would be obtained under the BLM visual impact assessment methods.

Staff concludes that these visual impacts would be significant in terms of the four criteria of CEQA Appendix G, and in terms of the context and intensity of the effects in general. Regarding the latter, the context of the project is one directly adjoining a national park and two designated wilderness areas, and a land-sailing site of regional or greater importance. Intensity of potential effects involve the unique scenic characteristics of the local landscape as indicated by the national park and wilderness designations of portions of the project viewshed; concerns expressed by public commentors to date; a degree of uncertainty as to the level of discomfort or disability glare from the solar tower receivers; and concern over cumulative visual effects of renewable projects on the CDCA and Mojave Desert as a whole.

Staff found that with recommended conditions of certification, potentially significant visual impacts at the Primm Valley Golf Course (KOPs 1 and 2) could be mitigated to less than significant levels in the long term. However, staff has concluded that potentially significant visual impacts at the other locations cited above could not be mitigated to less than significant levels and would thus result in significant and unavoidable impacts.

Staff also concludes that the proposed ISEGS project, particularly the solar receiver units atop the solar power towers, would generate conspicuously bright levels of glare for most or all viewers. This glare, while not representing a hazard, could represent a strong, visually dominant feature as seen from the viewpoints named above, and could strongly alter the character of views of Clark Mountain from the valley floor, interfering with the public's ability to enjoy those views. Staff concludes solar radiation and light reflected from proposed project heliostats could cause a significant human health and safety hazard to observers in vehicles on adjacent roadways or air traffic flying above the site, and could cause a distraction of drivers on I-15 that would lead to road hazards and to pilots of aircraft flying over the site. Staff has proposed Condition of Certification **TRANS-3** in the **Traffic and Transportation** section to ensure solar radiation and light from the heliostats does not impair the vision of motorists or pilots traveling near the site and that the potential for exposure of observers does not cause a human health and safety hazard.

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In addition, staff concludes that the project would not conform with applicable goals and policies of the San Bernardino County General Plan Conservation and Open Space Elements as follows:

- Conservation Element Goal D/CO 1, calling for preservation of scenic vistas in the County.
- Open Space Element Goal OS 5, and Policy OS 5.2, which require projects to be visually compatible with the scenic qualities of designated County scenic routes. Highway I-15 in the project vicinity is a County-designated scenic route.

Finally, staff concludes that the project in combination with foreseeable future projects could have significant unavoidable cumulative visual impacts of two kinds:

1. Cumulative impacts within the immediate project viewshed, essentially comprising foreseeable future projects in the Ivanpah Valley; and

2. Cumulative impacts of foreseeable future solar and other renewable energy projects within the southern California Mojave Desert.

As stated, staff concludes that the project would have significant unavoidable adverse impacts in both a direct and cumulative context. If the Energy Commission approves the project, staff recommends that all of staff's proposed conditions of certification be adopted in order to minimize impacts to the greatest feasible extent.

WASTE MANAGEMENT

BLM and Energy Commission staff concludes that management of the waste generated during construction and operation of the Ivanpah Solar Electric Generating System (ISEGS) would not result in any significant adverse impacts under CEQA or NEPA, and would comply with applicable waste management laws, ordinances, regulations, and standards if the measures proposed in the Application for Certification (AFC) and staff's proposed conditions of certification are implemented.

WILD HORSES AND BURROS

BLM and Energy Commission staff concludes that the proposed project would have no CEQA or NEPA-significant impact on wild horses and burros at the proposed project location. The proposed project location was formerly included within a Herd Management Area (HMA) established by the California Desert Conservation Area Management Plan (CDCA Plan). Although no wild horses are present in this area, burros are present. In the NEMO Plan Amendments, the Appropriate Management Level (AML) for burros in the Clark Mountain HMA was reduced from 44 to 0, and approximately 100 burros were removed from the area in January 2007.

Although burros are known to still exist in the area, BLM plans to remove the remaining individuals.. Until that gather is accomplished, the remaining individuals are to be protected from harassment or injury by the provisions of the Wild and Free-Roaming Horses and Burros Act. Increased traffic associated with construction and operation of the proposed project could potentially cause injury or death to individual burros through vehicle strikes. Speed limits of 10 miles per hour (mph) on unpaved roads and 25 mph on stabilized roads imposed for fugitive dust control as would be required under **Air Quality Conditions of Certification AC-SC3 and AQ-SC7** are expected to be effective in protecting the remaining burros from vehicle strike. Individual burros could also be injured or killed if they were to fall into excavations associated with project construction activities. Fencing of project construction areas and of permanent facilities used during operations would also be required as a component of the Construction and Operation Site Security Plans as would be specified under **Hazardous Materials Conditions of Certification HAZ-4 and HAZ-5** respectively. Project construction and operations workers shall be notified of the protection requirements of the Wild and Free-Roaming Horses and Burros Act through training and/or the placement of signs as would be

required under the Worker Environmental Awareness Program specified in **Biological Resources Condition of Certification BIO-6**. Staff believes these recommended mitigation measures would ensure protection of the remaining burro individuals until they are completely removed by BLM.

Cumulative impacts on burros may result from the combination of this proposed project with other current and reasonably foreseeable future land uses, including other solar energy projects. These impacts would result from the reduction of area of the HMAs in which they are managed, as well as potential hazards due to increased traffic. Under NEPA, the cumulative impact would be considered minor because the Northern and Eastern Mojave Desert Management Plan (NEMO Plan) Amendments have established the AML in the vicinity of the proposed project area at zero, meaning BLM is actively involved in removing all burros within the HMA and the area within this project site is a minor forage producing area relative to other locations elsewhere within the HMA

WORKER SAFETY AND FIRE PROTECTION

BLM and Energy Commission staff concludes that, if the applicant for the proposed Ivanpah Solar Electric Generating System (ISEGS) provides project construction safety and health and project operations and maintenance safety and health programs, as required by Conditions of Certification **WORKER SAFETY -1, -2, -3, -4, -5,** and **-6**, the project would incorporate sufficient measures to both ensure adequate levels of industrial safety and comply with applicable laws, ordinances, regulations, and standards (LORS). These proposed conditions of certification ensure that these programs, proposed by the applicant, will be reviewed by the appropriate agencies before they are implemented. The conditions also require verification that the proposed plans adequately ensure worker safety and fire protection and comply with applicable LORS.

Staff also concludes that the proposed project would not have significant impacts on local fire protection services that would be significant with respect to CEQA or NEPA. The fire risks at the proposed facility do not pose significant added demands on local fire protection services. Staff also concludes that the San Bernardino County Hazmat Team and the San Bernardino County Fire Department (SBCFD) are adequately equipped and staffed to respond to hazardous materials incidents at the proposed facility with an adequate response time, given the remote location of this project (Crawford 2008).

NOTEWORTHY PUBLIC BENEFITS

ISEGS offers the benefit of providing a source of renewable energy augmented with minimal use of natural gas when solar conditions are insufficient. In addition, staff has identified the following public benefits:

1. ISEGS would contribute to meeting goals under California's Renewable Portfolio Standard Program (Senate Bill 1078), which establishes that the state's renewable energy must contribute 20 percent of the supply for meeting total state energy demands by 2010, and which also reduces our dependence on fossil fuels;

2. ISEGS would contribute to meeting the Governor's Executive Order #S-14-08 which establishes that the state's renewable energy must contribute 33 percent of the supply for meeting total state energy demands by 2020;

3. ISEGS would contribute to the state accomplishing its goals for reducing global carbon emissions in accordance with the California Global Warming Solutions Act of 2006 (Assembly Bill 32);

4. ISEGS would provide Socioeconomics public benefits which would include both short term construction-related and long term operational-related increases in local expenditures and payrolls, as well as sales tax revenues.

INTRODUCTION

Robert Dover, Tom Hurshman and John Kessler

INTRODUCTION

The proposed action evaluated within this Final Staff Assessment (FSA)/Draft Environmental Impact Statement (DEIS) is the construction and operation of the Ivanpah Solar Electric Generating System (ISEGS) project, a proposed solar-thermal electricity generation facility located on public lands managed by the Bureau of Land Management (BLM) in San Bernardino County, California. The FSA/DEIS represents a joint environmental review document developed by the California Energy Commission (Energy Commission) and BLM to evaluate potential impacts associated with the proposed action.

When considering an energy project for licensing, the Energy Commission is the lead state agency for evaluating environmental impacts of a proposed licensing action under the California Environmental Quality Act (CEQA). The FSA, the result of the Energy Commission staff's environmental evaluation process, is functionally equivalent to the preparation of an Environmental Impact Report.

Because the proposed project is located on public lands managed by the BLM, BLM is the lead federal agency for evaluating environmental impacts of the proposed right-of-way grant under the National Environmental Policy Act (NEPA). The DEIS is the BLM's environmental evaluation of the potential impacts that could result from the authorization of the requested right-of-way. The Department of Energy (DOE) is a cooperating agency on this FSA/EIS pursuant to an MOU between DOE and BLM signed in February 2009.

In August, 2007, the Energy Commission and BLM California Desert District (CDD) entered into a Memorandum of Understanding (MOU) to jointly develop the environmental analysis documentation for solar thermal projects which are under the jurisdiction of both agencies. The purpose of the MOU is to avoid duplication of staff efforts, share staff expertise and information, promote intergovernmental coordination, and facilitate public review. Under the guidelines of the MOU, the Energy Commission developed the Preliminary Staff Assessment (PSA), which was published on December 9, 2008. The PSA was available for a 30-day public comment period. This document represents the Energy Commission's FSA, as well as the BLM's DEIS. Following a 90-day public comment period, BLM will issue a Final EIS.

This FSA/DEIS is a staff document. It is neither a document of the California Energy Commission Siting Committee, a draft decision by the Siting Committee, nor a decision document approving the right-of-way grant by BLM. The FSA/DEIS describes and evaluates the following:

- the proposed project;
- the existing environment;

- whether the facilities can be constructed and operated safely and reliably in accordance with applicable laws, ordinances, regulations, and standards (LORS);
- the environmental consequences of the proposed project including potential public health and safety impacts;
- the potential cumulative impacts of the proposed project in conjunction with other existing and known planned developments;
- mitigation measures proposed by the applicant, staff, interested agencies, local organizations, and interveners which may lessen or avoid potential impacts;
- the proposed conditions under which the project should be constructed and operated, if it is certified (known as “conditions of certification”); and
- alternatives to the proposed project.

The analyses contained in this FSA/DEIS are based upon information from the: 1) Application for Certification (AFC), 2) responses to data requests, 3) supplementary information from local, state, and federal agencies; interested organizations; and individuals, 4) existing documents and publications, 5) independent research, and 6) comments at workshops. The FSA/DEIS presents conclusions about potential environmental impacts and conformity with LORS, as well as proposed conditions of certification/mitigation measures that apply to the design, construction, operation, and closure of the facility. Each proposed condition of certification/mitigation measure is followed by a proposed means of verification that the condition has been met.

BACKGROUND

BrightSource Energy is a U. S. Corporation whose business model includes the development and deployment of concentrating solar power tower technology. It has formed limited liability corporations Solar Partners I, II, IV, and VIII (referred to as applicant or BrightSource Energy hereafter) for the purposes of filing ROW applications with the BLM for the use of public land and for filing an Application for Certification with the Energy Commission. BrightSource Energy has executed Power Purchase Agreements with Pacific Gas and Electric and interconnection agreements with Southern California Edison to deliver 400 MW of electricity to the California market by the year 2013.

Through the limited liability corporations, the applicant has applied for four ROW grants from the BLM to construct the ISEGS project that will occupy 4073 acres of public land, use approximately 100 acre feet of water per year, produce a nominal 400 MWs of electricity, and operate for a term of 50 years. BrightSource has also filed an Application for Certification with the Energy Commission. Under California law, the Energy Commission has regulatory authority for certifying applications for thermal power generating facilities in excess of 50 megawatts in size.

Additionally, BrightSource has applied to the U.S. Department of Energy (DOE) for a loan guarantee pursuant to Title XVII of the EPAct. The application for a loan guarantee for Ivanpah 1 was made in November 2008, and the application for Ivanpah 2 and 3 was made in February 2009. The EPAct established a Federal loan guarantee program

for eligible energy projects that employ innovative technologies. Title XVII of EPAct authorizes the Secretary of Energy to make loan guarantees for a variety of types of projects, including those that “avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases, and employ new or significantly improved technologies as compared to commercial technologies in service in the United States at the time the guarantee is issued”. The two principal goals of the loan guarantee program are to encourage commercial use in the United States of new or significantly improved energy-related technologies and to achieve substantial environmental benefits. DOE can comply with the requirements under EPAct by selecting eligible projects that meet the goals of the Act. DOE is using this NEPA process to assist in determining whether to issue a loan guarantee to BrightSource Energy to support the proposed project.

The proposed project could help meet the explicit policy goals of the State of California and the Federal goals of producing 10% of the nation’s electricity from renewable sources by 2012 and 25% by 2025 and of approving 10,000 MW of non-hydropower renewable energy generated from the public lands by 2015. Authorities include:

- Executive order 13212, dated May 18, 2001, which mandates that agencies act expediently and in a manner consistent with applicable laws to increase the “production and transmission of energy in a safe and environmentally sound manner.”
- The Energy Policy Act of 2005 (EPAct), which requires the Department of the Interior (BLM’s parent agency) to approve at least 10,000 MW of renewable energy on public lands by 2015. Currently, proposed renewable energy projects amounting to 1,900 MW of electricity are on file with the BLM within the Ivanpah Dry Lake area, including 400 MW associated with the proposed Project.
- Secretarial Order 3285, dated March 11, 2009, which "establishes the development of renewable energy as a priority for the Department of the Interior".

AGENCY AUTHORITIES AND RESPONSIBILITIES

The Energy Commission has the exclusive authority to certify the construction, modification, and operation of thermal electric power plants 50 megawatts (MW) or larger. The Energy Commission certification is in lieu of any permit required by state, regional, or local agencies and by federal agencies to the extent permitted by federal law (Pub. Resources Code, § 25500). The Energy Commission must review power plant AFCs to assess potential environmental impacts including potential impacts to public health and safety, potential measures to mitigate those impacts (Pub. Resources Code, § 25519), and compliance with applicable governmental laws or standards (Pub. Resources Code, § 25523 (d)). The Energy Commission staff’s analyses were prepared in accordance with Public Resources Code, section 25500 et seq.; Title 20, California Code of Regulations, section 1701 et seq.; and CEQA (Pub. Resources Code, § 21000 et seq.).

The Bureau of Land management’s authority for the proposed action includes Federal Land Policy and Management Act (FLPMA) of 1976 [43 United States Code (U.S.C.) 1701 et seq.], Section 211 of the Energy Policy Act (EPAct) of 2005 (119 Stat. 594,

600), and BLM's Solar Energy Development Policy of April 4, 2007. The FLPMA authorizes BLM to issue right-of-way grants for renewable energy projects. Section 211 of the Energy Policy Act of 2005 states that the Secretary of the Interior should seek to have approved a minimum of 10,000 megawatts of renewable energy generating capacity on public lands by 2015.

Title XVII of EPAct authorizes the Secretary of Energy to make loan guarantees for eligible projects, including those that "avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases, and employ new or significantly improved technologies as compared to commercial technologies in service in the United States at the time the guarantee is issued." BrightSource Energy has applied to the U.S. Department of Energy (DOE) for a loan guarantee pursuant to Title XVII of the EPAct. DOE is participating in the review of this NEPA document as a cooperating agency (40 CFR §1508.5) to ensure that analyses needed to support its decisionmaking on whether to provide a loan guarantee to BrightSource Energy are provided in the EIS.

PROJECT DESCRIPTION (CASE AND PROPERTY DESCRIPTION)

The proposed action is designated by BLM as ROW serial numbers CACA 48668, CACA 49504, CACA 49503, and CACA 49502.

The site is located in Townships 16 and 17 North, Range 14 East, Dan Bernardino Meridian, approximately 4.5 miles southwest of Primm, Nevada in San Bernardino County, California. The property proposed for the rights-of-way grants comprises 3,712.7 acres of long-term (life of facility) disturbance, and 359.9 acres of temporary disturbance, for a total of 4,073 acres.

Long-term Acreages:

Legal Description
San Bernardino Principal Meridian

Solar Partners II, LLC CACA-49504

Ivanpah 1 Site
T. 16 N. R.14 E.,
Sec. 2: Lots 2, 3, 4, and SW¼NE¼, S½NW¼, SW¼, W½SE¼
Sec. 3: Lots 1, 2, and S½NE¼, SE¼NW¼, S½SW¼, SE¼
Sec. 10: NE¼, E½NW¼
Sec. 11: W½NE¼, NW¼

Solar Partners I, LLC CACA-48668

Ivanpah 2 Site
T. 17 N., R. 14 E.,
Sec. 27: SW¼SE¼, SW¼
Sec. 28: SE¼SW¼, SE¼
Sec. 33: E½, E½W½
Sec. 34: W½E½, W½

Solar Partners VIII, LLC CACA-49503

Ivanpah 3 Site
T. 17 N., R.14 E.,
Sec. 20: E½, E½W½
Sec. 21: All
Sec. 22: W½W½
Sec. 27:W½NW¼, NW¼SW¼
Sec. 28: N½, SW¼, N½SE¼, SW¼SE¼
Sec. 29: E½, SE¼NW¼, E½SW¼

Solar Partners IV, LLC CACA-49502

Administrative Site and Substation
T. 16 N., R. 14 E.,
Sec. 3: NW¼NE¼, N½NW¼, SW¼NW¼
Sec. 4: E½NE¼

T.17 N., R.14 E.,
Sec. 34: S½SW¼

Temporary Acreages:

Legal Description
San Bernardino Principal Meridian

Temporary Construction Logistics Area
T. 16 N., R. 14 E.,
Sec. 3: W½NE¼, NE¼, N½SW¼
Sec. 4: NE¼, NE¼SE¼

T. 17 N., R. 14 E.,
Sec. 33: SE¼SW¼, S½SE¼
Sec. 34: S½SW¼, SW¼SE¼

APPLICANT OBJECTIVES

The applicant's project objectives are set forth below. The fundamental objective is to build a solar project that generates 400 MW of renewable solar energy that will help the State meet its Renewable Portfolio Standard goals for new renewable electric generation. To assist in meeting the requirement for additional generating capacity, the Applicant (BrightSource) has developed solar technology which requires commercial-scale development to demonstrate its technical and commercial viability, and has entered into power purchase agreements to provide power from renewable sources into the California Independent System Operator (CAISO) system.

1. To safely and economically construct and operate a nominal 400-MW, solar generating facility in California capable of selling competitively priced renewable energy consistent with the needs of California utilities.

2. To demonstrate the technical and economic viability of Bright Source's technology in a commercial-scale project.

3. To locate the facility in areas of high solarity with ground slope of less than 5 percent.

4. To minimize infrastructure needs and reduce environmental impacts by locating the plant near existing and planned infrastructure, including: CAISO transmission lines, a source of natural gas, and an adequate water supply.

5. To avoid siting the plant in areas that are highly pristine or biologically sensitive (e.g., a Desert Wildlife Management Area).

6. To locate the project consistent with existing land use plans. If on public land, to comply with the multiple use objectives of the Federal Land Policy and Management Act (FLPMA), which includes renewable energy development, and the objectives of the California Desert Conservation Area (CDCA) Resource Management Plan (RMP), which allows for solar energy development in some areas.

7. To assist California in repositioning its generation asset portfolio to use more renewable energy in conformance with State Policy, including the policy objectives set forth in Senate Bill (SB) 1078 (California Renewable Portfolio Standard Program) and Assembly Bill (AB) 32 (California Global Warming Solutions Act of 2006).

8. To comply with provisions of the power sales agreement in negotiation for the first projects, to develop a project that can interconnect to a CAISO transmission line with the potential of achieving a commercial on-line date in 2010, but no later than 2011.

CEQA OBJECTIVES

State Objectives

Senate Bill 1078, passed on 2002, established the California Renewable Portfolio Standard (RPS), which requires utilities to increase their sale of electricity produced by renewable energy sources, including solar facilities, by a minimum of one percent per year with a goal of 20 percent of their total sales by 2017. However, the California Public Utilities Commission, Energy Commission, and the California Power Authority adopted the Energy Action Plan (EAP), which pledged that the agencies would meet an accelerated goal of 20% by the year 2010. As a result, the California Senate passed Senate Bill 107 to be consistent with the EAP, and accelerated the implementation of RPS, requiring utilities to meet the goal of 20 percent renewable energy generation by 2010. In November 2008, California's Governor instituted Executive Order S-14-08 which establishes an updated RPS goal that all retail sellers of electricity shall serve 33% of their load with renewable energy by 2020. The Ivanpah Dry Lake area has been identified as an area with high potential for solar resource development. The Project would allow California utilities to increase the percentage of renewable resources in their energy portfolio, and aid the utilities in reaching the goals set forth by the RPS.

CEQA guidelines require a clearly written statement of objectives to guide the lead agency in developing a reasonable range of alternatives and aid decision-makers in preparing findings or a statement of overriding considerations. CEQA specifies that the statement of objectives should include the underlying purpose of the project (Section

15126.6(a)).These objectives reflect the applicants objectives and the BLM's stated purpose and need of the Project and will be considered in the comparison of alternatives, as required under both NEPA and CEQA. The Energy Commission developed the following objectives for the Project:

1. to safely and economically construct and operate a nominal 400-MW, renewable power generating facility in California capable of selling competitively priced renewable energy consistent with the needs of California utilities;

2. to locate the facility in areas of high solarity with ground slope of less than 5 percent;

3. to complete the impact analysis of the project by the first quarter of 2010 so that if approved, construction could be authorized in 2010 and beyond.

BLM PURPOSE AND NEED

National Environmental Policy Act (NEPA) guidance published by the Council on Environmental Quality (CEQ) states that environmental impact statements' Purpose and Need section "shall briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action" (40 CFR §1502.13). The following discussion sets forth the purpose of, and need for, the project as required under NEPA.

The purpose of the proposed action is to approve, approve with modifications, or disapprove ROW applications filed by Solar Partners I, LLC; Solar Partners II, LLC; Solar Partners IV, LLC; and Solar Partners VIII, LLC (applicant), which are subsidiaries of BrightSource Energy, Inc. to develop the Ivanpah Solar Electric Generating System (ISEGS) project. The BLM will determine and disclose the environmental impacts of the 400 MW ISEGS proposal and decide whether granting the requested ROW is in the public interest. The BLM has determined that the proposed solar project and associated ROW would require an amendment to the CDCAPlan (Plan). The BLM will also consider the amendment of the CDCA Plan to allow for the project.

The need for the action has its basis in Federal orders and laws that require government agencies to evaluate energy generation projects and facilitate the development of renewable energy sources. The proposed project could help meet the explicit policy goals of the State of California and the Federal goals of producing 10% of the nation's electricity from renewable sources by 2012 and 25% by 2025 and of approving 10,000 MW of non-hydropower renewable energy generated from the public lands by 2015. Authorities include:

- Executive order 13212, dated May 18, 2001, which mandates that agencies act expediently and in a manner consistent with applicable laws to increase the "production and transmission of energy in a safe and environmentally sound manner."
- The Energy Policy Act of 2005 (EPAct), which requires the Department of the Interior (BLM's parent agency) to approve at least 10,000 MW of renewable energy

on public lands by 2015. Currently, proposed renewable energy projects amounting to 1,900 MW of electricity are on file with the BLM within the Ivanpah Dry Lake area, including 400 MW associated with the proposed Project.

- Secretarial Order 3285, dated March 11, 2009, which "establishes the development of renewable energy as a priority for the Department of the Interior".

DOE PURPOSE AND NEED

The EPAct of 2005 established a Federal loan guarantee program for eligible energy projects that employ innovative technologies. Title XVII of the EPAct of 2005 authorizes the Secretary of Energy to make loan guarantees for a variety of types of projects, including those that “avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases, and employ new or significantly improved technologies as compared to commercial technologies in service in the United States at the time the guarantee is issued”.

The two purposes of the loan guarantee program are to encourage commercial use in the United States of new or significantly improved energy-related technologies and to achieve substantial environmental benefits. The purpose and need for action by DOE is to comply with its mandate under EPAct by selecting eligible projects that meet the goals of the Act.

LAND USE PLAN CONFORMANCE AND AMENDMENT (BLM)

The principal land use plan affecting this proposed project is the U.S. Bureau of Land Management’s (BLM) California Desert Conservation Area (CDCA) Plan of 1980, as amended, and the Northern and Eastern Mojave Desert Management Plan (NEMO), which amends the CDCA Plan for those areas identified as the northern and eastern Mojave Desert. In the CDCA Plan, the location of the proposed ISEGS facility includes land that is classified as Multiple-Use Class L (Limited Use). The Plan states that solar power facilities may be allowed within Limited Use areas after NEPA requirements are met. This DEIS acts as the mechanism for complying with those NEPA requirements.

Because solar power facilities are an allowable use of the land as it is classified in the CDCA Plan, the proposed action does not conflict with the Plan. However, Chapter 3, “Energy Production and Utility Corridors Element” of the Plan also requires that newly proposed power facilities that are not already identified in the Plan be considered through the Plan Amendment process. The proposed ISEGS facility is not currently identified within the Plan, and therefore a Plan Amendment is required to include the facility as a recognized element within the Plan.

Other Agency Plans. In March, 2008, the BLM entered into a Memorandum of Understanding (MOU; BLM Agreement No. 08-223) with San Bernardino County to establish a cooperative process for conducting environmental reviews of proposed projects located on BLM-managed lands located within the County. Under the terms of the MOU, the BLM acts as the lead agency for NEPA evaluation of each proposed project. The County acts as the CEQA lead agency, except in cases involving thermal energy projects that exceed 50 MW in size, in which case the Energy Commission is designated as the lead and the County acts as a cooperating agency. For this proposed

project, the Energy Commission is the lead agency for CEQA, and an analysis of conformance with applicable San Bernardino County land use plans is included within the **Land Use** section of this FSA/DEIS.

Land within San Bernardino County is classified according to Land Use Zoning Designations under the San Bernardino County General Plan, and Land Use Zoning Districts under the County Development Code. The Development Code implements the General Plan by regulating the use of land within unincorporated portions of the County. The Development Code identifies the land area of the proposed ISEGS facility as Resource Conservation (RC), a designation that allows use for electric power generation. Therefore, the proposed project conforms to the applicable County General Plan.

Planning Criteria (BLM)

The CDCA Plan planning criteria are the constraints and ground rules that guide and direct the development of the Plan Amendment. They ensure that the Plan Amendment is tailored to the identified issues and ensure that unnecessary data collection and analyses are avoided. They focus on the decisions to be made in the Plan Amendment, and will achieve the following:

"Sites associated with power generation of transmission not identified in the Plan will be considered through the Plan Amendment process."

Because the proposed facility is not currently identified within the CDCA Plan, an amendment to identify the proposed facility within the Plan is hereby proposed. As specified in Chapter 7, Plan Amendment Process, there are three categories of Plan Amendments, including:

- Category 1, for proposed changes that will not result in significant environmental impact or analysis through an Environmental Impact Statement;
- Category 2, for proposed changes that would require a significant change in the location or extent of a multiple-use class designation; and
- Category 3, to accommodate a request for a specific use or activity that will require analysis beyond the Plan Amendment Decision.

Based on these criteria, approval of the proposed project would require a Category 3 amendment. This section summarizes the procedures necessary to evaluate the proposed Plan Amendment, as well as the procedures required to perform the environmental review of the right-of-way (ROW) application.

Statement of Plan Amendment. The Implementation section of the Energy Production and Utility Corridors Element of the CDCA Plan lists a number of Category 3 amendments that have been approved since adoption of the Plan in 1980. An additional amendment is proposed to be added to this section of the Plan, and would read "Permission granted to construct solar energy facility (proposed Ivanpah Solar Electric Generating System)."

Plan Amendment Process. The Plan Amendment process is outlined in Chapter 7 of the Plan. In analyzing an applicant's request for amending or changing the Plan, the BLM District Manager, Desert District, will:

1. Determine if the request has been properly submitted and if any law or regulation prohibits granting the requested amendment.

2. Determine if alternative locations within the CDCA are available which would meet the applicant's needs without requiring a change in the Plan's classification, or an amendment to any Plan element.

3. Determine the environmental effects of granting and/or implementing the applicant's request.

4. Consider the economic and social impacts of granting and/or implementing the applicant's request.

5. Provide opportunities for and consideration of public comment on the proposed amendment, including input from the public and from federal, State, and local government agencies.

6. Evaluate the effect of the proposed amendment on BLM management's desert-wide obligation to achieve and maintain a balance between resource use and resource protection.

Decision Criteria for Evaluation of Proposed Plan Amendment. The Decision Criteria to be used for approval or disapproval of the proposed amendment require that the following determinations be made by the BLM Desert District Manager:

1. The proposed amendment is in accordance with applicable laws and regulations;

2. The proposed amendment will provide for the immediate and future management, use, development, and protection of the public lands within the CDCA.

The BLM Desert District Manager will base the rationale for these determinations on the principles of multiple use, sustained yield, and maintenance of environmental quality as required in the Federal Land Policy and Management Act (FLPMA) of 1976.

Decision Criteria for Evaluation of Application. In addition to defining the required analyses and Decision Criteria for Plan Amendments, the Plan also defines the Decision Criteria to be used to evaluate future applications in the Energy Production and Utility Corridors Element of Chapter 3. These Decision Criteria include:

1. Minimize the number of separate rights-of-way by utilizing existing rights-of-way as a basis for planning corridors;

2. Encourage joint-use of corridors for transmission lines, canals, pipelines, and cables;

3. Provide alternative corridors to be considered during processing of applications;

4. Avoid sensitive resources wherever possible;

5. Conform to local plans whenever possible;

6. Consider wilderness values and be consistent with final wilderness recommendations;

7. Complete the delivery systems network;

8. Consider ongoing projects for which decisions have been made; and

9. Consider corridor networks which take into account power needs and alternative fuel resources.

Factors to be Considered. The Plan also states that, in the evaluation of proposed power plants, BLM will use the same factors affecting the public lands and their resources as those used by the Energy Commission. These factors are the environmental information requirements defined in the California Code of Regulations (CCR) Title 20, Appendix B, and include:

- General (Project Overview)
- Cultural Resources
- Land Use
- Noise
- Traffic and Transportation
- Visual Resources
- Socioeconomics
- Air Quality
- Public Health
- Hazardous Materials Handling
- Worker Safety
- Waste Management
- Biological Resources
- Water Resources
- Soils
- Paleontological Resources
- Geological Hazards and Resources
- Transmission System Safety and Nuisance
- Facility Design
- Transmission System Design

- Reliability
- Efficiency

The specific determinations required for the Plan Amendment evaluation are discussed in detail below. This DEIS acts as the mechanism for evaluating both the proposed project application, and the proposed Plan Amendment. The factors specified in CCR Title 20, Appendix B are included within the scope of the analysis presented in the DEIS.

Results of CDCA Plan Amendment (BLM)

Required Determinations

1. Determine if the request has been properly submitted and if any law or regulation prohibits granting the requested amendment.

The applicant's request for a right-of-way was properly submitted, and this DEIS acts as the mechanism for evaluating and disclosing environmental impacts associated with that applications. No law or regulation prohibits granting the amendment.

2. Determine if alternative locations within the CDCA are available which would meet the applicant's needs without requiring a change in the Plan's classification, or an amendment to any Plan element.

The CDCA Plan does not currently identify any sites as solar generating facilities. Therefore, there is no other location within the CDCA which could serve as an alternative location without requiring a Plan Amendment. The proposed project does not require a change in the Multiple-Use Class classification for any area within the CDCA.

1. Determine the environmental affects of granting and/or implementing the applicant's request.

This DEIS acts as the mechanism for evaluating the environmental effects of granting the right-of-way and the Plan Amendment.

2. Consider the economic and social impacts of granting and/or implementing the applicant's request.

This DEIS acts as the mechanism for evaluating the economic and social impacts of granting the right-of-way and the Plan Amendment.

3. Provide opportunities for and consideration of public comment on the proposed amendment, including input from the public and from federal, State, and local government agencies.

A Notice of Intent (NOI) to amend the CDCA Plan was published in the Federal Register November 6, 2008, Vol. 72, No. 214 Fed. Reg.62671-62672. Three respondents, all government agencies, provided comments during the 30-day NOI scoping period. Although not part of BLM's required NEPA or Plan Amendment process, public comments were also received on the Preliminary Staff Assessment (PSA) published by the Energy Commission in December, 2008. In response to the PSA, 13 respondents

provided comments. These included government agencies, environmental organizations, and individuals with no stated affiliation. In accordance with the NOI, issues identified during the scoping period are placed in the comment categories below.

1. Issues to be resolved in the plan amendment

One commenter who provided comments on the PSA expressed concern that the proposed project was not in conformance with the CDCA Plan, and that such conformance should be achieved before the project would be approved. This comment is being resolved through this Plan Amendment.

2. Issues to be resolved through policy or administrative action

All other comments received addressed specific environmental impacts and mitigation measures that each commenter requested be analyzed in the FSA/DEIS. These comments are being resolved by being considered within this DEIS.

3. Issues beyond the scope of this plan amendment

No comments were received which were outside of the scope of this Plan Amendment.

1. Evaluate the effect of the proposed amendment on BLM management's desert-wide obligation to achieve and maintain a balance between resource use and resource protection.

The balance between resource use and resource protection is evaluated within the DEIS. Title VI of the FLPMA, under California Desert Conservation Area, provides for the immediate and future protection and administration of the public lands in the California desert within the framework of a program of multiple use and sustained yield, and maintenance of environmental quality. Multiple use includes the use of renewable energy resources, and through Title V of FLPMA, the BLM is authorized to grant rights-of-way for generation and transmission of electric energy. The acceptability of use of public lands within the CDCA for this purpose is recognized through the Plan's approval of solar generating facilities within Multiple-Use Class L. The purpose of the DEIS is to identify resources which may be adversely impacted by approval of the proposed project, evaluate alternative actions which may accomplish the purpose and need with a lesser degree of resource impacts, and identify mitigation measures and Best Management Practices (BMPs) which, when implemented, would reduce the extent and magnitude of the impacts and provide a greater degree of resource protection.

Conformance of ROW Application with Decision Criteria (BLM)

1. Minimize the number of separate rights-of-way by utilizing existing rights-of-way as a basis for planning corridors.

The proposed project assists in minimizing the number of separate rights-of-way by being proposed in close proximity to existing Corridors D and BB. Electrical transmission associated with the proposed project will occur within these existing

corridors, and placement of the facility adjacent to these corridors minimizes the length of new corridors necessary for transmission of natural gas to the site.

1. Encourage joint-use of corridors for transmission lines, canals, pipelines, and cables.

Placement of the proposed project adjacent to existing Corridor D maximizes the joint-use of this corridor for natural gas and electrical transmission.

2. Provide alternative corridors to be considered during processing of applications.

This decision criterion is not applicable to the proposed project. Placement of the proposed facility adjacent to existing corridors does not require designation of alternative corridors to support the proposed project.

3. Avoid sensitive resources wherever possible;

The extent to which the proposed project has been located and designed to avoid sensitive resources is addressed throughout the DEIS. BLM and other Federal regulations that restrict the placement of proposed facilities, such as the presence of designated Wilderness Areas or Desert Wildlife Management Areas were considerations in the original siting process used by the applicant to identify potential project locations. The project location and configurations of the boundaries were modified in consideration of mineral resources. The alternatives analysis considered whether the purpose and need of the proposed project could be achieved in another location, but with a lesser effect on sensitive resources.

4. Conform to local plans whenever possible;

The extent to which the proposed project conforms to local plans is addressed within the Land Use section of the DEIS. The proposed project is in conformance with the San Bernardino County General Plan.

5. Consider wilderness values and be consistent with final wilderness recommendations;

The proposed project is not located within a designated Wilderness Area or Wilderness Study Area.

6. Complete the delivery systems network;

This decision criterion is not applicable to the proposed project.

7. Consider ongoing projects for which decisions have been made; and

This decision criterion is not applicable to the proposed project. Approval of the proposed project would not affect any other projects for which decisions have been made.

8. Consider corridor networks which take into account power needs and alternative fuel resources.

This decision criterion is not applicable to the proposed project. The proposed project does not involve the consideration of an addition to or modification of the corridor

network. However, it does utilize facilities located within Corridors D and BB, which were designed with consideration of both power needs and locations of alternative fuel resources.

PROJECT EVALUATION AND DECISION PROCESS

Energy Commission Process

The Energy Commission's siting regulations require staff to independently review the AFC and assess whether the list of environmental impacts contained is complete and whether additional or more effective mitigation measures are necessary, feasible, and available (Cal. Code Regs., tit. 20, §§ 1742 and 1742.5(a)).

In addition, staff must assess the completeness and adequacy of the measures proposed by the applicant to ensure compliance with health and safety standards and the reliability of power plant operations (Cal. Code Regs., tit. 20, § 1743(b)). Staff is required to develop a compliance plan (coordinated with other agencies) to ensure that applicable laws, ordinances, regulations, and standards are met (Cal. Code Regs., tit. 20, § 1744(b)).

Staff conducts its environmental analysis in accordance with the requirements of the California Environmental Quality Act (CEQA). No additional Environmental Impact Report (EIR) is required because the Energy Commission's site certification program has been certified by the California Resources Agency as meeting all requirements of a certified regulatory program (Pub. Resources Code, § 21080.5 and Cal. Code Regs., tit. 14, § 15251 (j)).

Staff's impact assessment, including the recommended conditions of certification, is only one piece of evidence that the Siting Committee will consider in reaching a decision on the proposed project and making its recommendation to the full Energy Commission. At the public hearings, all parties will be afforded an opportunity to present evidence and to rebut the testimony of other parties, thereby creating a hearing record on which a decision on the project can be based. The hearing before the Siting Committee also allows all parties to argue their positions on disputed matters, if any, and it provides a forum for the Committee to receive comments from the public and other governmental agencies.

Following the hearings, the Siting Committee's recommendation to the full Energy Commission on whether or not to approve the proposed project will be contained in a document entitled the Presiding Members' Proposed Decision (PMPD). Following its publication, the PMPD is circulated in order to receive written public comments. At the conclusion of the comment period, the Siting Committee may prepare a revised PMPD. At the close of the comment period for the revised PMPD, the PMPD is submitted to the full Energy Commission for a decision.

BLM Process

The DEIS is available for a 90-day public comment period. Following completion of that period, BLM will review and develop responses to comments provided by the public and other agencies. The responses to the comments, and other information identified during

this period, will be incorporated into a Final EIS (FEIS), which will make a recommendation regarding the preferred alternative. A Notice of Availability (NOA) of the FEIS will be published when the FEIS becomes available for public review. The FEIS will be available for public review for a minimum of 30-days before the BLM issues a Record of Decision (ROD). The decision regarding the ROW grant is in full force and effect, however it is appealable to the Interior Board of Land Appeals upon issuance of the ROD. The FEIS will also contain a proposed decision to amend the BLM Plan. Proposed plan amendment decisions may be protested within 30-days of the proposed decision. BLM cannot make a final decision regarding issuance of a ROW grant or amending the Plan until any Plan protest is resolved.

Under the NEPA process, the significance of the impacts are developed based on the definition of "significantly" provided in NEPA regulations Section 1508.27. This evaluation includes both the context of the action with respect to the affected resources, as well as the intensity of the effect on those resources. The following are considered in evaluating the intensity:

- Whether the impact is beneficial or adverse;
- The degree to which the proposed action affects public health or safety;
- Unique characteristics of the geographic area, including parks, farmlands, wetlands, wild and scenic rivers, or ecologically critical areas;
- The degree to which the effects are likely to be highly controversial;
- The degree to which the effects are highly uncertain or involve unique or unknown risks;
- The degree to which the action may establish a precedent for future actions;
- Whether the action may be individually insignificant, but cumulatively significant when combined with other actions;
- The degree to which the action may adversely affect significant scientific, cultural, or historical resources;
- The degree to which the action may adversely affect an endangered or threatened species or its habitat; and
- Whether the action threatens a violation of federal, State, or local law or requirements imposed for the protection of the environment.

As outlined in NEPA regulations Section 1502.16, the analysis also includes a discussion of both direct and indirect effects and their significance, adverse environmental effects which cannot be avoided, whether impacts are short-term or long-term, and any irreversible or irretrievable commitments of resources.

The decisions to be made by the agencies (licensing by the Energy Commission, and right-of-way grant by BLM) are independent of each other.

DOE Process

When the FEIS is completed and made available to the public by BLM, DOE will carry out an independent review to ensure that DOE comments have been addressed and that the proposed action is substantially the same as the action described in the EIS. If these conditions are met, DOE will adopt the FEIS without recirculating it pursuant to CEQ NEPA regulations at 40 CFR 1506.3(c).

While the FEIS is being developed, DOE will also be carrying out a detailed technical and legal evaluation of the proposed project pursuant to its procedures for loan guarantees set out at 10 CFR Part 609. DOE may reach agreement on a conditional commitment for a loan guarantee prior to completion of the FEIS and the BLM ROW grant; however, in this case a condition precedent will be included in the conditional commitment requiring that the NEPA review and the BLM ROW grant process be completed before DOE closes the loan guarantee transaction.

Following conclusion of the NEPA process and the BLM decision on issuance of the ROW grant, DOE will issue a Record of Decision (ROD) and proceed to close the loan guarantee transaction provided that the applicant has satisfied all the detailed terms and conditions contained in the conditional commitment and other related documents, and all other contractual, statutory, and regulatory requirements.

Agency Coordination

As noted previously, the Energy Commission certification is in lieu of any permit required by state, regional, or local agencies and by federal agencies to the extent permitted by federal law (Pub. Resources Code, § 25500). However, both the Commission and BLM typically seek comments from and work closely with other regulatory agencies that administer LORS that may be applicable to the proposed project. The following paragraphs describe the agency coordination that has occurred through this joint SA/EIS process.

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers (USACE) has jurisdiction to protect water quality and wetland resources under Section 404 of the Clean Water Act. Under that authority, USACE reviews proposed projects to determine whether they may impact such resources, and/or be subject to a Section 404 permit. Throughout the FSA/DEIS process, the Energy Commission, BLM, and the applicant have provided information to the USACE to assist them in making a determination regarding their jurisdiction and need for a Section 404 permit. The USACE rendered a final opinion on May 28, 2009 concluding that the project does not affect waters of the U.S., and thus does not require such a permit.

National Park Service

The National Park Service manages the Mojave National Preserve (MNP), which is located near the proposed project area. Because of the proximity of the MNP, the Park Service has been invited to participate in scoping meetings and public workshops, and has been provided the opportunity review and provide comment on the PSA and FSA/DEIS.

U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (USFWS) has jurisdiction to protect threatened and endangered species under the Endangered Species Act (ESA). Formal consultation with the USFWS under Section 7 of the ESA is required for any federal action that may adversely affect a federally-listed species. The desert tortoise (*Gopherus agassizii*), which occurs in the proposed project area, is a federally-listed threatened species, and therefore formal consultation with the USFWS is required. This consultation has been initiated through the preparation and submittal of a Biological Assessment (BA) which describes the proposed project to the USFWS. Following review of the BA, the USFWS is expected to issue a Biological Opinion (BO) which will specify mitigation measures which must be implemented for the protection of the desert tortoise.

State Water Resources Control Board/Regional Water Quality Control Board

The Lahontan Regional Water Quality Control Board (RWQCB) has the authority to protect both surface water and groundwater resources at the proposed project location. Throughout the FSA/DEIS process, the Energy Commission, BLM, and the applicant have invited the RWQCB to participate in public scoping and workshops, and have provided information to assist the agency in evaluating the potential impacts and permitting requirements of the proposed project. The RWQCB has responded by providing comments that have been evaluated and incorporated into the FSA/DEIS analysis. The agency has also made a determination that the proposed project would impact waters of the state, and has specified conditions to satisfy requirements of a dredge and fill permit/waste discharge requirements. These requirements will be included as a recommended Condition of Certification/Mitigation Measure.

California Department of Fish and Game

The California Department of Fish and Game (CDFG) has the authority to protect water resources of the state through regulation of modifications to streambeds, under Section 1602 of the Fish and Game Code. The Energy Commission, BLM, and the applicant have provided information to CDFG to assist in their determination of the impacts to streambeds, and identification of permit and mitigation requirements. The applicant filed a Streambed Alteration Agreement with CDFG on June 2, 2009. The requirements of the Streambed Alteration Agreement will be included as a recommended Condition of Certification/Mitigation Measure.

CDFG also has the authority to regulate potential impacts to species that are protected under the California Endangered Species Act (CESA). On May 22, 2009, the applicant filed an application for authorization for incidental take of the desert tortoise under Section 2081(b) of the CESA. The requirements of the Incidental Take Permit will be included as a recommended Condition of Certification/Mitigation Measure.

Tribal relationships

The BLM has notified affected Indian Tribes regarding the proposed project, has sought their comments and has invited them to consult on the project on a government-to-government basis.

County of San Bernardino

On March 18, 2008, the BLM California Desert District entered into an MOU with the County of San Bernardino to coordinate environmental reviews for renewable energy projects on public land within the County. Under this MOU, BLM will invite the County to become a cooperating agency for EISs, and will provide opportunities for County staff to review and participate in technical discussions and analyses. San Bernardino Count y has requested cooperating agency status pursuant to the MOU. BLM has provided the County with project-related documentation for their review and evaluation.

Public Coordination

Both the Energy Commission's CEQA-equivalent process and the BLM's NEPA process provide opportunities for public participation in the scoping of the environmental analysis, and in the evaluation of the technical analyses and conclusions of that analysis. For the Energy Commission, this outreach program is primarily facilitated by the Public Adviser's Office (PAO). As part of the coordination of the environmental review process required under the Energy Commission/BLM California Desert District MOU, the agencies have jointly held public meetings and workshops which accomplish the public coordination objectives of both agencies. This is an ongoing process that to date has involved the following efforts.

Libraries

The AFC was sent to the main county libraries in San Bernardino, Barstow, Fresno, and Eureka; the main branches of the San Diego and San Francisco public libraries; the University Research Library at UCLA; the California State Library, and the Energy Commission's library in Sacramento.

Outreach Efforts

The PAO's public outreach is an integral part of the Energy Commission's AFC review process. The PAO reviewed information provided by the applicant and also conducted its own outreach efforts to identify and locate local elected and certain appointed officials, as well as "sensitive receptors" (including schools, community, cultural and health facilities and daycare and senior-care centers, as well as environmental and ethnic organizations). There were not any sensitive receptors identified within a six-mile radius of the proposed site for the project.

Notices for workshops and hearings have been and will continue to be distributed to those agencies, individuals, and businesses that are currently on or request to be placed on the project's mailing list. Notices were distributed for the Informational Hearing and Site Visit, which was conducted on January 4, 2008, in Primm, Nevada. An additional Informational Hearing was held, also in Primm, on January 25, 2008.

Coincident with the PAO's outreach efforts, BLM solicited interested members of the public and agencies through the NEPA scoping process. BLM published a Notice of Intent to develop the EIS and amend the CDCA Plan in the Federal Register, Vol. 72, No. 214, page 62671, on November 6, 2007. The Energy Commission's January 4, 2008 Informational Hearing also acted as the Public Scoping meetings for the EIS, as required by NEPA. On January 9, 2009, BLM published notice of an extension of the

public scoping period, and held an additional joint public scoping meeting on January 25, 2008.

Throughout the process, the Energy Commission and BLM have held additional joint Issue Resolution workshops which were announced and made available to the public. These workshops were held on June 23, 2008 in Primm, Nevada, and on July 31, 2009 in Sacramento, California. The Energy Commission has also continued to accept and consider public comments, and has issued orders granting petitions to intervene to six interested groups including Defenders of Wildlife, Sierra Club, Basin and Range Watch, and Center for Biological Diversity (June 2, 2009), California Native Plant Society, and Western Watersheds .

Those agencies and individuals that have provided comments concerning the project have been considered in staff's analysis. This FSA/DEIS provides agencies and the public with an opportunity to review the Energy Commission staff's analysis of the proposed project. Comments received on this FSA/DEIS will be taken into consideration in preparing the subsequent project documents, including the FEIS.

Energy Commission regulations require staff to notice, at a minimum, property owners within 1,000 feet of a project and 500 feet of a linear facility under its jurisdiction. This was done for the ISEGS project. Staff's ongoing public and agency coordination activities for this project are discussed under the Public and Agency Coordination heading in the **Executive Summary**.

The AFC, the PSA, this FSA/DEIS, and other project documents are located on the Energy Commission's website at http://www.energy.ca.gov/sitingcases/ivanpah/index.html.

Summary of Public and Agency Comments

The BLM and Energy Commission processes include soliciting comments regarding the scope of the analysis from other government agencies, the public, and non-governmental organizations. The persons and organizations which provided scoping comments, and the general issues addressed within their comments, are provided in **Introduction Table 1** below.

Following the publication of the PSA, the Energy Commission received comments on the scope, analytical methodology, and conclusions from other government agencies, the public, and non-governmental organizations. A summary of the comments received on the PSA is provided in **Introduction Table 2** below.

Introduction Table 1 - Scoping Comments Received

Date	Name, Title, Association/ Location	Issue addressed within Comment
Oct. 18,2007	Mack Hakakian, PG, Engineering Geologist, California Regional Water Quality Control Board Lahontan Region	Impacts to surface Water of the State and/or Water of the U.S, pre and post construction stormwater management, Water Quality Certification, Design features (runoff and drainage), Wastewater Discharge
Oct. 25, 2007	Curt Shifrer, Water Resources Control Engineer, California Regional Water Quality Control Board Lahontan Region	Groundwater Quality, Wastewater Discharge, Aboveground Surface Irrigation system, Sub-surface irrigation system
Sept. 26, 2007	Carrie Hyke, AICP, Principal Planner, San Bernardino County Land Use Service Department Advance Planning Division, Environmental & Mining Section, County of San Bernardino Public and Support Services Group, Department of Public Works	Biological Impacts, Cultural Resources, Fire Hazards, Groundwater
Jan. 23, 2009	Alice Bond, Regional Program Coordinator, The Wilderness Society, California/Nevade Regional Office Alex Daue, Renewable Energy Coordinator, The Wilderness Society, BLM Action Center Johanna Wald, Senior Attorney, Natural Resources Defense Council	Encourages agency (Energy Commission and BLM) coordination in ROW permitting application. Addresses characteristics conducive to utility-scale development within the project area. Impacts to Natural, Cultural and Visual Resources, Air Quality. Public Benefits (relating to Greenhouse Gas Emissions)
June 22,2009	Sidney Silliman, San Gorgonio Chapter and Desert Committee, Sierra Club	Designation of Areas of Critical Environmental Concern, retire Clark Mountain Grazing Allotment, Alternative Site Analysis (Site Relocation)

Introduction Table 2 - Comments Received on Preliminary Staff Assessment

Date	Name, Title, Association/ Location	Issue addressed within Comment
Jan. 5, 2009	Nancy Sansonetti, AICP, S.C., Principal Planner/Chief Planning & Permitting Section, County of San Bernardino Public and Support Services Group, Department of Public Works	Sufficiency of the environmental analysis.
Jan. 14, 2009	Jenny Wilder, Apple Valley, Ca.	Groundwater, Assessment of Alternative Locations, Energy Production efficiency

Jan. 14, 2009	Craig Deutsche, Sacramento, Ca.	Habitat and Wildlife (Desert Tortoise), Mitigation
Jan. 14, 2009	George Kerr, Wildlife and Habitat Coordinator, Society for the Conservation of Bighorn Sheep	Impacts to Bighorn Sheep and their habitat
Jan. 21,2009	David Lamfrom, California Desert Field Representative, National Parks Conservation Association	Supports the efforts in using dry cool technology, as well as, for ensuring the public a right to participate in the NEPA/CEQA process. Desert Tortoise
Jan. 22, 2009	Lynn Davis, Fallbrook, Ca.	Impacts to Bird, Animal and Plant Species, Mitigation, Groundwater
Jan. 22, 2009	Sidney Silliman, San Gorgonio Chapter and Desert Committee, Sierra Club	Biological Resources (Animal and Plant Species), Habitat, Visual Resources, Supports the Private Land Alternative
Jan. 23, 2009	Alice Bond, Regional Program Coordinator, The Wilderness Society, California/Nevade Regional Office Alex Daue, Renewable Energy Coordinator, The Wilderness Society, BLM Action Center Johanna Wald, Senior Attorney, Natural Resources Defense Council	Encourages agency (Energy Commission and BLM) coordination in ROW permitting application. Addresses characteristics conducive to utility-scale development within the project area. Impacts to Natural, Cultural and Visual Resources, Air Quality. Public Benefits, Greenhouse Gas Emissions
Jan. 23, 2009	Teresa M. Arnold, AICP , Airport Planning Manager, Las Vegas, McCarran International Airport	Impacts to Jean Sport Aviation Center and proposed Southern Nevada Supplemental Aviation (SNSA), Glare, Thermal Effects, Military Training Routes, Ivanpah Lands Act
Jan. 23, 2009	Kim Delfino, California Program Director, Defenders of Wildlife Joshua Basofin, California Representative, Defenders of Wildlife	Habitat, Endangered Species (Animal and Plant Species), Cumulative Impacts, Assessment of Alternatives
Jan. 30, 2009	Tasha La Doux, Ph.D., Kelso, Ca.	Light Pollution, Impacts to Plant and Animal Species, Economy (Tourism)
Jan. 31, 2009	Kevin Emmerich, Basin and Range Watch Laura Cunningham, Basin and Range Watch	Power Generation (natural gas), Air Quality, Greenhouse Gas Emmsions, Biological Resources (Endangered Species), Species Monitoring, Hazardous Materials Management (Waste Disposal, noxious weed management), Land Use, Wastewater, Detention Pond management, Groundwater (Impacts to Water Quality), Erosion Control, Visual Impacts

ORGANIZATION OF THE DOCUMENT

The FSA/DEIS begins with an Executive Summary, Introduction, Proposed Action Alternative/Project Description, Alternatives, and Cumulative Scenario. The environmental, engineering, and public health and safety analyses of the proposed project are contained in 22 separate chapters. They include the following: Air Quality, Biological Resources, Cultural Resources and Native American Values, Hazardous Materials Management, Land Use, Noise and Vibration, Public Health and Safety, Socioeconomics and Environmental Justice, Soil and Water Resources, Traffic and Transportation, Transmission Line Safety and Nuisance, Visual Resources, Waste Management, , Worker Safety and Fire Protection, Geology, Paleontology and Minerals, Livestock Grazing, Wild Horses and Burros, Recreation, Facility Design, Power Plant Efficiency, Power Plant Reliability, and Transmission System Engineering. These chapters are followed by the general project conditions and a summary of agency and public comments. This is followed by a list of staff who contributed to the document and a reference list.

Each of the 22 technical area assessments includes a discussion of:

- laws, ordinances, regulations and standards (LORS);
- the regional and site-specific setting;
- project direct and indirect impacts;
- mitigation measures;
- closure and decommissioning impacts and mitigation;
- no project/no action alternative;
- cumulative impacts;
- noteworthy public benefits;
- response to public and agency comments on the PSA;
- conclusions and recommendations; and
- mitigation measures/conditions of certification for both construction and operation (as applicable).

PROPOSED ACTION ALTERNATIVE/PROJECT DESCRIPTION

Robert Dover and John Kessler

INTRODUCTION

The applicant for this project consists of Solar Partners I, LLC; Solar Partners II, LLC; Solar Partners IV, LLC; and Solar Partners VIII, LLC (applicant), which are subsidiaries of BrightSource Energy, Inc. On August 31, 2007, the applicant filed an Application for Certification (AFC) with the California Energy Commission (Energy Commission) seeking permission to develop the Ivanpah Solar Electric Generating System (ISEGS) project. The applicant filed four right-of-way (ROW) applications with the U.S. Bureau of Land Management (BLM) for the ISEGS project on August 29, 2007. BrightSource Energy, Inc.(BrightSource), is a technology and development company and the parent company of the four limited liability companies. The Applicant will use BrightSource's solar thermal technology to develop ISEGS. The four ROW applications filed by BrightSource are for projects that are designed and intended to operate while sharing certain common areas and facilities. The analysis contained in the FSA/DEIS applies to the proposed project as a whole. The AFC filed with the Energy Commission and the four applications to BLM include an application for shared facilities including a substation, administration and maintenance buildings within a construction logistics area, and separate applications for the three power plants. On October 31, 2007, the Energy Commission accepted the AFC as data adequate. The applicant's development plans have been updated several times since filing its original AFC and ROW applications with the most substantial revisions summarized as follows in **Project Description Table 1**.

Project Description Table 1
Summary of Applicant's Updates to its ISEGS Development Plans

Date	Reference Document	Project Area	Number of Heliostats	Other Revisions to Proposed Project
AFC and ROW Application				
8-31-07	AFC Section 2.1, page 2-2 (BSE2007a)	3,400	272,000	The original heliostat proposal consisted of a single 7 square meter (m²) mirror hung in a landscape orientation;
Revision 1 – Optimized Project Design				
5-9-08	Data Response 1D, page 4 (CH2ML2008g)	3,700	214,000	1. Reduced the total number of heliostats from 272, 000 in the single-hung to 214,000 in the double-hung mirror configuration (reducing from 68,000 to 55,000 heliostats each for Ivanpah 1 and 2, and reducing from 136,000 to 104,000 heliostats for Ivanpah 3); 2. Doubled the heliostat mirror surface area from 7 to 14 m²; 3. Reduced the number of power towers associated with Ivanpah 1 and 2 from three to one, and increased the height of the power tower from 262 to 459 feet; 4. Moved the project boundaries out an additional 250 feet on the perimeters within the surveyed areas to increase the spacing between the larger heliostats;
Revision 2 – Revision to Site Plans & Stormwater Drainage Design				
6-10-08	Data Response 2A (CH2MHL2008i)	4,065	214,000	1. Revised stormwater drainage plans from pass-through to active management including large detention ponds and conveyance features; 2. The addition of stormwater detention ponds resulted in an increased project area from 3,700 to 4,065 acres; 3. Proposed a high level of grading and ground disturbance;
Note: Because the revised plans were not supported with underlying site characterization assumptions and stormwater calculations, BLM and staff requested supporting information from the applicant. This led the applicant to reconsider its site plans and to develop Revision 3.				
Revision 3 – Revision to Site Plans & Stormwater Drainage Design				
5-18-09	Data Response 2I (CH2ML2009f)	4,073	214,000	1. Revised stormwater drainage plans again, eliminating large detention basins and conveyance features, and relying on existing ephemeral drainages; 2. Proposed Low Impact Development (LID) approach to minimize ground disturbance and to retain as much vegetation as possible; Vegetation would be cut and maintained to a height of 12 – 18" ;
Note: The Power Purchase Agreement would allow utilization of up to 270,000 heliostats.				

PROJECT LOCATION

The applicant has proposed to locate the ISEGS project in the Mojave Desert, near the Nevada border in San Bernardino County, California, on land administered by the BLM. The proposed project site is located 4.5 miles southwest of Primm, Nevada, and 0.5 mile west of the Primm Valley Golf Club, which is located just west of the Ivanpah Dry Lake. Access to site is from the Yates Well Road Interchange on Interstate 15 (I-15) via Colosseum Road. Please see **Project Description Figure 1 – Regional Setting** and **Project Description Figure 2 – Local Setting**.

PROJECT DESCRIPTION

The proposed ISEGS project would be a development of three solar concentrating thermal power plants, which are comprised of fields of heliostats (elevated mirrors guided by a tracking system) focusing solar energy on boilers located on centralized power towers. Each heliostat tracks the sun throughout the day and reflects the solar energy to the receiver boiler. In each plant, one Rankine-cycle reheat steam turbine receives live steam from the solar boilers and reheat steam from the solar reheater. The applicant proposes to develop the ISEGS project as three power plants in separate and sequential phases that are designed to generate a total of 400 megawatts (MW) of electricity. Ivanpah 1 and 2 would each have an electrical generation capacity of 100 MW, and Ivanpah 3 a capacity of 200 MW. Shared facilities consisting of the substation, administration and maintenance buildings would be developed during construction of the first power plant in the Construction Logistics area between Ivanpah 1 and 2.

As noted above in **Project Description Table 1**, since filing the AFC and ROW Application, the applicant's proposed project plans have been updated for design optimization and for two revisions associated with stormwater management approaches. Associated with the Optimized Project Design adjustment of power plant boundaries, the applicant proposed that the western Ivanpah 3 boundary line be moved to exclude the existing mining claim at the limestone outcrop to the west of the project site (CH2ML2008g). The acreages of long term (life of the facility) and temporary disturbances associated with the applicant's final conceptual plans are summarized as follows in **Project Description Table 2**:

Project Description Table 2
Long Term and Temporary Disturbance of BLM Land (acres)

Facility	Acres
Long Term Disturbance	
Ivanpah 1	913.5
Ivanpah 2	920.7
Ivanpah 3	1,836.3
Substation	16.1
Administration/warehouse & parking	8.9
Southwest Gas Company's Kern River Gas Line Tap Station (100' X 150')	0.3
Southwest Gas Company's Metering Set for Ivanpah 1 & 2 (20' X 40')	0.02
Groundwater Wells [10' x 10' area for 2 supply wells and 1 monitoring well)	0.01
Transmission Towers (8' x 8' area every 750 feet)	0.01
Linear Facilities (Colosseum Road, Gas, Water & Transmission Lines)	16.9
Subtotal – Long Term Disturbance	**3,712.7**
Temporary Disturbance	
Main Construction Laydown Area	260.0
Equipment Laydown and Wash Area	21.5
Contractor Trailers	20.1
Colosseum Road Improvement (100-ft wide construction corridor from Golf Club to Ivanpah 2, less asphalt road)	12.4
Southwest Gas Company's construction laydown	5.0
Gas line (75' wide construction disturbance from tap to Ivanpah 3 for 2,011 feet)	2.9
Southwest Gas Company's Kern River Gas Line tap construction area (200' x 200')	0.9
Adjustment for Roads	(1.8)
Subtotal – Temporary Disturbance	**321.0**
Existing Transmission Line Corridor (within Construction Logistics Area)	38.9
Total ISEGS Project Land Use	**4,073**
Overview of ISEGS Project Land Use	
Ivanpah 1	**913.5**
Ivanpah 2	**920.7**
Ivanpah 3	**1,836.3**
Construction Logistics Area	**377.5**
External Features to ISEGS Project Boundaries (Roads & Natural Gas Line)	**24.5**
Total ISEGS Project Land Use	**4,073**

Source: CH2ML2009f

The proposed project would cause long term disturbance of about 3,713 acres, temporary disturbance of 321 acres, and including the existing transmission line corridor of about 39 acres within the Construction Logistics area, ISEGS would utilize about

4,073 acres (6.4 square miles) of federal land managed by BLM. Please see **Project Description Figure 3 – Visual Simulation from Benson Mine/Mojave Preserve**.

SOLAR POWER PLANT EQUIPMENT AND FACILITIES

HELIOSTATS

Each heliostat would be configured with two mirrors hung in the portrait position. Each mirror would be 7.2 feet high by 10.5 feet wide, providing a reflective surface of 75.6 square feet (7.04 m²) per mirror or 14.08 m² per heliostat (See **Project Description Figure 4 – Double Mirror Heliostat**). The overall height of the heliostats would be about 12 feet. The heliostats would be connected with communication cables strung aboveground between each heliostat. The communications cables would transmit signals from a computer-programmed aiming control system that would direct the movement of each heliostat to track the movement of the sun (CH2ML2009f). Heliostats in the northern section of the heliostat array have the highest solar collection efficiency because the sun is predominantly in the southern horizon, and they have the most direct reflection angle to the power towers (most perpendicular to the face of the mirror as it reflects to the power tower). Conversely, heliostats in the southern section of the heliostat array have the lowest solar collection efficiency. The eastern sector of heliostats is more valuable than the western sector because afternoon energy collection during on-peak utility hours, is more valuable than morning energy collection during partial-peak or off-peak hours. In consideration of the relative efficiency of heliostats depending on their orientation to the power tower, the applicant indicated that the number of heliostat rows increased from least to greatest according to this efficiency in order of southern, western, eastern and northern sectors respectively (BSE2007a, page 2-5).

The heliostats would normally travel by day within the range of the stowed position with the mirrors facing vertically upwards to the track position at some angle higher than facing horizontally. At night, the heliostats would normally be maintained in the stowed position. Approximately every 2 weeks, the mirror would travel from the stowed to the wash position for night-time mirror washing with the mirrors facing horizontally. Daily positioning of the heliostats would occur as follows:

1. At dawn, when likely all heliostats would be moved from stowed to track position to begin reflecting solar energy to the receiver/boiler;

2. During mid-day, when some heliostats would be returned to the stowed position to not exceed solar energy capacity limits of the receiver/boiler;

3. During late-afternoon or evening, when the stowed heliostats would be returned to track position to increase solar energy directed to the receiver/boiler as the sun's position begins to lower in the western horizon and be less optimal for energy production;

4. At nightfall, when all heliostats would be returned to the stowed position or to the wash position for mirror washing at a frequency of about once every two weeks (CH2ML 2009f).

The number of heliostats described under the Optimized Project Design (55,000 each for Ivanpah 1 and 2, and 104,000 for Ivanpah 3) represents the maximum number of heliostats that would be constructed; however, all of them may not be constructed. Although the number of heliostats within Ivanpah 1 and 2 have been reduced about 19.1 percent, the permitted surface area of the heliostats would increase about 61.8 percent from about 5,283,600 square feet (~490,960 square meters) to about 8,547,000 square feet (~794,200 square meters). In Ivanpah 3, with a 23.5 percent reduction in the number of heliostats, the reflective surface area permitted would increase about 52.9 percent from about 10,567,200 square feet (~981,920 square meters) to about 16,161,600 square feet (~1,501,760 square meters). This surface area increase would result in additional electricity production (MW-hours) on an annual basis with no change in installed capacity (MW) and with only a small amount of additional land. Under the Optimized Project Design, the applicant has not proposed any changes in the steam turbine-generators and interconnection capacity (CH2ML2008g).

The applicant's proposed increase in heliostat mirror surface area associated with the Optimized Project Design led the applicant to also propose an increase in total ISEGS area of about 300 acres and extension of the project boundaries of the three power plants by 250 feet along each perimeter. The proposed increase in the heliostat mirror area is a result of the following considerations:

1. The double-hung mirror configuration is taller than the single-hung orientation, and the resulting increase in shadowing requires greater distance between the arrays, with the result that the last rows are farther from the towers. Energy collection is less efficient the farther the mirrors are from the tower receivers, so additional heliostat surface area (approximately 5 to 10 percent) is needed to achieve the same annual energy output.

2. The Applicant has also sought to increase the annual electricity production from the same facility by adding heliostat surface area, an efficiency gain made possible by the double mirror configuration. Daily solar output is less in the early morning hours and later afternoon hours. Adding heliostat surface area results in increased heat to the receivers and increased steam to the steam turbine during these otherwise lower production hours. During the peak hours of the day, these additional mirrors will be placed on standby since the steam turbine remains the same size and cannot accept additional steam. The double-hung heliostats are more compact and use less land than the single-hung heliostats, which creates the opportunity for additional heliostat surface area within the same land area. This means that the land is more productive, and that the impacts per kilowatt hour (kWh) of production are less.

3. Finally, a portion of the increased heliostat surface area to be licensed ensures that the project will be able to meet its contractual output requirements even if the solar resource is less than forecasted. The final rows of heliostats may not be necessary. Pending the results of actual performance during plant operation, a decision will be made on whether or not to install the additional heliostats. Thus, the project optimization represents the maximum number of heliostat structures and heliostat surface area (CH2ML2008g).

SOLAR POWER TOWERS

Another result of the applicant's Optimized Project Design was to revise the number and height of the solar power towers for Ivanpah 1 and 2. In the original application, Ivanpah 1 and 2 would have required three power tower receivers and one solar reheater; each would have stood 262 feet high. The revised site design incorporated only one power tower for each Ivanpah 1 and 2, with an increased height to 459 feet, consistent with the height of the five power towers for Ivanpah 3. The decrease from three power towers to one each for Ivanpah 1 and 2 also resulted in a change in the orientation of the heliostats as they are generally arranged concentrically around the power tower. Ivanpah 3 would have five power tower receivers situated with one in each quadrant, and one central to the Ivanpah 3 site, each with a height of 459 feet. The central power tower of Ivanpah 3 would include the power block with one steam turbine-generator supplied superheated steam by the five power tower boilers. Steam from the four quadrant solar power tower boilers would be conveyed by above-ground pipeline.

The solar power tower is a metal structure designed specifically to support the boiler and efficiently move high-quality steam through a STG at its base. The power tower support structure would be about 120 meters high (approximately 393 feet). The receiving boiler (which sits on top of the support structure) would be 20 meters tall (approximately 66 feet) including the added height for upper steam drum and protective ceramic insulation panels (See **Project Description Figure 5 – Power Block and Power Tower Elevations**). Overall, each of the seven power towers would have a height of 140 meters (approximately 459 feet). Additionally, a Federal Aviation Administration (FAA)-required lighting and a lightning pole would extend above the top of the towers approximately 10 feet. The height of the power towers allows heliostats from significant distances to accurately reflect sunlight to the receiving boiler. The receiving boiler is a traditional high-efficiency boiler positioned on top of the power tower. The boiler converts the concentrated energy of the sun reflected from the heliostats into superheated steam. The boiler's tubes are coated with a material that maximizes energy absorbance. The boiler has steam generation, superheating, and reheating sections and is designed to generate superheated steam at a pressure of 160 bars and a temperature of 550 degrees Celsius (°C).

POWER BLOCK

Each solar power plant (Ivanpah 1, 2 and 3) would have a power block located in the approximate center of the power plant area. The power block would include a solar power tower, a receiver boiler, a steam turbine-generator (STG) set, air-cooled condensers, and other auxiliary systems. Each of the three solar-thermal plants would include the following equipment and facilities in their power block:

- natural gas-fired start-up boiler;
- the air emission control system for the combustion of natural gas in the start-up boiler;
- steam turbine generator;
- air-cooled condenser;

- auxiliary equipment (feed water heaters, a de-aerator, an emergency diesel generator, diesel fire pump, etc.);
- a raw water tank with a 250,000 gallon capacity, to supply water for plant use and fire fighting; and a
- water treatment system.

Each of the three power plants includes a partial-load, natural gas-fired steam boiler, which would be used for thermal input to the turbine during the morning start-up cycle to assist the plant in coming up to operating temperature more quickly. The boiler would also be operated during transient cloudy conditions, in order to maintain the turbine on-line and ready to resume production from solar thermal input, after the clouds pass. After the clouds pass and solar thermal input resumes, the turbine would be returned to full solar production and the boilers would be shut down. The solar field and power generation equipment are started up each morning after sunrise and insolation build-up, and shut down in the evening when insolation drops below the level required to keep the turbine on line. The natural gas-fired boilers would not be big enough to allow operation for sustained periods of reduced sunlight (i.e., on cloudy days or at night). Heat input from natural gas would not exceed 5% of the heat input from the sun, on an annual basis. The natural gas-fired boiler use would not exceed four hours on any given day, and average use would be less than one hour per operating day. Solar heat would be used to keep each boiler in hot standby mode, capable of responding to demand on short notice. No fuel would be fired while a boiler is on hot standby. Please see **Project Description Figure 6 – Ivanpah 1 Solar Field and Project Description Figure 7 – Ivanpah 1 Power Block**.

RELATED EQUIPMENT AND FACILITIES

The following related equipment and facilities described in this section are included as part of the proposed action. All would be constructed, operated and maintained by the one or more of the individual applicants except for the Ivanpah Substation. The Ivanpah Substation would eventually be constructed, operated and maintained by the transmission line owner, Southern California Edison but is included in this analysis because it is directly connected to this proposed action.

NATURAL GAS PIPELINE

The solar heat used in the boiler (steam) process would be supplemented by burning natural gas to heat a partial load steam boiler when solar conditions are insufficient. Each power plant within the project would include a small package, natural gas-fired start-up boiler to provide additional heat for plant start-up and during temporary cloud cover. Natural gas would be supplied to the site through a new, proposed six-mile long distribution pipeline ranging from 4 to 6 inches in diameter. From the Kern River Gas Transmission pipeline, the pipeline would extend 0.5 miles south to the northern edge of Ivanpah 3. The ROW area required for this section of the pipeline would be 75 feet wide and 0.5 miles long. The line would then run east along the northern edge, and then south along the eastern edge, of Ivanpah 3 to a metering station near the southeast corner of Ivanpah 3. From there, a supply line would extend northwest into the Ivanpah 3 power block. The main pipeline would continue along the eastern edge of Ivanpah 2 to another metering station at its southeastern corner. Again, a branch supply line will

extend northwestwards into the center of the Ivanpah 2 power block. From that station, the pipeline would follow the paved access road from Colosseum Road past the administration/warehouse building to the Ivanpah 1 power block. The extensions of the pipeline into the power blocks would be located within the project fenceline. However, the sections of pipeline along the northern boundary of Ivanpah 3, and then the eastern boundaries of Ivanpah 3 and 2, would be located outside of the fenced heliostat area, in order to allow access to the pipeline for maintenance.

A new tap metering station of approximately 100 feet by 150 feet in area would be located at the Kern River Gas Transmission Line. The tap station would measure and record gas volumes. Facilities would be installed at the tap station to regulate the gas pressure, to remove any liquids or solid particles, and facilitate the use of pigs for pipeline inspection and cleaning. Once measured this tap would be a custody transfer point in the sale of natural gas to the applicant. In addition to the tap station, separate metering sets would be installed for each of the power plant sites. The three metering sets would measure and record gas volumes utilized at each individual power plant. As part of the Optimized Project Design, the location of the proposed gas line was re-routed along the west side of Ivanpah 2 and 3 to provide the applicant access to the line for service/repair work (CH2ML2008g). Please see **Project Description Figure 8 – Site Plan and Linear Facilities**.

AIR POLLUTION CONTROL

Air pollution emissions from the combustion of natural gas in the start-up boiler would be controlled using best available control technology. Each boiler would be equipped with low-Nitrogen Oxide (NOx) burners for NOx control. Carbon Monoxide (CO) would be controlled using good combustion practices such as burner and control adjustment based on oxygen continuous monitoring, operator training and proper maintenance. Particulate and Volatile Organic Compounds (VOC) emissions will be minimized through the use of natural gas as the fuel. To ensure that the systems perform correctly, continuous emission monitoring for NO_x and CO would be performed. Boiler use would not exceed four hours on any given day, and average boiler use would be less than one hour per operating day.

WATER SUPPLY AND DISCHARGE

The facilities would require a water source to support operations, including process water consisting of make-up water for the steam system and wash water for the heliostats, and potable water for domestic water needs. Groundwater would be supplied from one of two wells that would be constructed at the northwest corner of Ivanpah 1, just outside the perimeter fence but within the construction logistics area. Each of the three power blocks would be connected to the groundwater wells by underground water pipelines. The applicant estimates project water consumption would not exceed a maximum of 100 acre-feet per year (afy) for all three solar plants combined, which would primarily be used to provide water for washing heliostats (mirrors) and to replace boiler feed water blow-down. The applicant has estimated that average annual water demands for all project operating needs would be on the order of 77 afy allocated as shown in **Project Description Table 3.**

Project Description Table 3
Annual Average ISEGS Water Demands (acre-feet/year)

Facility	Mirror Wash	Boiler Makeup	Total
Ivanpah 1	11	7	18
Ivanpah 2	11	7	18
Ivanpah 3	21	16.5	37.5
Potable Water			2.9
Total	**43**	**30.5**	**76.4**

The quality of groundwater would be improved using a treatment system for meeting the requirements of the boiler make-up and mirror wash water. Water treatment equipment would consist of activated carbon filters, de-ionization media, and a mixed-bed polisher. Each power plant would have a 250,000 gallon raw water storage tank. Approximately 100,000 gallons would be usable for plant process needs and 150,000 gallons would be reserved for fire protection. Demineralized water would be stored in a 25,000-gallon demineralized water storage tank. Boiler feedwater make-up water will be stored in another 25,000-gallon tank.

Because the BLM expressed concern that the two original proposed well locations would interfere with monitoring and regulation of the Primm Valley Golf Club Colosseum wells, the applicant relocated the proposed wells 4,250 feet south of their original location to the northwest corner of Ivanpah 1. This would eliminate the need for a separate access road and minimize land disturbance. In addition to supply wells, a monitoring well would be installed between the Ivanpah supply wells and the Primm Valley Golf Club wells (CH2ML 2008g).

FIRE PROTECTION

The fire protection system would be designed to protect personnel and limit property loss and plant downtime in the event of a fire. The primary source of fire protection water would be the 250,000 gallon raw water storage tank to be located in each power block. Approximately 100,000 gallons would be usable for plant process needs and 150,000 gallons would be reserved for fire protection. An electric jockey pump and electric motor-driven main fire pump would be provided to increase the water pressure to the level required to serve all fire fighting systems. In addition, a backup diesel engine-driven fire pump would be provided to pressurize the fire loop if the power supply to the electric motor-driven main fire pump fails. All fire protection systems would be focused on the power blocks, administration/warehouse building, and other areas of active operations. The project would not include any specific facilities to address potential wild fires.

ACCESS ROADS AND MAINTENANCE PATHS

Access to the project site would occur from the Yates Well Road exit from I-15 to Colosseum Road. Colosseum Road, currently a dirt road, would be paved to a 30-foot wide, two lane road for a distance of 1.9 miles from the Primm Valley Golf Club to the facility entrance. A portion of the current route of Colosseum Road would be

incorporated into the Ivanpah 2 plant site, so the road would be diverted for a distance of 1.66 miles. A segment of 1.2 miles would be re-routed around the southern end of Ivanpah 2 and paved, and then an additional 0.46 mile, 12-foot wide dirt segment would link the paved road to the existing dirt road to the west of Ivanpah 2. Please see **Project Description Figure 9 – Access Roads**.

Within the heliostat fields, maintenance paths would be established concentrically around the power blocks to provide access for heliostat washing and maintenance. The paths would be established between every other row of heliostats. An additional maintenance path would be established on the inside perimeter of the boundary fence. Within each unit, a diagonal dirt road would be established to provide access to the concentric maintenance paths and the power blocks.

Off-road, recreational vehicle trails currently authorized by BLM which run through the proposed project site would be re-located outside of the project boundary fence. The trails that would be rerouted are:

1. Trail 699226, which passes through the northern third of Ivanpah 3, would be rerouted along the northern border of Ivanpah 3;

2. Trail 699198 would be rerouted between Ivanpah 2 and 3; and

3. An unnumbered trail on the east side of Ivanpah 3 would be relocated outside the project site so that it would provide continued access to the limestone outcrop.

CONSTRUCTION LOGISTICS AREA, SUBSTATION, AND ADMINISTRATIVE COMPLEX

The applicant proposes using a temporary construction logistics area for staging contractor equipment and trailers, assembly yards, storage of materials, equipment laydown and wash area, construction personnel parking, and assembly areas for heliostats. The construction logistics area would be located between Ivanpah 1 and 2 and would comprise approximately 377.5 acres. Following project construction, the majority of the area would undergo site closure, rehabilitation, and revegetation as described in the Draft Closure, Revegetation, and Rehabilitation Plan (CH2ML2009q). A 40-acre portion of this area would be used as a botanical succulent storage and stockpiling area.

The administrative complex and substation area would be located within the perimeter of this 377.5 acre logistics area. The administrative complex, comprising 8.9 acres, would be used as a common area to support all three solar facilities. These facilities would include an administration/warehouse building and asphalt-paved parking lot. Please see **Project Description Figure 10 – Construction Logistics Area**.

FENCING

The project area would be surrounded by security fence, which would be constructed of 8-foot tall galvanized steel chain-link, with barbed wire at the top as required. The security fence would surround the outer perimeter of each power plant, the substation, and the administrative complex. Tortoise barrier fence would also be installed in accordance with the Recommended Specifications for Desert Tortoise Exclusion

Fencing (USFWS 2005). The tortoise fence would consist of 1-inch horizontal by 2-inch vertical galvanized welded wire. The fence would be installed to a depth of 12 inches, and would extend 22 to 24 inches above the ground surface and integrated with the security fence.

In addition to use of the proposed right-of-way area, the applicant proposes some project-related maintenance and monitoring activities to occur outside of the project perimeter fence. As presented in the applicant's Revised Project Description, a variety of project-related activities must be conducted outside of the project security fence, including:

- Inspection and maintenance of security fence and tortoise exclusion fence;
- Underground utility repairs;
- Installation of new underground pipeline;
- Maintenance of drainage systems, including removal of debris and sediment; and
- Installation of new stormwater drainage systems (CH2MHL 2009f).

In addition to these activities, a roadway would need to be maintained outside of the project fence to allow vehicle and equipment access for these activities. The Revised Project Description does not define specific locations or acreages for these activities. Instead, it states that some activities, such as installation of new stormwater drainage systems, could disturb greater than one acre, with no upward bound placed on the projected disturbance.

Throughout most of the proposed right-of-way area, the applicant proposes that the security and tortoise exclusion fence be inset from the right-of-way boundary to allow access for these activities. These inset distances range from 65 feet where natural gas pipeline is buried to 12 feet in areas without pipeline. In some preliminary drawings submitted by applicant, it is unclear if the fence is inset sufficiently to allow access for proposed maintenance and monitoring activities. Applicant has also stated the potential area of disturbance associated with new stormwater drainage systems is defined as "one acre or more". Since the buffer distance between the security fence and the right-of-way boundary in other areas is as narrow as 12 feet, the development of stormwater drainage systems that exceed one acre in size would likely extend outside of the right-of-way boundary and would require supplemental environmental review and analysis and appropriate land use authorizations and permits (CH2ML2009e, Drainage, Erosion and Sediment Control Plan Figure 15 – Access Roadway Plan). Please see **Project Description Figure 9 – Access Roads**.

TRANSMISSION SYSTEM INTERCONNECTION AND UPGRADES

The ISEGS project would deliver power from Ivanpah 1, 2 and 3 via three separate 115-kilovolt (kV) transmission generation tie lines to a new Ivanpah substation that would be owned and operated by Southern California Edison and located in the common construction logistics area between Ivanpah 1 and 2. The new Ivanpah substation would be about 850 feet by 850 feet and located on a little over 16 acres. Each of the power plants would have a switchyard with a step-up transformer to increase the 13.8 kV generator output voltage to 115 kV. The ISEGS #1 115 kV generator tie line would be

approximately 5,800 feet long and supported by single-pole structures. The ISEGS #2 and #3 generator tie lines would share the same poles for the last 1,400 feet of their routes before they interconnect to SCE's Ivanpah Substation. The ISEGS #2 generator would connect to the Ivanpah Substation through a 115kV, 3,900 feet-long single circuit generator tie line built with the last 1,400 feet merged with the ISEGS #3 generator tie line to create a 1,400 feet long, overhead double circuit line prior to entering the Ivanpah Substation. The ISEGS #3 generator tie line would be an approximately 14,100 feet long, single circuit, 115 kV line and would merge into a 115kV double circuit with the ISEGS #2 generator tie line.

In accordance with the Interconnection Agreement between the applicant and SCE, the existing Eldorado-Baker-Cool Water-Dunn Siding-Mountain Pass 115-kV line would loop in and out through the newly built Ivanpah Substation to interconnect the project to the SCE transmission grid. This 115-kV line is currently aligned between the Ivanpah 1 and 2 sites along a northeast-southwest right-of-way. In order to accommodate the total anticipated 1,400 MW load generation by ISEGS and five other planned renewable energy generation projects in the region, the California Independent System Operator (California ISO) has identified approximately 36 miles of transmission line within California and Nevada that would need to be upgraded from 115 kV to 220 kV. SCE is in the process of developing a project to upgrade the transmission system, which includes removing the existing 115-kV transmission lines and constructing a new double-circuit 220-kV transmission line between the existing Eldorado Substation in Nevada and the proposed new Ivanpah Substation in California. The upgraded to 220-kV transmission line by SCE and the 1,400 MW of planned renewable energy projects are discussed in the Cumulative Scenario and analyzed as cumulative impacts throughout this document. Additional upgrades required as mitigation in order for ISEGS to receive final approval of interconnection to California ISO and Non-California ISO controlled facilities include replacing an existing 115/230 kV, 102 megavolt-ampere (MVA) transformer bank at the Eldorado Substation with 115/230 KV, 280 MVA bank and modifying a Special Protection System affecting the Eldorado-Baker-Cool Water-Dunn Siding-Mountain Pass 115-kV line. These additional upgrades would be accomplished within the property boundaries of existing developed facilities and are being addressed in a separate CEQA/NEPA analysis by the Californina Public Utilities Commission and the BLM.

SCE has filed an application for a Certificate of Public Convenience and Necessity from the California Public Utilities Commission (CPUC) for the transmission line upgrade. They have also filed an application for a ROW from the BLM. The CPUC will serve as the lead agency for CEQA compliance for the approximately five-mile portion of the transmission line work within California. BLM will serve as the lead agency for National Environmental Policy Act compliance. BLM published a Notice of Intent to prepare an Environmental Impact Statement/Environmental Impact Report (EIS/EIR) with the CPUC on July 27, 2009. SCE is completing required inventories and preparing reports for the joint environmental analysis of the transmission line upgrade.

TELECOMMUNICATIONS FACILITIES

The proposed Ivanpah Substation would also require that new telecommunication infrastructure be installed to provide protective relay circuit and a supervisory control

and data acquisition (SCADA) circuit, together with data and telephone services. The telecommunication path from Ivanpah Substation to the local carrier facility interface at Mountain Pass area consists of approximately eight miles of fiber optic cable to be installed overhead on existing poles and through new underground conduits to be constructed in the substation and telecom carrier interface point. This fiber optic route consists of two segments. The first segment is from Ivanpah Substation to Mountain Pass Substation using the existing Nipton 33-kV distribution line poles built along the transmission line corridor that crosses between Ivanpah 1 and 2. The second segment is from Mountain Pass Substation to the telecommunications facility approximately 1.5 miles away at an interface point to be designated by the local telecommunication carrier. The fiber cable would be installed on the existing 12-kV distribution line poles.

PROJECT DESIGN AND MANAGEMENT APPROACH

STORMWATER MANAGEMENT APPROACH

The proposed project site is located on an alluvial fan that acts as an active stormwater conveyance between the Clark Mountain Range to the west and the Ivanpah Dry Lake to the east. In addition to receiving direct precipitation that results in stormwater runoff, rainfall within the mountains to the west passes through the proposed project site along a complex series of braided channels that are normally dry throughout the year. In response to the original AFC, CEC and BLM provided a series of Data Requests (Numbers 53 through 60, and Number 139) which requested a variety of information and calculations describing the proposed site grading and stormwater management systems, with the intention of understanding both the potential impact of the proposed development on downstream stormwater flow and sedimentation rates, and the potential impact of stormwater on the facilities (heliostats, fences, roads, buildings, and power blocks) installed as part of the proposed project.

In response to the referenced Data Requests, the Applicant developed an iterative series of conceptual design plans, calculations, and other supporting materials which have resulted in the currently proposed stormwater design and management system. This proposed system, defined in Data Response Set 2I (CH2ML2009f), generally relies on a Low-Impact Development (LID) design concept which attempts to minimize disruption to natural stormwater flow pathways. The elements of the applicant's design approach include:

- Minimizing the areas of direct vegetation removal. Where possible, natural vegetation would be left in place and undisturbed during construction activities. This is to be accomplished through the use of equipment selected to maximize slope-climbing capability, minimize width of footprint, minimize weight of equipment and ground pressure, and allow extended reach across multiple heliostat rows. Vegetation would be actively removed only in the power block areas, long term access roads, and areas where topography modification is required for access or construction. In other areas, vegetation may be cut to facilitate access for construction, but existing root systems would remain in place. Additional cutting of vegetation during active operations would be conducted to avoid interference with mirror movement.

- Minimizing the areas of grading and leveling. Grading would be conducted in areas where existing topography must be modified for installation and operations. This primarily includes the northern portion of Ivanpah 3, and may also include limited areas within Ivanpah 1 and 2.
- Providing for active stormwater management in limited areas. Active stormwater management generally includes construction of erosion protection features, diversion channels, detention ponds, and culverts for road crossings. For the proposed project, these systems would be limited to diversion channels around the power block areas, and installation of erosion protection and/or culverts at channel crossings along the long term access roads (CH2ML2009f). Please see **Project Description Figure 11 – Existing Watershed and Primary Washes** and **Project Description Figure 12 – Overall Grading Plan**.

PROJECT CONSTRUCTION

The applicant anticipates ISEGS construction would be performed in the following order: 1) the Construction Logistics Area; 2) Ivanpah 1 (the southernmost site) and other shared facilities; 3) Ivanpah 2 (the middle site); and 4) Ivanpah 3 (the 200-MW plant on the north). However, it is possible that the order of construction may change. The shared facilities will be constructed in connection with the first plant construction, whether it is Ivanpah 1, 2, or 3. Prior to construction, geotechnical testing, heliostat installation tests, and heliostat load tests would be performed in each of the three units. This testing was performed in Ivanpah 1 in the summer of 2009, under a Temporary Use Permit granted by BLM. Should the right-of-way be approved, the additional testing in Ivanpah 2 and 3 would occur within the approved right-of-way area under the conditions associated with the right-of-way grant.

Construction is planned to take place over approximately 48 months, with the applicant's desire that it could begin during the first quarter of 2010 and be completed during the fourth quarter 2013. The applicant has estimated the overall durations and aerial extent of grading at the 3 sites and common construction logistics area as follows:

1. Ivanpah 1 and Common Construction Logistics Area - Total of 4 - 5 months for everything comprising the common construction logistics area (laydown, administration and other buildings, main access roads, road to access gas line, and the substation) and Ivanpah 1 comprising the diagonal access roads, perimeter road for fence, channel crossings as needed, and the power block;

2. Ivanpah 2 - Total of 3 - 4 months comprising the diagonal access roads, perimeter road for fence, channel crossings as needed, power block, and grading of approximately 170 acres in the southwest region of the power plant area;.and

3. Ivanpah 3 - Total of 5 months comprising the diagonal access roads, perimeter road for fence, channel crossings as needed, five solar power tower area and one power block, and grading of approximately 360 acres in the northern and western regions of the power plant area.

Project construction would be performed in accordance with plans and mitigation measures that would assure the project conforms with applicable LORS and would

avoid significant adverse impacts. These plans that are to be developed by the applicant, for which some have already been prepared in draft and reviewed by staff to support this environmental analysis, and the necessary mitigation measures, are specified in the Conditions of Certification as appropriate of each technical area of this FSA/DEIS. Of the plans already prepared in draft by the applicant, those that have contributed most significantly to define the proposed plan of development including construction procedures are as follows:

- Draft Contractor Health and Safety Standards (CH2ML 2009g)
- Administrative Draft ISEGS Construction Stormwater Pollution Prevention Plan (CH2ML 2009d)
- Preliminary Draft Plan, Revision 2, Drainage, Erosion, and Sediment Control Plan (CH2ML 2009e)
- Draft Raven Management Plan, ISEGS (CH2ML 2008v)
- Draft Desert Tortoise Translocation/Relocation Plan for ISEGS (CH2ML 2009c)
- Application for Incidental Take Permit Under Section 2081 of the Fish and Game Code (CH2ML2009i)
- Draft Biological Assessment for the ISEGS Project (CH2ML 2008u)
- Streambed Alteration Agreement Application (CH2ML 2009j)
- Weed Management Plan for ISEGS, Eastern Mojave Desert (CH2ML 2008o)

FACILITY OPERATION AND MAINTENANCE

Assuming the construction of Ivanpah 1, 2 and 3 were to begin in a sequential fashion during the first quarter of 2010 and be completed during the fourth quarter of 2013, the applicant would expect to commence commercial operation in the fourth quarter for each of the power plants beginning in 2011 at Ivanpah 1, in 2012 at Ivanpah 2, and in 2013 at Ivanpah 3. The proposed project would be designed for an operational life of 50 years. During this period, project operations would be supported by a variety of operational, maintenance, and monitoring activities. Within the power blocks, operations would include transmission of water and natural gas into the power block, and operation of the natural gas-fired start-up boiler, the air emission control system for the combustion of natural gas in the start-up boiler, a steam turbine generator, an air-cooled condenser, and auxiliary equipment (feed water heaters, a de-aerator, and an emergency diesel generator, diesel fire pump).

Within the heliostat fields, operations would include routine washing of mirrors on a rotating basis, every two weeks. Washing would utilize water accessed from the groundwater supply wells, following treatment in the water treatment system. Water requirements would include approximately 2.5 gallons every 2 weeks, for a total consumption of 42.7 acre-feet per year. Washing would be done using a truck-mounted pressure washer. Maintenance would also include clipping of vegetation that could interfere with mirror movement to a height of 12 – 18 inches, management of weeds as specified in the Applicant's Weed Management Plan (CH2ML2008o), and use of soil binder and weighting agents to minimize dust accumulation on the mirrors and fugitive dust as could occur by wind or vehicle traffic.

In addition to those activities, discussed above, that would occur within the fenced area, certain routine inspection and maintenance activities would be conducted outside the project security fence. Activities to be conducted outside of the security fence may include inspection and maintenance of the buried natural gas pipeline, the buried water pipelines, and the fence itself, including its desert tortoise exclusion features.

Similar to project construction, facility operations would be performed in accordance with plans and mitigation measures that would assure the project conforms with applicable LORS and would avoid significant adverse impacts. These plans that are to be developed by the applicant, for which some have already been prepared in draft and reviewed by staff to support this environmental analysis, and the necessary mitigation measures, are specified in the Conditions of Certification as appropriate of each technical area of this FSA/DEIS. Of the plans already prepared in draft by the applicant, those that have contributed most significantly to define the proposed plan of development including operating procedures are as follows:

- Draft Contractor Health and Safety Standards (CH2ML 2009g)
- Preliminary Draft Plan, Revision 2, Drainage, Erosion, and Sediment Control Plan (CH2ML 2009e)
- Draft Raven Management Plan, ISEGS (CH2ML 2008v)
- Application for Incidental Take Permit Under Section 2081 of the Fish and Game Code (CH2ML2009i)
- Draft Biological Assessment for ISEGS (Ivanpah SEGS) Project (CH2ML 2008u)
- Weed Management Plan for ISEGS, Eastern Mojave Desert (CH2ML 2008o)

WASTE MANAGEMENT

Non-hazardous solid wastes generated during construction would include approximately 280 tons of scrap wood, concrete, steel/metal, paper, glass, scrap metals and plastic waste (BSE2007a, § 5.14.4.1.1). All non-hazardous wastes would be recycled to the extent possible and non-recyclable wastes would be collected by a licensed hauler and disposed in a Class III solid waste disposal facility. Generation of hazardous wastes anticipated during construction includes over 100 5-gallon empty hazardous material containers which would include 4,300 pounds of solvents, waste paint, and adhesives; 3,000 pounds of oil absorbents, used oil, oily rags; and varying amounts of batteries, and waste oil filters. Hazardous wastes would be recycled to the extent possible and disposed in either a Class I or II waste facility as appropriate.

All operational wastes produced at ISEGS would be properly collected, treated (if necessary), and disposed of at either a Class I or II waste facility as appropriate. Wastes include process and sanitary wastewater, nonhazardous waste and hazardous waste, both liquid and solid. A septic system for sanitary wastewater would be located at the administration building/operations and maintenance area, located between Ivanpah 1 and 2. Portable toilets would be placed in the power block areas of each the three solar facilities and pumped by a sanitary service provider. Process wastewater from all equipment, including the boilers and water treatment equipment would be recycled. If necessary, a small filter/purification system would be used to treat project groundwater and provide potable water at the administration building. Any reject

streams from water treatment would be trucked off site for treatment or disposal at either a Class I or II waste facility as appropriate. Additionally, two concrete-lined holding basins, approximately 40 feet by 60 feet by 6 feet deep in size, would be part of each power block facility, and would serve for boiler commissioning and emergency outfalls from any of the processes.

HAZARDOUS WASTE MANAGEMENT

Hazardous materials used during facility construction and operations would include paints, epoxies, grease, transformer oil, and caustic electrolytes (battery fluid). Several methods would be used to properly manage and dispose of hazardous materials and wastes. Waste lubricating oil would be recovered and recycled by a waste oil recycling contractor. Chemicals would be stored in appropriate chemical storage facilities. Bulk chemicals would be stored in large storage tanks, while most other chemicals would be stored in smaller returnable delivery containers. All chemical storage areas would be designed to contain leaks and spills in concrete containment areas.

PROJECT DECOMMISSIONING

Following the operational life of 50 years, the project owner would perform site closure activities to meet federal and state requirements for the rehabilitation and revegetation of the project site after decommissioning. The procedures to be used for project decommissioning and restoration are defined in the Applicant's Draft Closure, Revegetation, and Rehabilitation Plan (CH2ML2009q). Under this plan, all aboveground structures and facilities would be removed to a depth of three feet below grade, and removed offsite for recycling or disposal. Concrete, piping, and other materials existing below three feet in depth would be left in place. Areas that had been graded would be restored to original contours. Succulent plant species would be salvaged prior to construction, transplanted into windrows, and maintained for later transplanting following decommissioning. Shrubs and other plant species would be revegetated by the collection of seeds, and re-seeding following decommissioning.

Similar to project construction and facility operations, decommissioning would be performed in accordance with plans and mitigation measures that would assure the project conforms with applicable LORS and would avoid significant adverse impacts. These plans that are to be developed by the applicant, for which some have already been prepared in draft and reviewed by staff to support this environmental analysis, and the necessary mitigation measures, are specified in the Conditions of Certification as appropriate for each technical area of this FSA/DEIS. Of the plans already prepared in draft by the applicant, those that have contributed most significantly to define the proposed plan of development including decommissioning procedures are as follows:

- Draft Closure, Revegetation, and Rehabilitation Plan (CH2ML2009q)
- Draft Contractor Health and Safety Standards (CH2ML 2009g)
- Preliminary Draft Plan, Revision 2, Drainage, Erosion, and Sediment Control Plan (CH2ML 2009e)
- Draft Raven Management Plan, ISEGS (CH2ML 2008v)
- Application for Incidental Take Permit Under Section 2081 of the Fish and Game Code (CH2ML2009i)

- Draft Biological Assessment for the ISEGS (Ivanpah SEGS) Project (CH2ML 2008u)
- Weed Management Plan for ISEGS, Eastern Mojave Desert (CH2ML 2008o)

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BSE2007a – Bright Source Energy / J. Woolard (tn: 42174). Application for Certification, Volumes I and II, for the Ivanpah Solar Electric Generating System. Dated 8/28/2007.

CEC2008o – California Energy Commission / M. Jones (tn: 48836). System Impact Study Application for Confidentiality. Dated 10/30/2008.

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CH2ML2008e – CH2M Hill/ J. Carrier (tn: 45322). Attachment DR 93-1B, Interconnection System Impact Study. Dated 2/11/2008.

CH2ML2008g – CH2M Hill/ / J. Carrier (tn: 46239). Data Responses Set 1D. Dated 5/09/2008.

CH2ML2008i – CH2M Hill/ J. Carrier (tn: 46666). Data Response Set 2A –. Dated 6/10/2008.

CH2ML2008m – CH2M Hill / J. Carrier (tn: 47190). Data Response, Set 2B. Dated 7/22/2008.

CH2ML 2008o - CH2M Hill/ J. Carrier (tn: 47476). Data Response 1F - Weed Management Plan for ISEGS, Eastern Mojave Desert. Dated 8/6/2008.

CH2ML2008u – CH2M Hill/ J. Carrier (tn: 48033). Data Responses Set 2D – Draft Biological Assessment. Dated 9/12/2008.

CH2ML 2008v - CH2M Hill/ J. Carrier (tn: 48034). Data Response Set 1H - Draft Raven Management Plan, Ivanpah Solar Electric Generating System. Dated 9/12/2008.

CH2ML 2009c - CH2M Hill/ J. Carrier (tn: 50610). Data Response Set 2A - Draft Desert Tortoise Translocation/Relocation Plan for ISEGS. Dated 3/19/09

CH2ML2009d - CH2M Hill/ J. Carrier (tn: 51575). Data Response Set 2B - Draft ISEGS Construction Stormwater Pollution Prevention Plan. Dated 5/13/2009.

CH2ML2009e - CH2M Hill/ J. Carrier (tn: 51576). Data Response Set 2H - Drainage, Erosion and Sediment Control Plan. Dated 5/13/2009.

CH2ML2009f – CH2M HILL / J. Carrier (tn 51597). Data Response Set 2I – Project Description and Stormwater Plans. Dated on 05/18/2009. Submitted to CEC / J. Kessler on 05/18/2009.

CH2ML2009g - CH2M Hill/ J. Carrier (tn: 51612). Data Response Set 2C - Draft Contractor Health and Safety Standards. Dated 5/19/2009.

CH2ML2009i - CH2M Hill/ J. Carrier (tn: 51720). Data Response Set 2D - Application for Incidental Take Permit Under Section 2081 of the Fish and Game Code. Dated 5/27/2009.

CH2ML 2009j - CH2M Hill/ J. Carrier (tn: 51790). Data Response 1L - Streambed Alteration Agreement Application. Dated 6/2/2009.

CH2ML 2009q – CH2M HILL / J. Carrier (tn 52208). Data Response Set 2K – Draft Closure, Revegetation, and Rehabilitation Plan. Dated on 06/30/2009. Submitted to CEC / J. Kessler on 06/30/2009.

PROJECT DESCRIPTION - FIGURE 1
Ivanpah Solar Electric Generating System - Regional Setting

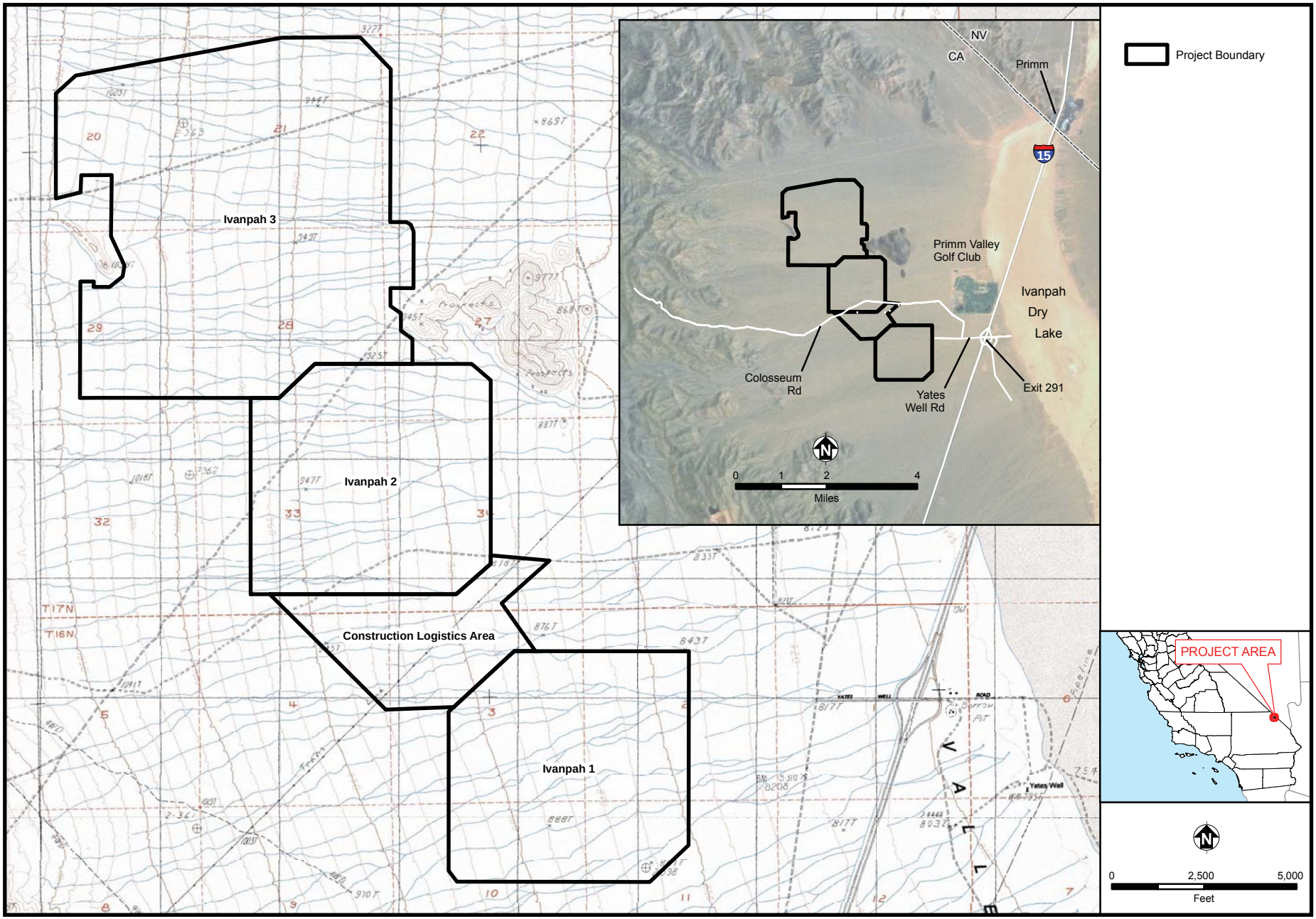


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SOURCE: AFC Figure 1

OCTOBER 2009

PROJECT DESCRIPTION - FIGURE 2

Ivanpah Solar Electric Generating System - Local Setting



PROJECT DESCRIPTION

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SOURCE: Attachment DR130-2B Figure 1

PROJECT DESCRIPTION - FIGURE 3

Ivanpah Solar Electric Generating System - Visual Simulation view from Benson Mine / Mojave Preserve

OCTOBER 2009



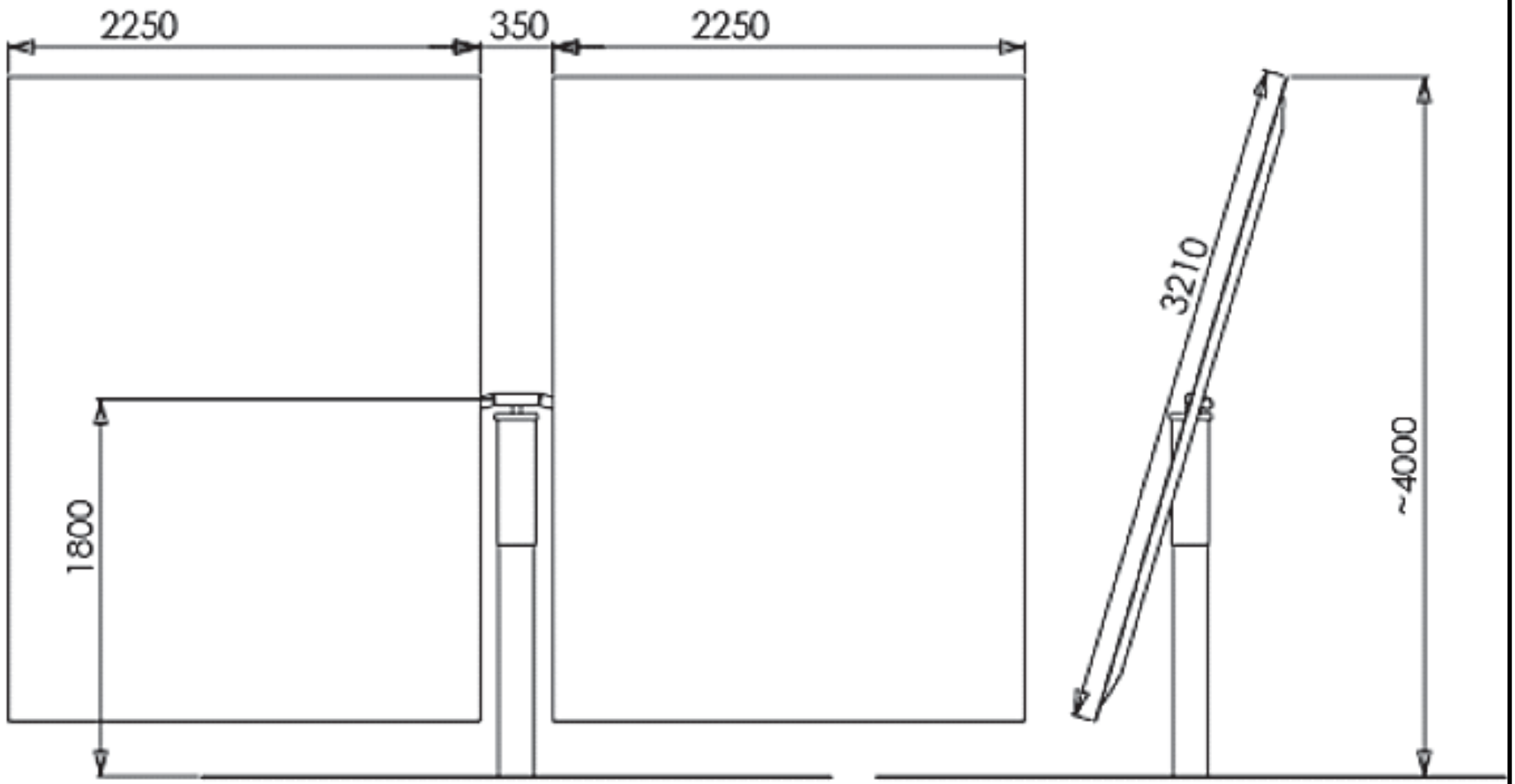
PROJECT DESCRIPTION

U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009

SOURCE: Data Response Set 2C #148 Figure DR 147-3

PROJECT DESCRIPTION - FIGURE 4

Ivanpah Solar Electric Generating System - Double Mirror Heliostat



Double-mirror heliostat

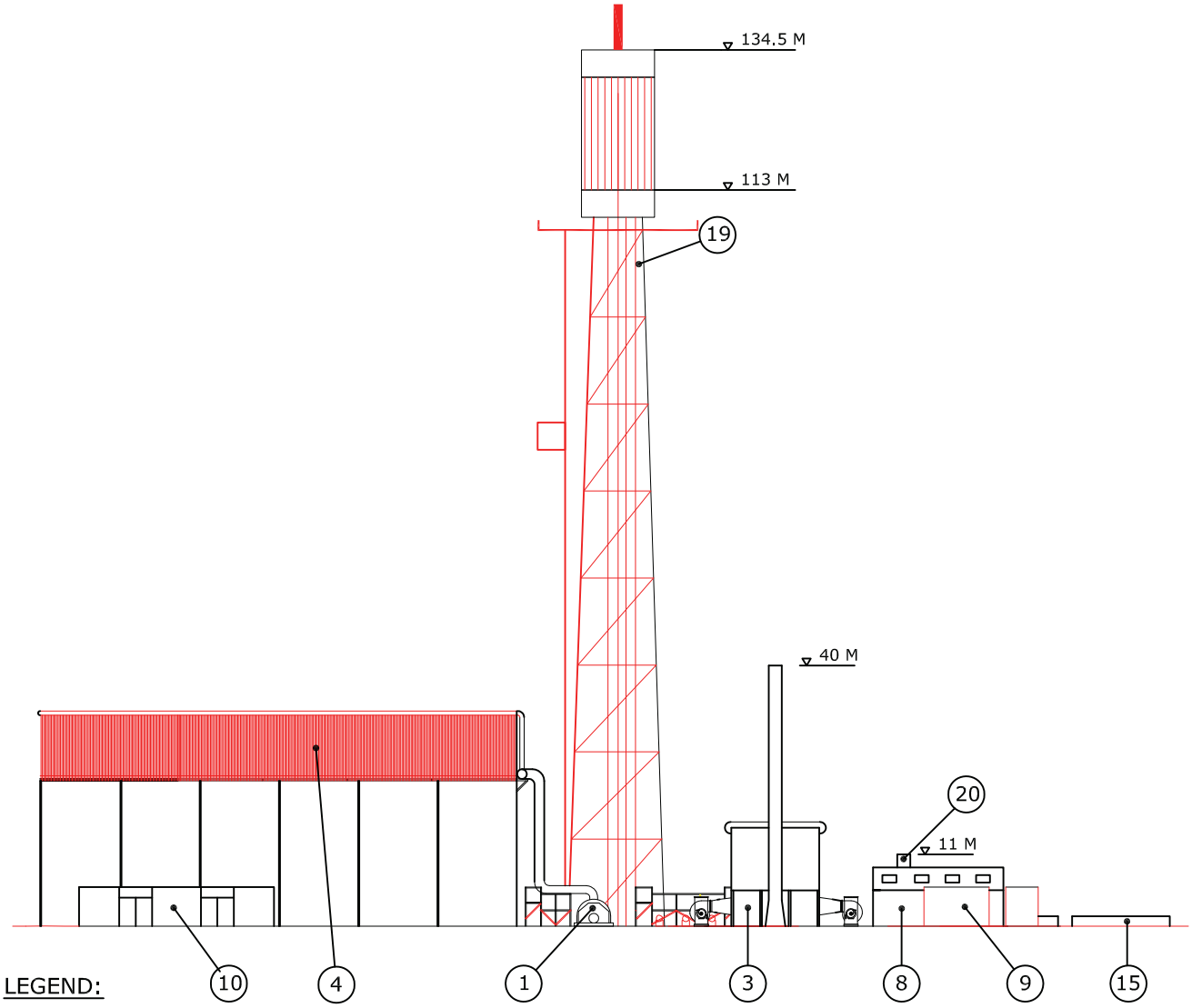
Note: Units are in millimeters.

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SOURCE: DR SET 1D # 102-1R

PROJECT DESCRIPTION - FIGURE 5

Ivanpah Solar Electric Generating System - Power Block Power Tower Elevations



LEGEND:

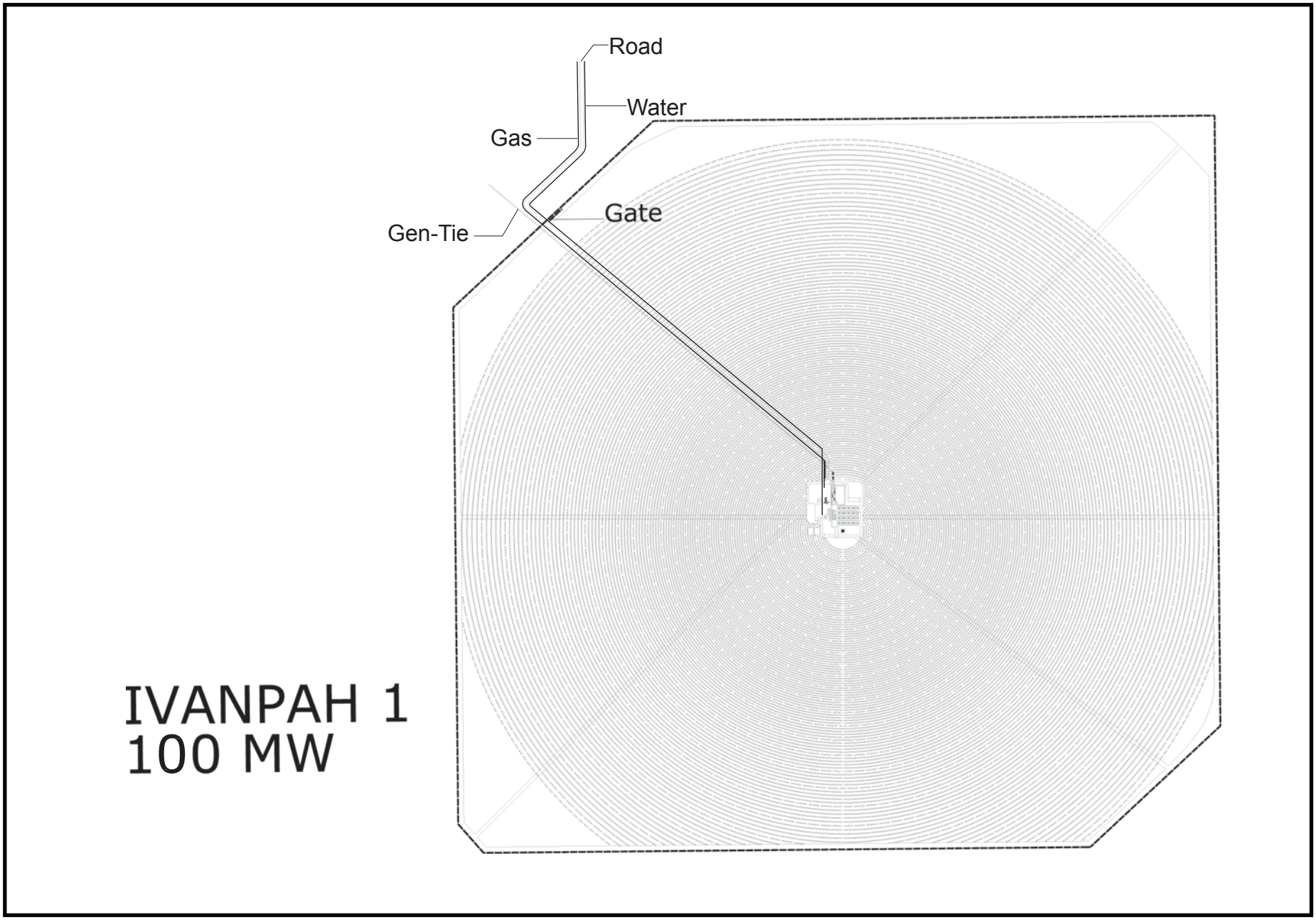
1- TURBINE
2- GENERATOR
3- BOILER
4- AIR COOLED CONDENSER
5- FEED WATER PREHEATER
6- DEAERATOR
7- STEAM DISTRIBUTOR
8- WATER TREATMENT PLANT ,ADMINISTRATION & ELECTRICAL BUILDING
9- WATER STORAGE TANKS
10- MAINTENANCE WING
11-SWITCH YARD
12-TURBINE LUBRICATION SYSTEM
13-PIPE BRIDGE
14-GAS PIPE
15-EVAPORATION PITS
16-[RESERVED]
17-EMERGENCY GENERATOR
18-DIESEL FIRE PUMP
19- REHEATER TOWER
20- EMERGENCY GENERATOR EXHAUST

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SOURCE: AFC Figure 2.2-C

PROJECT DESCRIPTION - FIGURE 6

Ivanpah Solar Electric Generating System - Ivanpah 1 Solar Field



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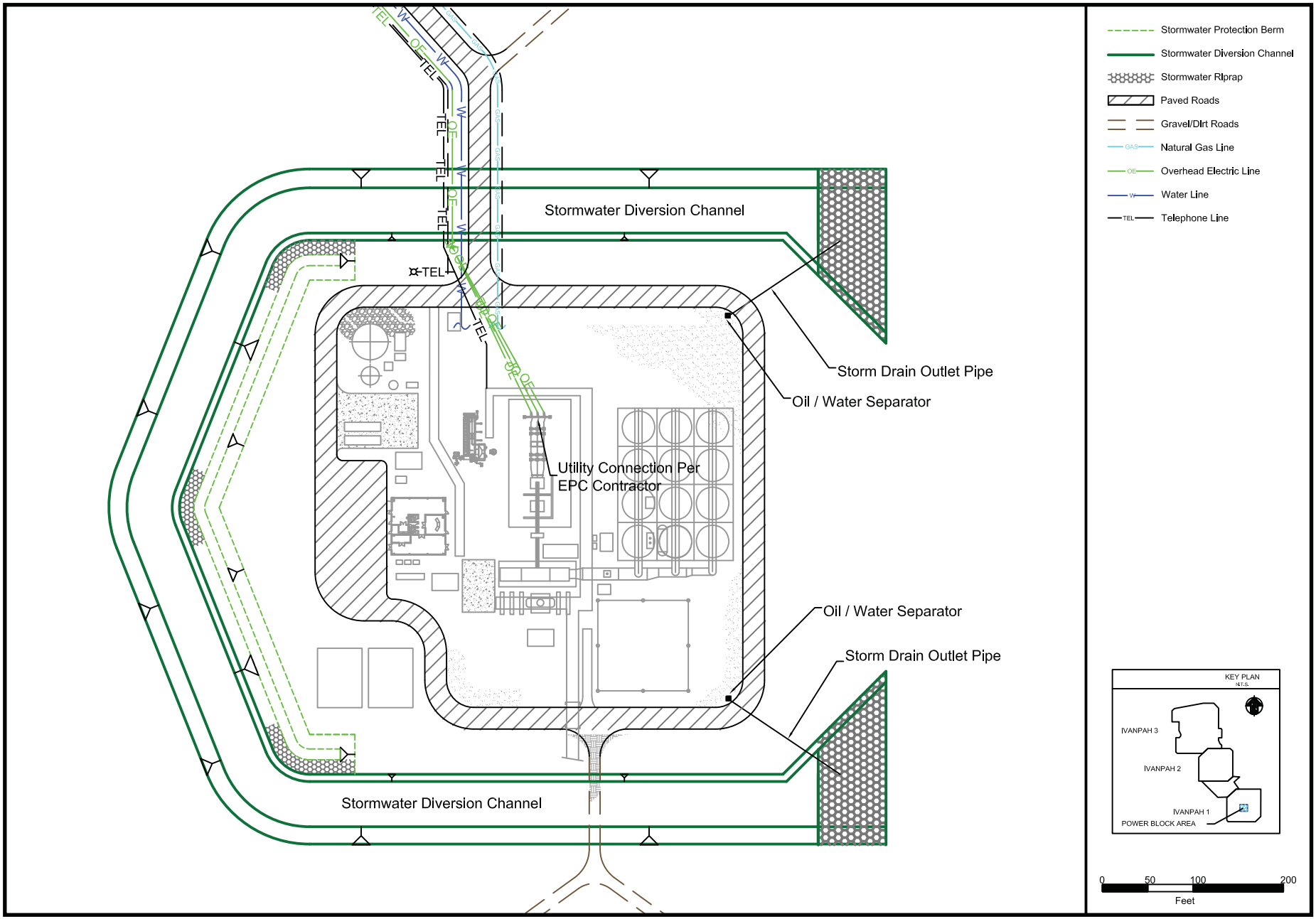
SOURCE: Data Response Set 1D- Figure DR4-1

OCTOBER 2009

PROJECT DESCRIPTION

PROJECT DESCRIPTION - FIGURE 7

Ivanpah Solar Electric Generating System - Ivanpah 1 Power Block

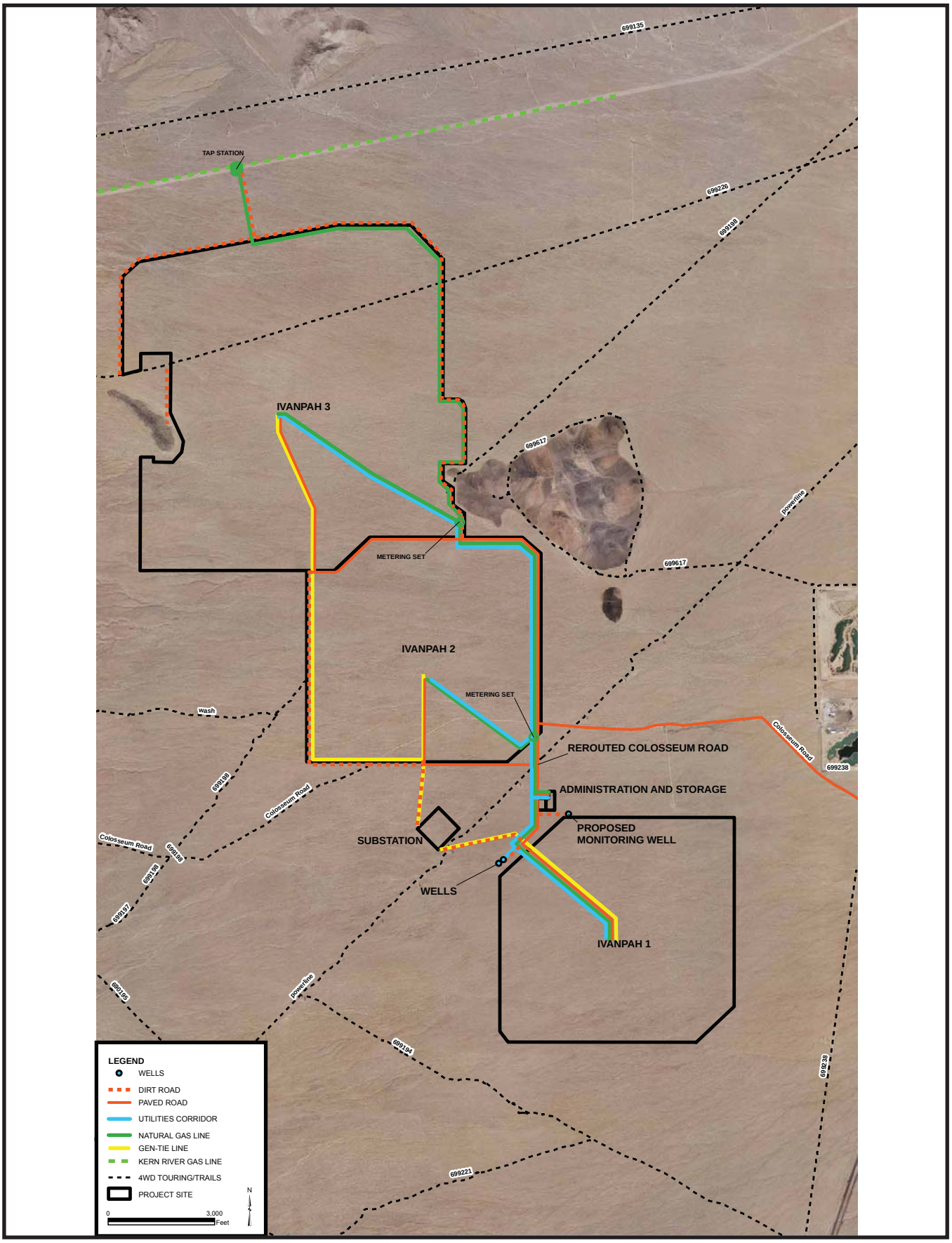


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SOURCE: Attachment DR130-2B Figure 7

PROJECT DESCRIPTION - FIGURE 8

Ivanpah Solar Electric Generating System - Site Plan and Linear Facilities

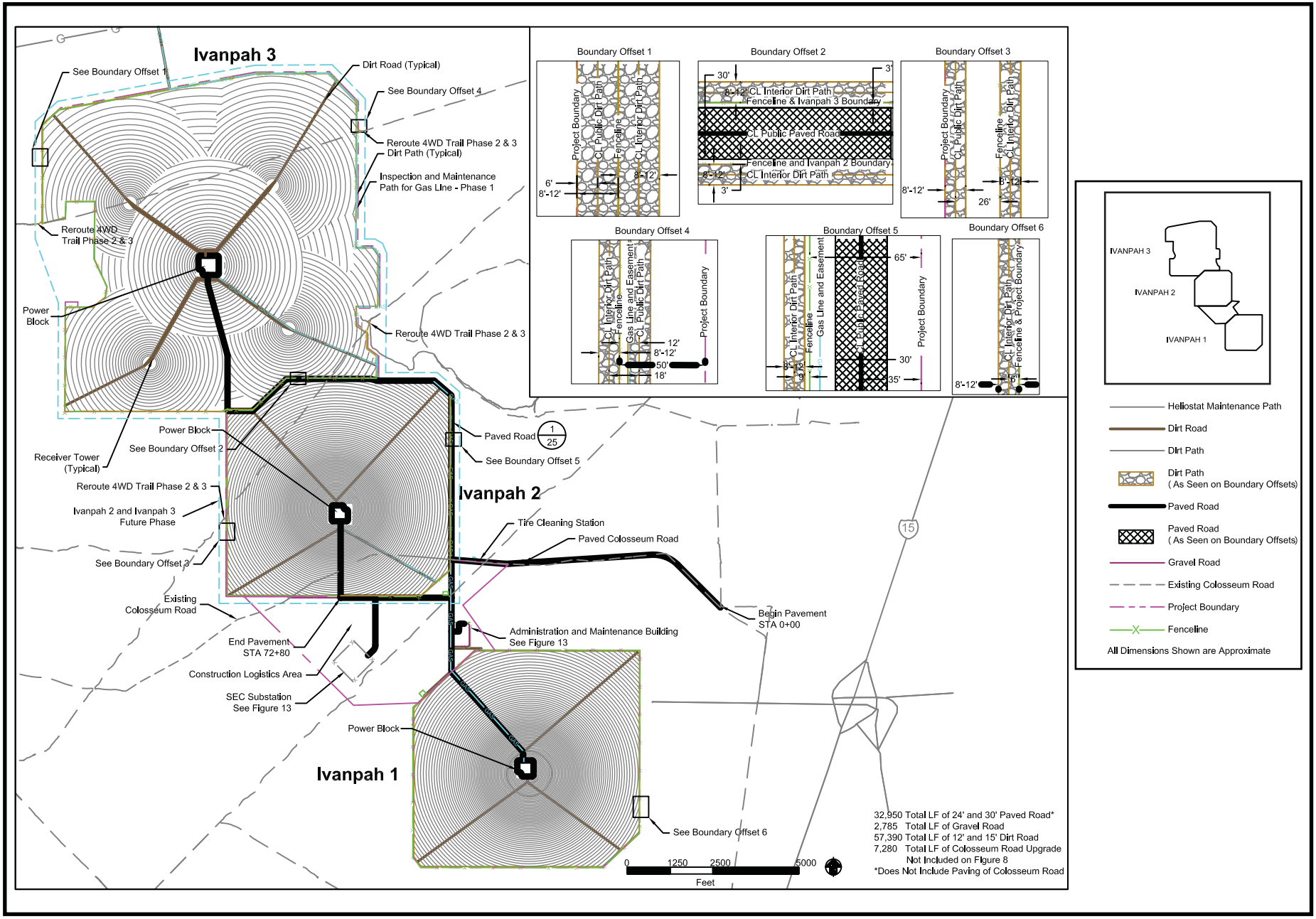


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SOURCE: Data Response 2I - Fig.1 - Trails

PROJECT DESCRIPTION - FIGURE 9

Ivanpah Solar Electric Generating System - Access Roads



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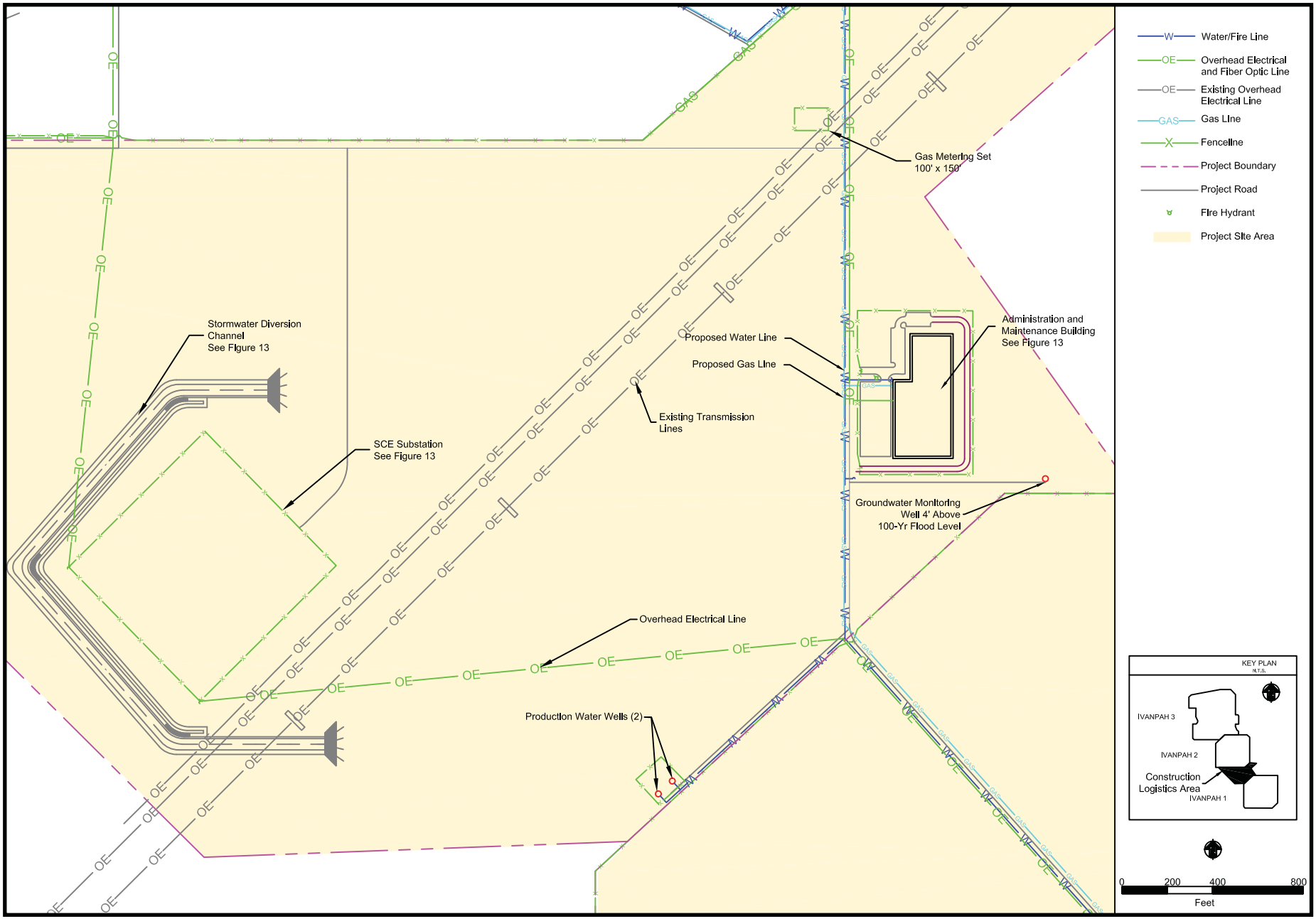
SOURCE: Attachment DR130-2B Figure 15

OCTOBER 2009

PROJECT DESCRIPTION

PROJECT DESCRIPTION - FIGURE 10

Ivanpah Solar Electric Generating System - Construction Logistics Area

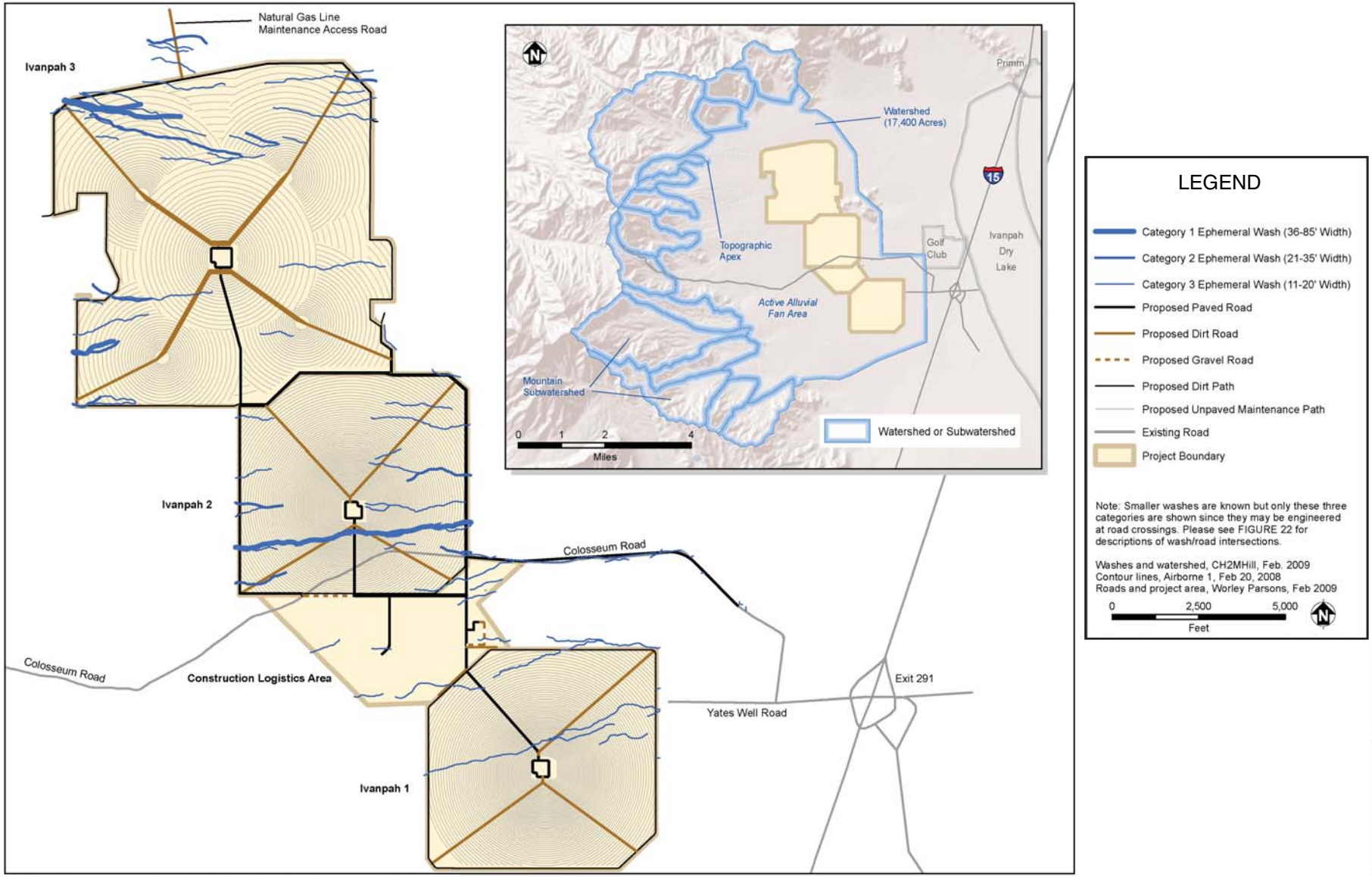


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SOURCE: Attachment DR130-2B Figure 4

PROJECT DESCRIPTION - FIGURE 11

Ivanpah Solar Electric Generating System - Existing Watershed and Primary Washes

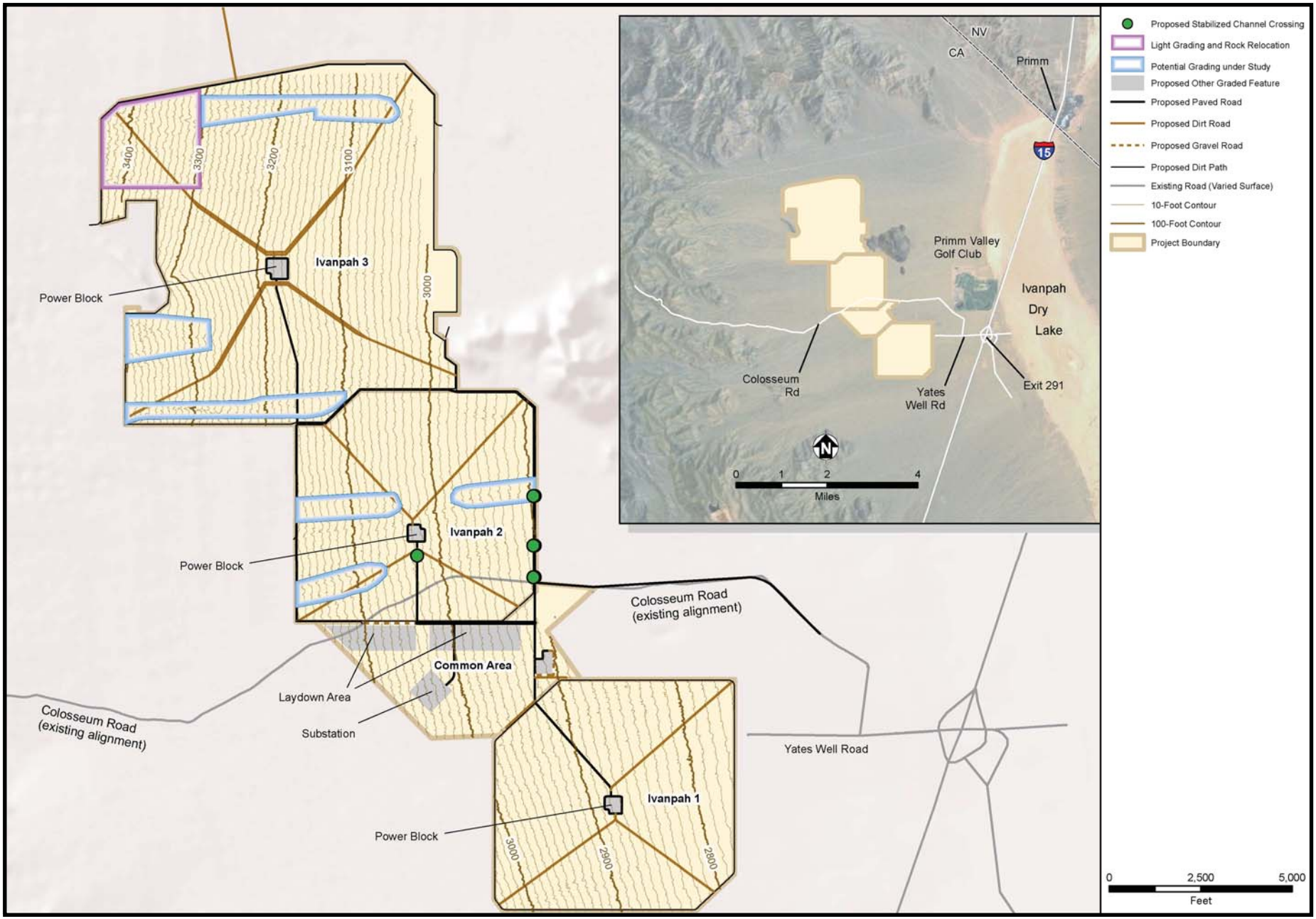


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SOURCE: Attachment DR130-2B Figure 8

PROJECT DESCRIPTION - FIGURE 12

Ivanpah Solar Electric Generating System - Overall Grading Plan



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SOURCE: Attachment DR130-2B Figure 11

ALTERNATIVES

Prepared by Susan V. Lee

SUMMARY OF CONCLUSIONS

In the CEC's analysis of the Ivanpah Solar Electric Generation Station (ISEGS) project, 23 alternatives to the ISEGS project have been developed and evaluated. These include eight alternative site locations, a range of different solar and renewable technologies, generation technologies using different fuels, and conservation/demand-side management. Of the 23 alternatives, the only alternative that was determined to be both feasible and have the potential to result in lesser impacts was the No Project/No Action alternative.

Since no other ROW application was brought forward by the applicant, the BLM will respond to the ROW application for the ISEGS project as proposed. Therefore, the only alternatives that are within the agency's jurisdiction, and that meet the purpose and need for the proposed project, are approval of the right-of-way (the Proposed Project Alternative) and denial of the right-of-way (No Project/No Action Alternative). A detailed analysis of these two alternatives is presented within the resource-specific sections of this FSA/DEIS.

Although only the Proposed Project and No Project/No Action Alternatives are within the agency's jurisdiction, Section 1502.14(c) of the NEPA regulations requires that the agency develop and evaluate reasonable alternatives that are not within the jurisdiction of the agency, and which are outside of the capability of the applicant to implement. This situation is specifically addressed in Question Number 2a of the Council on Environmental Quality's (CEQ's) guidance document of NEPA's 40 Most Asked Questions. The CEQ response to Question Number 2a, which requests guidance on alternatives analysis with respect to federal consideration of permit applications, requires that reasonable alternatives outside of the lead agency's jurisdiction be developed and analyzed. These alternatives are not to be limited to the agency's approval/denial decision, nor limited to alternatives that are desirable from the standpoint of the applicant. Instead, they are to include all reasonable alternatives that are practical and feasible from the technical and economic standpoint.

To address this requirement, this section presents a technical analysis of 22 additional alternatives which include alternative sites, technologies, and conservation/demand-side management. Although selection of the 22 additional alternatives evaluated within this section is not within the agency's jurisdiction and they have not been proposed by the applicant as alternatives to the proposed project, they do constitute sites, technologies, site configurations, and management strategies that are potentially feasible technically and economically.

After a comprehensive evaluation, CEC concludes that none of the eight alternative site locations were found to offer reduced impacts as compared with the proposed site. In addition, the sites at Broadwell Lake and Siberia East would be considered infeasible by the Bureau of Land Management (BLM), because both sites have current active applications that must be separately evaluated on its own merits. The ISEGS applicant

desires to construct solar generation facilities at both of these locations in addition to the ISEGS project.

Alternative solar thermal technologies (parabolic trough, Stirling dish, utility scale solar photovoltaics, and linear Fresnel) as well as the proposed project technology were considered. As with distributed power tower technology, these technologies would not substantially change the severity of visual impacts or biological resources impacts, though land requirements vary among the technologies. CEC concludes that rooftop solar photovoltaic (PV) facilities would likewise require extensive acreage, although rooftop PV would minimize the need for undisturbed open space. However, increased deployment of rooftop solar PV faces challenges in manufacturing capacity, cost, and policy implementation.

Other generation technologies (wind, geothermal, biomass, tidal, wave, natural gas, and nuclear) were also examined as possible alternatives to the project. These technologies would either be infeasible at the scale of the ISEGS project, or would not eliminate significant impacts caused by the ISEGS project without creating their own significant impacts in other locations. A natural gas plant would contribute to greenhouse gas emissions and would not meet the project's renewable generation objective. Construction of new nuclear power plants is currently prohibited under California law.

Conservation and demand side management programs would likely not meet the state's growing electricity needs that could be served by the ISEGS project. In addition, these programs would not provide the renewable energy required to meet the California Renewable Portfolio Standard requirements.

CEC Staff also believes that the No Project/No Action alternative is not superior to the proposed project. This alternative would likely delay development of renewable resources or shift development to other similar areas, and would lead to increased operation of existing power plants that use non-renewable technologies.

INTRODUCTION

BrightSource Energy, Inc. proposes to build the ISEGS solar facility on BLM land, which is under the jurisdiction of the federal government. Since the BLM is a federal agency, the ISEGS power plant is subject to review under the National Environmental Policy Act (NEPA) in addition to the California Environmental Quality Act (CEQA). The purpose of this alternatives analysis is to comply with State and Federal environmental laws by providing an analysis of a reasonable range of feasible alternative which could substantially reduce or avoid any potentially significant adverse impacts of the proposed project. This section summarizes the potentially significant impacts of the proposed project and provides a CEQA analysis of different technologies and alternative sites that may reduce or avoid significant impacts.

Twenty-three alternatives to the ISEGS project have been developed and evaluated in this section. These include eight alternative site locations, as well as different solar technologies, different renewable technologies, generation technologies using different fuels, and conservation/demand-side management. The evaluation in this section includes whether the alternative would be feasible in accomplishing the objectives for

the project, as well as whether it would result in impacts which are substantially lesser than those of the proposed action. BLM has reviewed this analysis of alternatives and has determined that none to the alternative locations or technologies analyzed would meet the purpose and need for the proposed action and therefore these alternatives have been eliminated from further consideration by BLM. Of the 23 alternatives, the only alternative which was determined to be both feasible and result in lesser impacts was the No Project/No Action alternative. The No Project/No Action alternative is analyzed in further detail by both BLM and CEC within each of the technical sections of this document, and is considered for selection as the preferred alternative as required by both CEQA and NEPA.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS

BrightSource Energy, Inc. proposes to build the ISEGS solar facility on federal land within the jurisdiction of the Bureau of Land Management (BLM). Since the BLM is a federal agency and the California Energy Commission has State authority to approve thermal power plants, the ISEGS power plant is subject to review under both NEPA and CEQA.

CALIFORNIA ENVIRONMENTAL QUALITY ACT CRITERIA

The *Guidelines for Implementation of the California Environmental Quality Act*, Title 14, California Code of Regulation, section 15126.6(a), provides direction by requiring an evaluation of the comparative merits of "a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project." In addition, the analysis must address the "no project" alternative (Cal. Code Regs., tit. 14, § 15126.6(e)). The applicant's objectives are described in the section entitled Alternatives Screening Methodology: Project Objectives.

The range of alternatives is governed by the "rule of reason" which requires consideration only of those alternatives necessary to permit informed decision making and public participation. CEQA states that an environmental document does not have to consider an alternative of which the effect cannot be reasonably ascertained and of which the implementation is remote and speculative (Cal. Code Regs., tit. 14, § 15125(d)(5)).

NATIONAL ENVIRONMENTAL POLICY ACT CRITERIA

NEPA requires that the decision-makers and the public be fully informed of the impacts associated with the proposed project. The intent is to make good decisions based on understanding environmental consequences, and to take actions to protect, restore, and enhance the environment. NEPA requires that an EIS consider all reasonable alternatives, those that are practical or feasible from the technical and economic standpoint and from using common sense, rather than simply desirable from the standpoint of the applicant (NEPA's 40 Questions, 1A).

NEPA requires that reasonable alternatives are not limited to ones the lead agency can adopt, and the agency should consider wide-reaching alternatives when the problem at hand is a broad one, such as a large-scale energy supply issue. (See *Natural Resources Defense Council, Inc. v. Morton* (D.C. Cir. 1972) 458 F.2d 827, 836

("*Morton*").) Further, "[i]n determining the scope of alternatives to be considered, the emphasis is on what is 'reasonable' rather than on whether the proponent or applicant likes or is itself capable of carrying out a particular alternative..." (CEQ Forty Questions, No. 2a.) However, alternatives identified must be consistent with BLM's purpose and need for the action under consideration, which include consideration of the applicant's objectives.

Consideration of the "no action" alternative is mandated by the NEPA. As with the CEQA "no project" alternative, this is the scenario that would exist if the proposed project were not constructed.

ALTERNATIVES SCREENING METHODOLOGY

To prepare the alternatives analysis, the following methodology was used:

1. Develop an understanding of the project, identify the basic objectives of the project, and describe its potentially significant adverse impacts.

2. Identify and evaluate technology alternatives to the project such as increased energy efficiency (or demand-side management) and the use of alternative generation technologies (e.g., solar or other renewable or nonrenewable technologies).

3. Identify and evaluate alternative locations for consideration by the Energy Commission.

4. Evaluate potential alternatives to select those qualified for detailed evaluation.

5. Evaluate the impacts of not constructing the project, known as the "no project" alternative under CEQA and the "no action" alternative under NEPA.

Based on this methodology, each potential alternative was evaluated for its ability to:

- avoid or substantially lessen one or more of the potential significant effects of the project;
- meet most project objectives;
- be consistent with BLM's purpose and need;
- not create unmitigable significant impacts of its own.

PROJECT OBJECTIVES

Eight objectives are set forth by BrightSource in its AFC:

- To safely and economically construct and operate a nominal 400-MW, solar generating facility in California capable of selling competitively priced renewable energy consistent with the needs of California utilities.
- To demonstrate the technical and economic viability of Bright Source's technology in a commercial-scale project.
- To locate the facility in areas of high solarity with ground slope of less than 5 percent.

- To minimize infrastructure needs and reduce environmental impacts by locating the plant near existing and planned infrastructure, including: CAISO transmission lines, a source of natural gas, and an adequate water supply.
- To avoid siting the plant in areas that are highly pristine or biologically sensitive (e.g., a Desert Wildlife Management Area).
- To locate the project consistent with existing land use plans. If on public land, to comply with the multiple use objectives of the Federal Land Policy and Management Act (FLPMA), which includes renewable energy development, and the objectives of the California Desert Conservation Area (CDCA) Resource Management Plan (RMP), which allows for solar energy development in some areas.
- To assist California in repositioning its generation asset portfolio to use more renewable energy in conformance with State Policy, including the policy objectives set forth in Senate Bill (SB) 1078 (California Renewable Portfolio Standard Program) and Assembly Bill (AB) 32 (California Global Warming Solutions Act of 2006).
- To comply with provisions of the power sales agreement in negotiation for the first projects, to develop a project that can interconnect to a CAISO transmission line with the potential of achieving a commercial on-line date in 2010, but no later than 2011.

After considering the objectives set out by BrightSource, the Energy Commission has identified the following three basic project objectives, which will be used to evaluate the viability of alternatives in accordance with CEQA requirements:

- to safely and economically construct and operate a nominal 400-MW, renewable power generating facility in California capable of selling competitively priced renewable energy consistent with the needs of California utilities;
- to locate the facility in areas of high solarity with ground slope of less than 5 percent;
- to complete the impact analysis of the project by the first quarter of 2010 so that if approved, construction could be authorized in 2010 and beyond.

IMPACTS OF THE PROPOSED PROJECT

Based on the analysis presented in the technical sections of this FSA/DEIS, the following impacts have been identified as issues of concern for the ISEGS project.

- **Biological Resources**. Approximately 4,073 acres of occupied desert tortoise habitat would be permanently lost and a minimum of 25 desert tortoises would have to be moved to a new location, requiring a State and federal endangered species "take" authorization. The project would fragment and degrade adjacent habitat and could promote the spread of invasive species. Ten special-status plant species would be directly impacted by construction of ISEGS, and staff considers five of these to be significant because the project would eliminate a substantial portion of the known occurrences in the state. The project would also affect approximately 2,000 ephemeral drainages on the ISEGS site.
- **Land Use**. The ISEGS project requests the BLM issue a right-of-way grant on 4,073 acres of public land, removing it from availability for its current use (recreation, grazing, and open space).

- **Soils and Water Resources**. The ISEGS project would potentially result in impacts to soils and water resources including stormwater impacts to heliostats and their surrounding environment, anticipated damage to heliostats in storm events, and potential changes in stormwater volume and discharge rates under developed conditions.
- **Traffic and Transportation**. Neither construction nor operation of the ISEGS project would have a significant adverse impact on the local or regional road network, except for northbound Interstate 15 (I-15) on Friday afternoons and evenings related primarily to motorists en route to Las Vegas. Vehicle trips generated during construction and operation of the project would contribute to a significant adverse direct and cumulative impact on northbound I-15 on Fridays between the hours of 12 p.m. and 10 p.m. during construction and operation. With the implementation of the Traffic Control Plan, construction and operation of the ISEGS would not cause a direct significant impact on northbound I-15, but would contribute to a cumulatively considerable significant impact on northbound I-15 on Friday afternoons. Before implementation of mitigation, the project also has the potential to result in exposure of aircraft pilots, motorists, and hikers to solar radiation reflected from project heliostats and/or power tower receivers that could cause a health and safety risk.
- **Visual Resources**. The ISEGS project would result in the installation of a large, industrial facility in a highly visible and scenic area of the Mojave Desert. The project would potentially have significant visual impacts that cannot be mitigated to less than significant levels and would thus result in significant and unavoidable impacts, as seen from several Key Observation Points in the Ivanpah Valley and Clark Mountains. Staff concludes that the visual analysis and resulting findings, obtained using the CEC staff methods typically used in Staff Assessment visual analysis, are essentially consistent with findings that would be obtained under the BLM visual impact assessment.
- **Cumulative Impacts.** Impact analyses in each of the technical sections identify significant cumulative impacts in areas of biological resources, land use, traffic and transportation, and visual resources. Cumulative impacts to biological resources include project contribution to cumulative loss of Ivanpah Valley vegetation communities, wildlife habitat, and special-status species, including desert tortoise. Cumulative impacts to land use include the project contribution to cumulative loss of Utility Corridor BB and to the significant change to land use opportunities in the desert. Cumulative traffic and transportation impacts include the project contribution to the congested level of service to northbound I-15 on Friday afternoons and evenings. Cumulative impacts to visual resources includes the project contribution to a transformation of the existing Ivanpah Valley landscape into a more urbanized visual setting, particularly as seen by I-15 motorists in the northern portion of the valley in the vicinity of the ISEGS project and some cumulative lighting pollution. Similarly, staff concludes ISEGS would contribute to cumulative impacts within the greater California Desert District and Mojave Desert resulting from the urbanized transformation.

The alternatives analysis focuses on the consideration of these impacts and the extent to which they could be reduced or eliminated with use of alternatives.

SUMMARY OF SCOPING AND SCREENING RESULTS

The public scoping comment period allowed the public and regulatory agencies an opportunity to comment on the scope of the environmental document, comment on the alternatives considered, and to identify issues that should be addressed in the environmental review. The discussion below presents the key issues identified from the written and oral comments received on the ISEGS Project. The specific issues raised during the public scoping process are summarized as follows:

- Potential impacts to rare, declining, and listed species and their associated desert habitat and water use;
- Loss of desert tortoise habitat and insufficient land acquisition ratio proposed for mitigation;
- Concerns regarding the proposed relocation of desert tortoise;
- Impacts to bighorn sheep and disruption of wildlife movement;
- Cumulative and regional effects including those of other renewable energy projects in the region, the CDCA and in Nevada;
- Alternatives; reasonable alternatives should include, but are not limited to, alternative sites, capacities, and technologies;
- Potential glare and thermal plume effects on aircraft using airports at or around Jean, Searchlight and Pahrump as well as the proposed Southern Nevada Supplemental Airport;
- Impacts to groundwater quality from additional groundwater withdrawal and emergency wastewater discharges;
- Impacts to the Mojave National Preserve including the scenic viewshed, disruption of natural soundscape, potential for blocking or limiting access to recreation in Clark Mountain, light pollution, and air quality impacts;
- Indirect impacts of solar, wind, and geothermal energy projects resulting from new transmission lines and corridors.

Scoping comments are also listed in **Introduction Table 1** of the **Introduction** section of this FSA/DEIS.

ALTERNATIVES EVALUATED

The Alternatives Considered But Not Evaluated In Further Detail Section describes the characteristics, feasibility, and impacts of the 22 of 23 alternatives that were considered, but were determined to not be feasible or have substantially reduced impacts than the proposed action. These 22 alternatives are not evaluated further or considered for selection as the preferred alternative. The one alternative which has been retained for more detailed analysis and consideration is the “no project/no action” alternative.

No Project/No Action Alternative

The “no project” alternative under CEQA or the “no action” alternative under NEPA defines the scenario that would exist if the project were not constructed. The CEQA

Guidelines state that “the purpose of describing and analyzing a “no project” alternative is to allow decision makers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project” (Cal. Code Regs., tit. 14 § 15126.6(i)). Toward that end, the “no project” analysis considers “existing conditions” and “what would be reasonably expected to occur in the foreseeable future if the project were not approved…” (§ 15126.6(e)(2)). Under NEPA, the “no action” alternative is used as a benchmark of existing conditions by which the public and decision makers can compare the environmental effects of the proposed action and the alternatives.

If the “no project/no action” alternative were selected, the construction and operational impacts of the ISEGS project would not occur. There would be no grading of the site, no loss or disturbance of approximately 4,000 acres of desert habitat, and no installation of extensive power generation and transmission equipment. The “no project/no action” alternative would also eliminate contributions to cumulative impacts in the Ivanpah Valley and in the Mojave Desert as a whole.

In the absence of the ISEGS project, however, other power plants, both renewable and nonrenewable, would have to be constructed to serve the demand for electricity. If the “no project/no action” were chosen, other solar renewable power plants may be built, and the impacts to the environment would likely be similar to those of the proposed project because solar renewable technologies require large amounts of land and similar slope and solarity requirements as the proposed ISEGS project. The “no project/no action” alternative may also lead to siting of other non-solar renewable technologies to help achieve the California Renewable Portfolio Standard.

Additionally, if the “no project/no action” alternative were chosen, it is likely that additional gas-fired power plants would be built or that existing gas-fired plants could operate longer. If the project were not built, California would not benefit from the reduction in greenhouse gases that this facility would provide. PG&E would not receive the 300-MW contribution to its renewable state-mandated energy portfolio and SCE would not receive the 100-MW renewable energy contribution.

Additional evaluation of the “no project/no action” alternative is found in each individual resource section of this DEIS/FSA

Conclusion Regarding Retained Alternatives

California’s Renewable Portfolio Standard has been implemented to reduce greenhouse gas emissions from gas- or coal-fired power plants. While the ISEGS project as proposed would have substantial impacts as a result of the extent of its disturbance, the facility is proposed to be located in an area of the desert that is not protected for specific wildlife species or for its wilderness values. In addition, substantial other development is proposed in the Ivanpah Valley. In the absence of the ISEGS project, other renewable or gas-fired power plants would likely be constructed to serve the electricity demand that could be met with the ISEGS project. Given these factors and the importance of solar technology as a tool in reducing greenhouse gases, the “no project/no action” alternative is not superior to the proposed ISEGS project.

ALTERNATIVES CONSIDERED BUT NOT EVALUATED IN FURTHER DETAIL

This section considers potential alternatives to the proposed ISEGS project that were evaluated, and determined not to be feasible, fail to result in impacts that are less severe than the proposed action/proposed project, or are outside the jurisdiction of the lead agencies. This analysis complies with state and federal environmental laws by providing an analysis of reasonable alternatives which could substantially reduce or avoid any potentially significant adverse impacts of the proposed project, even if those alternatives are outside of the jurisdiction of the agency.

Following are the alternatives considered in the remainder of this section:

Site Alternatives Eliminated

- Siberia East alternative
- Broadwell Lake alternative
- Private Land alternative
- I-15 alternative
- Ivanpah Site A alternative
- Ivanpah Site C alternative
- West of Clark Mountain alternative
- Reduced Acreage alternative

Renewable Solar Alternatives

- Parabolic Trough Technology
- Stirling Dish Technology
- Linear Fresnel Technology
- Solar PV Technology
- Distributed Solar Technology

Other Renewable Alternatives

- Wind energy
- Geothermal energy
- Biomass energy
- Tidal energy
- Wave energy

Alternative Methods of Generating or Conserving Energy

- Natural Gas Generation
- Coal Generation
- Nuclear Energy
- Conservation and Demand Side Management

SITE ALTERNATIVES

Alternative sites for the ISEGS project were suggested in the Application for Certification (AFC) and in scoping comments and were developed by BLM and Energy Commission staff. The origin of each alternative is explained below. The National Parks Conservation Association and National Park Service suggested consideration of a site west of Clark Mountain, thus offering a buffer between the project site and the preserve. Multiple scoping comments suggested consideration of a private, already disturbed site. The Sierra Club suggested relocating the project to the desert tortoise translocation sites along the I-15 and the Reduced Acreage and Relocated I-15 alternatives were considered as methods to reduce impact to biological resources. The following alternative sites are considered in this analysis and can be seen in **Alternatives Figure 1** (at the end of this section):

- Siberia East alternative

- Broadwell Lake alternative
- Private Land alternative
- I-15 alternative
- Ivanpah Site A alternative
- Ivanpah Site C alternative
- West of Clark Mountain alternative
- Reduced Acreage alternative

The California Energy Commission (Energy Commission) does not have the authority to approve an alternative or require BrightSource Energy, Inc. to move the proposed project to another location, even if it identifies an alternative site that meets the project objectives and avoids or substantially lessens one or more of the significant effects of the project. Implementation of an alternative site would require that the applicant submit a new AFC, including revised engineering and environmental analysis. This more rigorous AFC-level analysis of any of the alternative sites could reveal environmental impacts; nonconformity with laws, ordinances, regulations, and standards; or potential mitigation requirements that were not identified during the more general alternatives analysis presented herein. Preparation and review of a new AFC would require substantial additional time.

Of the eight alternative sites considered, putting the project at six of these locations would not significantly lessen the impacts of the project without creating significant impacts of their own. At the Private Land alternative site, achieving site control in an economically feasible manner would be more challenging than at the proposed site because land would have to be acquired from multiple landowners and would create significant impacts of its own. At the request of the National Parks Conservation Association and National Park Service, a site west of Clark Mountain was considered as a means of reducing visual impacts to the Mojave National Preserve. The only land areas west of Clark Mountain that is not within a Desert Wildlife Management Area, is not military land, and that achieves the appropriate solarity and slope requirements have applications pending before BLM. The BLM would need to consider the pending application for a particular site before it could consider selecting the site as a preferred location for another project. As such, the West of Clark Mountain alternative is not feasible.

Site Selection Criteria

According to the AFC, the applicant chose the proposed site to satisfy the following requirements (BSE 2007a):

- to locate the facility in an area of high solarity (low cloudiness), with at least 5 square miles of contiguous land and with a ground slope of less than 5 percent;
- to locate the facility on land that is available for sale or use. If on private land, the land owner(s) must be willing to negotiate a long-term option agreement so that site control does not require a large capital investment until the license is obtained;

- to minimize infrastructure needs and reduce environmental impacts by locating the plant near existing and planned infrastructure including transmission lines, a source of natural gas, and an adequate water supply;
- to avoid highly pristine or biologically sensitive areas;
- to locate the project consistent with existing jurisdictional policies;
- to locate the project in an area that will allow it to be economically viable and competitive with other renewable technologies including wind, geothermal, and solar.

In a June 2009 comment letter, Audubon California and other groups defined the following list of criteria for areas to avoid in siting renewable projects:

- Locations that support sensitive biological resources, including: federally designated and proposed critical habitat; significant populations of federal or state threatened and endangered species, significant populations of sensitive, rare and special status species, and rare or unique plant communities;
- Areas of Critical Environmental Concern, Wildlife Habitat Management Areas, proposed HCP and NCCP Conservation Reserves;
- Lands purchased for conservation including those conveyed to the BLM;
- Landscape-level biological linkage areas required for the continued functioning of biological and ecological processes;
- Proposed Wilderness Areas, proposed National Monuments, and Citizens' Wilderness Inventory Areas;
- Wetlands and riparian areas, including the upland habitat and groundwater resources required to protect the integrity of seeps, springs, streams or wetlands;
- National Historic Register eligible sites and other known cultural resources;
- Locations directly adjacent to National or State Park units.

Sites considered in this SA/EIS were selected based on an attempt to meet as many of these criteria as possible.

Other Sites on BLM Land

The BLM has received a large number of utility-scale solar energy project proposals for BLM-administered lands in California. The BLM processes solar energy right-of-way applications under its Solar Energy Development Policy (Instruction Memorandum No. 2007-097) and addresses environmental concerns for the utility-scale energy projects on a case-by-case basis. As such, existing applications for renewable projects give applicants prior rights to BLM-administered lands. Therefore, an alternative site on BLM land with a pending application for a renewable project is not considered as a viable alternative unless the other application is rejected or withdrawn, or if the application is from BrightSource, the ISEGS applicant.

The BLM and Department of Energy (DOE) are preparing a Programmatic Environmental Impact Statement (PEIS) on solar energy development in six states in

the western U.S. (Arizona, California, Colorado, New Mexico, Nevada, and Utah) (USDOE 2008). As part of the PEIS, the BLM and DOE identified 24 tracts of BLM-administered land for in-depth study for solar development, some or all of which may be found appropriate for designation as solar energy zones in the future. The public scoping period on the solar energy zone maps ends September 2009. The Draft PEIS will be published in 2010; the appropriateness of siting solar energy plants on various land use designations may be revisited in the PEIS.

Siberia East Alternative

The Siberia site was considered in the AFC as an alternative to the ISEGS site. The site is also the subject of a separate application to BLM for a solar power facility. BrightSource Energy submitted an Application for Transportation and Utility Systems and Facilities on Federal Lands to the BLM on April 30, 2007, to develop up to 1,600 MW of solar power at this site.

For the purposes of this alternatives analysis, an area of approximately 4,000 acres on the eastern half of the BrightSource Siberia site has been identified as an alternative to the ISEGS project. It is called herein the *Siberia East alternative*. The alternative site is located entirely on BLM land, approximately 8.5 miles southeast of the town of Ludlow and immediately west of National Trails Highway (Route 66). Interstate 40 is located approximately 5 miles north of the Siberia East alternative. The site is bordered on the northeast side by the National Trail Highway and a Burlington Northern Santa Fe (BNSF) railroad.

Alternatives Figure 2 shows the regional location of the Siberia East alternative and **Alternatives Figure 3** shows a more detailed map of the location of the Siberia East alternative. Alternatives Figure 2 also shows the federal land parcels that were acquired by BLM from Catellus with funds from The Wildlands Conservancy, other donors and the federal government. The Siberia East alternative would not be located on any Catellus lands.

The Siberia East alternative is located on BLM public lands, managed under the principle of multiple use and sustainable yield, and designated Multiple Use Class M (Moderate) for a controlled balance between more intense land use and protection of public lands. It is located on the eastern edge of the BLM Western Mojave Planning area, just west of the Northern and Eastern Mojave (NEMO) Planning area.

The land use in the immediate area of the alternative site area is open space, public land. The nearest residences are in Ludlow, California (population 10 in 2000) and approximately 8.5 miles northwest of the Siberia East alternative (U.S. Census 2008). The Bagdad Chase Mine is located approximately six miles west of the site and is owned and controlled by Bagdad Chase, Inc. The mine shares an access road to the western half of the Siberia site as proposed in the BLM application.

The Siberia East alternative was considered in detail in the Preliminary Staff Assessment (PSA) for the ISEGS project, but was not found to be preferred to the proposed Ivanpah Valley Site because it would not have substantially fewer impacts than the proposed site. In addition, as discussed above, the site cannot be selected as an alternative to the ISEGS site in this FSA/DEIS because BrightSource maintains

active applications with BLM and desires to develop both sites. As such, it has been eliminated from potential selection as the preferred alternative in this document, and is not discussed in further detail in each of the technical sections of this document. However, for informational purposes, a comparison of the impacts between the Siberia East site and the proposed ISEGS site is presented below. Please refer to the PSA for a more detailed discussion and comparison of the impacts of the Siberia East alternative site.

The analysis is summarized below for issue areas where there is a difference in impacts from the proposed site. For the following disciplines, there would be no substantial difference in impacts: Hazardous Materials, Noise & Vibration, Public Health and Safety, Soil and Water resources, Transmission Line Safety and Nuisance, Worker Safety and Fire Protection, Facility Design, and Power Plant Design, Efficiency and Reliability.

Air Quality. The construction and operation emissions resulting from building and operating a 400-MW solar power plant at the Siberia East alternative site would be similar to the emissions for the ISEGS project at Ivanpah Basin and would be subject to permit requirements and require Energy Commission mitigation to avoid significant air quality impacts. However, during the construction period, commuting emissions would likely be greater for the Siberia East alternative site than for the proposed ISEGS site.

Biological Resources. Approximately 4,000 acres of Mojave creosote scrub and other native plant communities would be permanently lost by vegetation clearing, grading, and construction of the solar facilities, potentially affecting special status animal species. No surveys were performed at this site, but given the size of the site, it is likely that impacts to listed or sensitive plant species would result from direct or indirect loss of habitat. Indirect loss of individuals may occur in instances such as sediments transported (e.g., from cleared areas during rain events) that cover adjacent plants or changes in a plant's environment that cause its loss (e.g., adjacent shrubs that provided necessary shade are removed). Additional impacts would occur due to the construction and operation of linear facilities associated with a solar facility at the Siberia East alternative site. However, definitive conclusions about the extent of impacts cannot be made in the absence of surveys and project design information.

Cultural Resources. Detailed surveys of the site have not been performed. However, based on site records, one known resource, National Trails Highway, would potentially be affected by construction and operation of a solar facility at the Siberia East alternative site. The presence of a solar facility at the Siberia East site would result in indirect visual impact to the historic architectural resources such as the National Trails Highway (SBR-2910H). This resource has been recommended eligible for the National Register of Historic Places (NRHP). Conditions of certification such as those required for the ISEGS project in the **Cultural Resources** section may reduce this impact; specific site surveys would be required to be certain. It is not known what cultural resources, if any, would be affected by development of a solar facility at the Siberia East alternative site; however, it is reasonable to assume that resources exist and would be uncovered at some places of this site (AIC 2008). Definite conclusions about the potential for significant impacts cannot be made because of the absence of site-specific survey and project design information.

Land Use. As with the proposed ISEGS site, the Siberia East alternative would not physically divide an established community. The proposed ISEGS site is located in areas that are designated Multiple-Use Class L (Limited Use) while the Siberia East alternative site is located in areas that are designated Multiple-Use Class M (based upon a controlled balance between higher intensity use and protection of public lands). While Multiple-Use Class L is more restrictive than Multiple-Use Class M, both allow for solar energy plants after complying with NEPA requirements.

Recreation and Wilderness. There is a high level of recreational use at the proposed ISEGS site; the Ivanpah Dry Lakebed alone is visited by an estimated 5,000 visitors annually. Recreation and wilderness impacts would be less severe at the Siberia East alternative site because the site is less intensely used for recreation.

Socioeconomics and Environmental Justice. Most of the socioeconomic impacts of the ISEGS project at the Siberia East alternative site would be similar to building and operating the project at the proposed site. However, because of the limited housing options at the Siberia East alternative site compared with the proposed site, accommodations for the construction workers at the Siberia East alternative would create greater construction impacts than at the proposed ISEGS site.

Traffic & Transportation. Impacts to traffic and transportation at the Siberia East alternative site would be similar to those at the proposed ISEGS site; however, the Siberia East alternative site would not require the use of Interstate 15 east of Barstow during the highly congested Friday afternoon time period. As such, the Siberia East alternative site would not contribute to a cumulatively considerable impact on traffic and transportation to northbound Interstate 15 during Friday afternoons as would the ISEGS site.

Visual Resources. The site would be prominently visible from the National Trails Highway (Route 66), particularly for westbound traffic. Travelers would see the site from a distance and there is little elevation or natural contouring to block the solar power towers. The ridges on the northern border of the MCAGCC would border the site to the south and as such would block the Siberia East alternative from sensitive viewers to the south.

The proposed Ivanpah site is preferred over the Siberia East alternative site because while Siberia East would be visible to fewer people than the proposed ISEGS site, it would be located in a much more remote and pristine area. The ISEGS project is located in an area with substantially more development and use because of its location along Interstate 15, adjacent to Primm, Nevada, and adjacent to heavily used recreation areas. As a result, a large solar project in the Siberia East area would create a more dramatic change to the visual environment than would occur at the ISEGS site.

Waste Management. The environmental impacts of waste disposal at the Siberia East alternative site would be similar to those at the proposed ISEGS site at Ivanpah. While the Siberia East alternative is closer to the Barstow Sanitary Landfill, the Ivanpah site has the option of using two additional landfills in Nevada (see the **Waste Management** section).

Geology, Paleontology & Minerals. The peak bedrock ground acceleration is higher for the Siberia East alternative than for the proposed ISEGS site at Ivanpah Basin as the (see PSA for details regarding the geologic hazards and peak ground acceleration).With the exception of stronger ground shaking, the Siberia East alternative site is subject to geologic hazards of similar magnitude as the Ivanpah Basin site. Strong ground shaking could be effectively mitigated through facility design. The potential to encounter significant paleontological resources at the Siberia East alternative site is similar to the Ivanpah Basin site.

Transmission System Engineering. Locating a solar facility at the Siberia East alternative would require re-evaluating the capacity of the SCE transmission lines that would be used for interconnection. This alternative may cause adverse effects to the SCE transmission system and require system upgrades. Moreover, it may not accomplish the project goal to be on line in 2011 because of grid improvement constraints.

Summary of Impacts. Without more site-specific information about biological and cultural resources at the Siberia East alternative, a detailed comparison of sites for those disciplines is not possible. It is believed that impacts to soils and water at the Siberia East alternative would be similar to those at the proposed Ivanpah Basin site; however, it is uncertain if there is groundwater available at the Siberia East alternative site.

The Siberia East alternative would have impacts similar to the proposed ISEGS site at Ivanpah Basin for Air Quality (operational impacts and most construction impacts), Hazardous Materials, Noise & Vibration, Visual Resources, Public Health & Safety, Transmission Line Safety and Nuisance, Waste Management, Worker Safety and Fire Protection, Facility Design, Power Plant Design, Efficiency and Reliability. While definitive conclusions about the extent of Biological Resource impacts cannot be made in the absence of surveys and project design information, staff believes that with the limited information regarding the Siberia East site, its vegetation, and surveys of nearby similar areas, there would likely be similar levels of significant impacts to desert tortoise at this site as there would be for ISEGS.

The Siberia East alternative would be less preferred than the proposed ISEGS site at Ivanpah Basin for air quality (commuting impacts during construction impacts only), socioeconomics, geology, paleontology and minerals, and transmission system engineering. The Siberia East alternative would be preferred to the proposed ISEGS site at Ivanpah Basin for land use, recreation, and traffic and transportation.

Rationale for Elimination

Energy Commission staff have determined that the Siberia East alternative does not appear to offer substantial environmental advantages over the proposed site.

Broadwell Lake Alternative

The Broadwell Lake site was considered as an alternative to the ISEGS site and as a site for a potential future solar facility (BSE 2007a). Independently, BrightSource submitted an Application for Transportation and Utility Systems and Facilities on

Federal Lands to the BLM on January 25, 2007 to develop up to 500 MW of solar power at this site (BSE 2007c). A September 18, 2009 newspaper article stated that BrightSource has "ceased all activity at the Broadwell site" due to the consideration of the area for a future national monument (San Francisco Chronicle 2009).

The Broadwell Lake alternative would be located on BLM land, approximately 8.5 miles north northwest of Interstate 40 at Ludlow. The Broadwell Lake alternative is located in unincorporated San Bernardino County, approximately 1.5 miles east of the Kelso Dunes Wilderness, approximately 7 miles north-northwest of the Bristol Mountains Wilderness, and approximately 1 mile west of the Broadwell Dry Lake. National Trails Highway (Route 66) and Interstate 40 are located approximately 8.5 miles south of the alternative site, and the historic Tonopah and Tidewater Railroad is located approximately 7 miles south of the site. **Alternatives Figure 2** shows the regional location of the Broadwell Lake alternative and **Alternatives Figure 4** shows the Broadwell Lake in greater detail. **Alternatives Figure 2** also indicates federal lands that had been obtained from Catellus with funds from The Wildlands Conservancy, other donors and the federal government. The Broadwell Lake alternative would be located on some parcels previously owned by Catellus.

The Broadwell Lake alternative as defined in this FSA/DEIS is located on BLM public lands, which are managed under the principle of multiple use and sustainable yield and are designated Multiple Use Class L (Limited) and M (Moderate) for a controlled balance between higher intensity use and protection of public lands (BLM 2008c). The site is located within the NEMO Planning Area. The elevation of the site is approximately 1,300 feet above mean sea level. The site would be accessed via Crucero Road, a one-lane dirt road with an exit off Interstate 40 (DWR 2004).

Broadwell Dry Lake is located approximately one mile east of the site. The land use character of the immediate alternative site area is open space and public land. The eastern portion of the dry lake and the mountains to the east are designated as wilderness—BLM's Kelso Dunes Wilderness Area.

The nearest residences are in Ludlow, CA (population 10 in 2000), approximately 7.5 miles south of the Broadwell Lake alternative (U.S. Census 2008). The nearest schools are in Newberry Springs, approximately 32 miles away.

The Broadwell Lake alternative was considered in detail in the PSA for the ISEGS project, but was not found to be preferred to the proposed Ivanpah Valley Site because it would not have substantially lesser impacts than the proposed site. In addition, as discussed above, the site cannot be selected as an alternative to the ISEGS site in this FSA/DEIS because BrightSource maintains active applications and desires to develop both sites. As such, it has been eliminated from potential selection as the preferred alternative in this document, and is not discussed in further detail in each of the technical sections of this document. However, for informational purposes, a comparison of the impacts between the Broadwell Lake site and the proposed ISEGS site is presented below. Please refer to the PSA for a more detailed discussion and comparison of the impacts of the Broadwell Lake alternative site.

The analysis is summarized below for issue areas where there is a difference in impacts from the proposed site. For the following disciplines, there would be no substantial difference in impacts: hazardous materials management, noise, public health, soils and water resources, transmission line safety and nuisance, worker safety and fire protection, geology and paleontology, facility design, and power plant efficiency and reliability.

Air Quality. The construction and operation emissions resulting from building a 400-MW solar power plant at the Broadwell Lake alternative site would be similar to the construction required for the construction of the ISEGS project at Ivanpah Basin and would be subject to permit requirements and require Energy Commission mitigation to avoid significant air quality impacts. Emissions from the commute of the construction workers would likely be greater at the Broadwell Lake alternative than at the proposed Ivanpah Basin site.

Biological Resources. Detailed biological surveys of this alternative have not been completed. However, approximately 4,000 acres of Mojave creosote scrub and other native plant communities would be permanently lost to the siting of a solar facility at Broadwell Lake by vegetation clearing, grading, and construction of the solar facilities. Such a siting also would likely result in losses of habitat for special-status plant and animal species as a result from loss of habitat. Indirect loss of individuals may occur in instances such as sediments transported (e.g., from cleared areas during rain events) that cover adjacent plants or changes in a plant's environment that cause its loss (e.g., the removal of shrubs that provided necessary shade). Additional impacts would occur due to the construction and operation of linear facilities associated with a solar facility at the Broadwell Lake alternative site, including a one-mile transmission line and a two-mile gas pipeline. While definite conclusions about the potential for significant impacts cannot be made because of the absence of site-specific survey and project design information, staff believes that based on its vegetation and surveys of nearby sites, there would likely be similar significant impacts to desert tortoise at the Broadwell Lake site as there would be at the proposed ISEGS site.

Cultural Resources. Twenty known archaeological, architectural, or historical sites would potentially be affected by construction and operation a solar facility at the Broadwell Lake alternative site. Conditions of certification such as those required for the proposed ISEGS project in the **Cultural Resources** section of this FSA/DEIS may reduce this impact; however, specific site surveys would be required to be certain. Unknown, unrecorded cultural resources may be found at the Broadwell Lake alternative site. It is not known what cultural resources, if any, would be affected by development of a solar facility at the Broadwell Lake alternative site; however, it is reasonable to assume that resources exist and would be uncovered at some places in this site (AIC 2008). Definite conclusions about the potential for significant impacts cannot be made because of the absence of site-specific survey and project design information.

Land Use. As with the proposed Ivanpah Basin site, the Broadwell Lake alternative would not physically divide an established community. The proposed ISEGS site is located in areas that are designated Multiple-Use Class L (Limited Use) while the Broadwell Lake alternative site is located in areas that are designated Multiple-Use

Class L and M (based upon a controlled balance between higher intensity use and protection of public lands). While Multiple-Use Class L is more restrictive than Multiple-Use Class M, both allow for solar energy plants after complying with NEPA requirements.

The alternative site would have no impact with respect to farmland conversion; however, the Broadwell Lake alternative site would be located within the Cady Mountain Grazing Allotment (Cady Mountain, allotment #08006). The Broadwell Lake alternative 4,000-acre property boundary area is part of a larger 97,560-acre (150 square mile) BLM grazing allotment. As stated in the **Land Use** section, pursuant to Title 43 Code of Federal Regulations, section 4110.4-2(2)(b) Grazing Administration, the process to withdraw a BLM grazing lease to allow development requires a two-year notification be given to the lease holder prior to the start of development.

Recreation and Wilderness. Recreationists at the Bristol Mountains Wilderness and at the Kelso Dunes Wilderness would have an unobstructed view of the ISEGS project were it built at the Broadwell Lake alternative site. Additionally, recreationists at the Cady Mountains and Afton Canyon Natural Area would have a distant view of the power towers. Because of the relatively pristine nature of these recreation areas, the ISEGS project would introduce an industrial nature to the region dissimilar to any existing facilities. While potentially fewer recreationists visit the region surrounding the Broadwell Lake alternative than the proposed Ivanpah Basin site, the recreationists visiting the Broadwell Lake alternative are likely searching for undisturbed desert landscape and wilderness. As such, there may be potential impacts to recreational resources at the Broadwell Lake alternative similar to the proposed project.

Socioeconomics and Environmental Justice. Most of the socioeconomic impacts of the ISEGS project at the Broadwell Lake alternative site would be similar to building and operating the project at the proposed site. However, because of the limited housing options in the Ludlow area as compared with the proposed site, accommodations for the construction workers at the Broadwell Lake alternative would create greater impacts than at the proposed Ivanpah Basin site.

Traffic and Transportation. Impacts to traffic and transportation at the Broadwell Lake alternative site would be similar to those at the proposed Ivanpah Basin site; however, the Broadwell Lake alternative site would not require the use of Interstate 15 east of Barstow during the highly congested Friday afternoon time period. As such, the Broadwell Lake alternative site would likely have fewer impacts than the Ivanpah Basin site on traffic and transportation.

Visual Resources. The proposed Ivanpah site would be located in an area that is much less remote and more developed, and further from designated wilderness. The Ivanpah Basin site is located in an area with substantially more development and use because of its location along Interstate 15 adjacent to Primm, Nevada, and to heavily used recreation areas. As a result, a large solar project in the Broadwell Lake area would create a more dramatic change to the visual environment than would occur at the Ivanpah Valley site.

Waste Management. The environmental impact of waste disposal at the Broadwell Lake alternative site would be the similar to that at the Ivanpah Basin site. While the Broadwell Lake alternative is closer to the Barstow Sanitary Landfill, the Ivanpah Basin site has the option of using two additional landfills in Nevada (see the **Waste Management** section of this FSA/DEIS).

Transmission System Engineering. Locating a solar facility at the Broadwell Lake alternative site would require re-evaluating the capacity of the SCE transmission lines that would be used for interconnection. This alternative may cause adverse effects to the transmission system and require system upgrades. Moreover, it may not accomplish the project goal to be on line in 2011 because of grid improvement constraints.

Summary of Impacts. Surveys for biological and cultural resources have not been conducted at the Broadwell Lake alternative, so a detailed comparison is not possible. Details on surface water flow are also not available, but given the topography and soils, it is believed that most impacts to soils and water at the Broadwell Lake alternative would be similar to those at the proposed Ivanpah Basin site. However, it is unknown if there is groundwater available at the Broadwell Lake alternative site.

The Broadwell Lake alternative would have similar impacts as the proposed Ivanpah Basin site for air quality (operation and most construction impacts), hazardous materials management, visual resources, land use, recreation, noise, public health, transmission line safety and nuisance, waste management, worker safety and fire protection, facility design, power plant efficiency and power plant reliability. While definitive conclusions about the extent of Biological Resource impacts cannot be made in the absence of surveys and project design information, staff believes that, based on vegetation types and surveys of nearby sites, there would likely be similar levels of significant impacts to desert tortoise at the Broadwell Lake sites as there would be for ISEGS.

The Broadwell Lake alternative would be less preferred than the proposed Ivanpah Basin site for Air Quality (for construction commuting only), Socioeconomics & Environmental Justice, Geology, Paleontology and Minerals, and Transmission System Engineering. The Broadwell Lake alternative would be preferred to the proposed Ivanpah Basin site for Traffic and Transportation.

Rationale for Elimination

Energy Commission staff are not considering this site further because it has determined that the Broadwell Lake alternative does not offer substantial environmental advantages over the proposed site.

Private Land Alternative

Multiple scoping comments requested that an alternative site be considered on disturbed private land in order to minimize the loss of more pristine public lands. The applicant evaluated three private land alternatives in its AFC (Harper Lake, Lucerne Valley, and Rabbit Lake alternatives; see **Alternatives Figure 1**). All of these sites were eliminated from further consideration by the applicant because they would have required completing option-to-purchase agreements with multiple private owners. BrightSource felt that obtaining site control with numerous owners would have been

time-consuming and risky (BSE 2007a). Only one of the private sites, Harper Lake, had sufficient land for a 400 MW facility with the configuration of the proposed project; however, one of the major land owners at the site requested too much money to make the site economically feasible.

A Private Land Alternative was evaluated in the PSA, but eliminated from consideration based on the number of private parcels that would be required to assemble enough land for a large project. Comments on the PSA requested that the Private Land alternative be analyzed in more detail; this section responds to those comments. Because this alternative was not discussed in detail in the PSA, the analysis of this alternative in this FSA/DEIS presents more detail than for other alternatives.

There are limited areas where undeveloped contiguous private land parcels exist within the California desert with the appropriate slope and solarity requirements. One of these areas is the triangular land area east of Barstow, bounded by I-15 on the north, I-40 on the south, and BLM land on the east. The western portion of this area was identified as a disturbed area by the RETI Phase 2 maps and includes the towns of Daggett and Yermo (both about 12 miles east of Barstow), the Barstow-Daggett Airport, and the Marine Corps Logistics Base (MCLB). The Mojave River passes through the northern portion of the triangle, and its floodplain ranges from about 2,000 feet to one mile wide. The river parallels I-15 on a northeasterly trend.

Alternatives Figure 5A shows this area of private land. **Alternatives Figure 5B** is a more detailed map of the potential site. This is also the area where the first two solar power tower facilities of the Solar Electric Generating System (SEGS), built in Daggett by LUZ Industries, were installed. The location adjacent to the original SEGS facilities was considered for a possible Private Land Alternative, incorporating approximately 2,000 acres of agriculture land. However, sufficient disturbed land is not available to build a 400 MW solar power facility without interfering with a number of existing residential areas. Additionally, the area surrounding the original SEGS facilities is located within 2,000 feet of the Barstow-Daggett Airport and would potentially conflict with the Federal Aviation Regulation Part 77 – Objects Affecting Navigable Airspace, specifically the surface structure height would potentially obstruct or impede air navigation. The Barstow-Daggett area includes undisturbed private land, rural residences, and a few private water ski lakes.

A Private Land alternative would require approximately 900 acres for each of the two 100 MW Phases and approximately 1,800 acres for the 200 MW phase. An additional approximately 100 acres would be required for a shared administrative building, operations and maintenance building, substation, and detention ponds. Approximately 300 acres is required for construction staging activities. The total footprint of the ISEGS project on private lands would be approximately 4,000 acres (approximately 6.25 square miles).

While all parcels at the location shown in **Alternatives Figure 5A** are not for sale, there are large parcels of land (500 acres or more) in the general vicinity that are listed on a

number of real estate websites.[1] Approximately 0.5 miles west of the Private Land alternative, at the intersection of Interstate 15 and Manix Rd, there is one square mile lot for sale specifically targeting solar and wind energy. While large lots of land are available in the vicinity of Daggett or Newberry Springs, a number of criteria would need to be met to make it most likely that the available land would be suitable for solar development.

To meet the alternative site criteria allowing development of a project the same size as the proposed ISEGS project, approximately 4,000 acres of land would be required. To minimize land use impacts, the land should avoid conflicting with existing rural residences and existing airports. While disturbed agricultural land is located in the Newberry Springs and Daggett communities, much of this land is located near the Barstow-Daggett Airport. Other already disturbed land is located in Newberry Springs south of the Mojave River. This area has a much greater density of rural residences, including water ski lakes with residences adjacent. In order to minimize land use conflicts, a site north of the Mojave River and south of Interstate 15 was selected as the Private Land alternative. The site is made up of disturbed agricultural land and private and public open space.

The Private Land alternative would be located on private land with a few BLM parcels included, south of and adjacent to Interstate 15 in the community of Harvard, north of Newberry Springs. Interstate 40 is located approximately 7 miles south of the alternative site. The Private Land alternative has appropriate insolation and minimal slope. The elevation of the site is approximately 1,800 feet above mean sea level. The site would be accessed via Harvard Road, off Interstate 15 at the Harvard Road exit. Additionally, there are several existing structures and residences on some of this private land, and removal of houses or other structures may be required.

The Private Land site would require acquisition of approximately 70 parcels, although the number of separate landowners may be fewer. Due to the number of parcels that would have to be acquired, this alternative would be substantially more challenging for an applicant to obtain site control (in comparison to BLM land). The applicant would have to negotiate separately with multiple landowners. The Draft Phase 2a Report published by the Renewable Energy Transmission Initiative (RETI) in early June 2009 identified private land areas for solar development only if there were no more than 20 owners in a two square mile (1,280 acre) area.

The Mojave River is located approximately 0.25 miles south of the site. The river is dry most of the year and flows only during the largest rain events. The land use character of the immediate alternative site area is open space and rural residential. Some public lands (BLM) occur within the site boundaries. There are lands owned by the California Department of Fish and Game (CDFG) just south of the site boundary. A Desert Wildlife Management Area (DWMA) for protection of desert tortoise is located north of the site on the north side of Interstate 15.

[1] See Trulia Real Estate Search at http://www.trulia.com/property/1045905451-Lot-Land-Yermo-CA-92398 and Land Watch at http://www.landwatch.com/San-Bernardino-County-California-Land-for-sale/pid/1343937 (Accessed May 9, 2009) and http://www.loopnet.com/property/16038677/I-15-and-Manix-Rd/ (Accessed May 28, 2009) for the one square mile parcel targeting solar and wind energy providers.

Approximately five residences are located within the site. The site would also be located adjacent to a low density residential area on east of Newberry Springs.

Like the proposed ISEGS project, the Private Land alternative would include a natural gas-fired start-up boiler to provide additional heat for plant start-up and during periods of cloud cover. The Private Land alternative would obtain natural gas by installing a pipeline to the Kern River Gas Transmission Pipeline approximately 3.3 miles north of the Private Land Alternative.

The SCE Cool Water-Dunn Siding 115 kV transmission line runs through the Private Land alternative site. The Private Land alternative would require either an interconnection and upgrade of the SCE Cool Water-Dunn Siding 115 kV transmission line or the construction of a new 10-mile 230 kV transmission line that would follow the existing corridor southwest to the Cool Water Substation. Additional transmission lines (between 287 kV and 500 kV) are located approximately two miles north of the Private Land alternative site on the northern side of Interstate 15.

Environmental and Engineering Assessment of the Private Land Alternative

Air Quality

Environmental Setting. Like the proposed ISEGS project, the Private Land alternative would be located within the Mojave Desert Air Basin, regulated by the Mojave Desert Air Quality Management District (MDAQMD). The Private Land alternative would be located in the Western Mojave Desert where ozone and particulate matter violate ambient standards, despite the low population density east of Barstow (USEPA 2008).

Environmental Impacts. Exhaust emissions from heavy-duty diesel and gasoline-powered construction equipment and fugitive particulate matter (dust) would be essentially the same at any site. Exhaust emissions would also be caused by workers commuting to and from the work sites, from trucks hauling equipment and supplies to the sites, and crew trucks (e.g., derrick trucks, bucket trucks, pickups). Workers and trucks hauling equipment and supplies would have to commute 20 miles (to Barstow) or 60 miles (to Victorville) to reach the Private Land alternative. The proposed project is located about 50 miles from Las Vegas, NV. Appropriate mitigation at the Private Land alternative site would likely involve similar, locally oriented recommendations such as the conditions of certification presented in the **Air Quality** section of this FSA/DEIS.

Comparison to Proposed Project. The construction and operational emissions at the Private Land alternative site would be similar to those of the ISEGS project at Ivanpah Basin.

Biological Resources

Environmental Setting. The Private Land alternative is located in the desert region of unincorporated San Bernardino County within the BLM West Mojave Planning Area. The western Mojave Desert comprises a distinct area of the Mojave Desert biome, and flora and fauna have adapted to local conditions and formed distinct natural communities. Freezing temperatures occur on a limited basis in the winter, and summer temperatures regularly exceed 100 degrees. The desert habitat of San Bernardino County includes soils that are predominantly sandy gravel, as well as major dune

formations, desert pavement, and dry alkaline lake beds (San Bernardino County 2007). The Mojave Desert region is characterized by arid conditions with low precipitation, and the eastern portion of the West Mojave Planning Area is crossed by expansive alluvial washes.

The West Mojave Planning Area supports a diverse array of plant and wildlife species because of the varied topography and landforms within the planning area (BLM 2005a). The predominant aspect of the West Mojave is a flat, sparsely vegetated region interspersed with mountain ranges and dry lakes. The characteristic creosote bush and saltbush plant communities bloom during years of above-normal winter rainfall, and up to 90 percent of the flora is comprised of annual plants (BLM 2005a).

The Private Land alternative would be located immediately north of the Mojave River. The Mojave River is in many ways the most prominent landscape feature of the West Mojave desert (BLM 2004). The now-dry river and playas of the historic Mojave River supported species of invertebrates, fish, amphibians, and pond turtles, and attracted migratory birds dependent on water. Remnant populations of these animals are still present today, and comprise many of the rare species in the vicinity of the river. The ancient river and lakes formed sandy beaches and prevailing winds carried the finer particles to the east, forming hummocks and dunes. These blowsand areas now support unique species of insects, plants, and reptiles, including the Mojave fringe-toed lizard, whose entire distribution can be traced to the former path of the ancient Mojave River and Amargosa River (BLM 2004).

The Private Land alternative would be located immediately north of the CDFG Camp Cady Wildlife Area (BLM 2004). This site supports mesquite thickets and riparian forest, and protects western pond turtle, summer tanager, yellow-breasted chat, and a variety of birds of prey, especially in winter. Camp Cady includes habitat for Mojave tui chub, hawks, songbirds and shorebirds. Adjacent public and private lands on the west including the Private Land alternative contain blowsand deposits with the Mojave fringe-toed lizard (BLM 2004).

The Private Land alternative would be located on habitat that is considered suitable for the Mohave Ground Squirrel (CDFG 2005). The Mohave Ground Squirrel is restricted to the Mojave Desert in San Bernardino, Los Angeles, Kern and Inyo Counties and populations have been reduced by urban development, off-road vehicle use, and agriculture. Populations in the southwestern San Bernardino County appear to be extirpated (CDFG 2005).The Mohave Ground Squirrel was not identified in the CNDDB data for this site.

A reconnaissance survey of the biological resources of the Private Land alternative was conducted on August 16, 2009 from public access roads which allowed visitation throughout the site. Mojave creosote bush scrub and atriplex scrub are the two dominate habitat types at the Private Land alternative site. The Private Land alternative also included some lands dominated by fallow and ruderal fields and developed areas . During this survey, a number of habitat characteristics were used to rate the quality of the habitat and the capacity to support desert tortoises. These include topography, soil texture, dominant shrubs, herb layer, plant diversity, likelihood of desert tortoise occurrence, likelihood of other special status species occurrence, quality of surrounding

habitat, overall habitat quality for wildlife, and overall habitat quality for desert tortoise. Results of the survey show that the Private Land alternative site has varying habitat quality for desert tortoise and wildlife and is generally made up of unsuitable to medium quality habitat for desert tortoise.

The Private Land alternative had poor quality habitat for rare plants, except on Harvard Hill (where no impacts would be expected due to unbuildable slopes). Much of the Mojave River lacks any notable riparian vegetation. Even where riparian vegetation is good, impacts to wildlife using the river vegetation during breeding season from a solar facility up on the ridge of private lands was expected to be low. There is a buffer of perhaps 300-500 feet from river vegetation/active channel to buildable flats to north where the Private Land alternative could be expected to be built.

The following sensitive species occur in the vicinity of the alternative site (CNDDB, 2009). Several species are noted because of the proximity to the Mojave River, which flows rarely.

- Southwestern pond turtle
- Vermilion flycatcher
- Mohave tui chub
- Desert tortoise
- Mojave fringe-toed lizard
- Parish's popcorn-flower
- Pallin bat
- Townsend's big-eared bats'

Environmental Impacts. Approximately 650 acres of the Private Land alternative are disturbed agricultural land. Approximately 3,350 acres of Mojave creosote scrub and other native plant communities would be permanently lost by vegetation clearing, grading, and construction of the solar facilities, potentially affecting special status animal species. Impacts to listed or sensitive plant species would result from direct or indirect loss of known locations of individuals or direct loss of habitat. Indirect loss of individuals may occur in instances such as sediments transported (e.g., from cleared areas during rain events) that cover adjacent plants or changes in a plant's environment that cause its loss (e.g., adjacent shrubs that provided necessary shade are removed). Additional impacts would occur due to the construction and operation of linear facilities associated with a solar facility at the Private Land alternative site, including a possible transmission line approximately 10 miles long and a 3.3-mile gas pipeline. In addition, this alternative is located near the Mojave River, so conditions of certification to protect river corridor species and habitat would be important.

Impacts/Mitigation to Wildlife—Overview

Building a solar facility at the Private Land alternative site would potentially have an adverse effect on listed and sensitive wildlife species and their habitats either directly or through habitat modifications. Any wildlife residing within the proposed project area would potentially be displaced, injured, or killed during project activities. Animal species

in the project area could fall into construction trenches, be crushed by construction vehicles or equipment, or be harmed by project personnel. In addition, construction activities may attract predators or crush animal burrows or nests.

Migratory/Special Status Bird Species. Mojave creosote bush scrub at the power plant site provides foraging, cover, and/or breeding habitat for migratory birds, including special-status bird species that may be present at the site. Project construction and operation could impact nesting birds in violation of the Migratory Bird Treaty Act. Preconstruction surveys and avoidance of nesting birds could reduce such impacts.

Desert Tortoise. The Private Lands Alternative site is located in habitat of varying quality for desert tortoises. Although the habitat/plant community varies somewhat with elevation, slope, and soils, many areas have been heavily disturbed and some are actively farmed. Portions of the site are unsuitable for desert tortoises and other portions range between low and medium quality habitat for desert tortoise. It is anticipated that the private lands alternative also provides unsuitable to medium quality habitat for other special status species that are known to occur in the area.

The Mojave River is located approximately one-half mile from the site. There are patches of well developed riparian habitat and areas of no and poorly developed riparian habitat. The proximity of the river to the project site would most likely result in increased bird activity in the area but this increase is not expected to result in significant impacts. This site is of much less value to desert tortoise than the ISEGS and I-15 sites.

This notwithstanding construction and operation activities may result in direct or indirect impacts to the desert tortoise or its occupied habitat and mitigation measures similar to those required for the proposed ISEGS site would be required should the project be build at the Private Land alternative. .

Mohave Ground Squirrel. Construction and operation activities may result in direct or indirect impacts to the Mohave ground squirrel or its occupied habitat. The project would result in potential take of individuals and permanent loss of up to 4,000 acres of habitat on the solar facility site. The project could also result in disturbance to nearby populations should there be any and increased road kill hazard from construction and operation traffic.

Human activities in the Private Land alternative project area potentially provide food or other attractants in the form of trash, litter, or water, which draw unnaturally high numbers of tortoise predators such as the common raven, kit fox, and coyote. Predation could be reduced through the preparation of a Raven Management Plan and other avoidance and minimization measures such as the conditions of certification presented in the **Biological Resources** section of the FSA/DEIS.

Spread of Noxious Weeds. Construction of a solar facility at the Private Land alternative site could result in the introduction and dispersal of invasive or exotic weeds. The permanent and temporary earth disturbance adjacent to native habitats increases the potential for exotic, invasive plant species to establish and disperse into native plant communities, which leads to community and habitat degradation. A weed reduction program could potentially reduce and mitigate impacts.

Noise. Noise from construction activities could temporarily discourage wildlife from foraging and nesting immediately adjacent to the project area. Many bird species rely on vocalization during the breeding season to attract a mate within their territory. Noise levels from certain construction, operations, and demolition activities could reduce the reproductive success of nesting birds.

Lighting and Collisions. Like the proposed project, the heliostat array at the Private Land alternative site would be arranged around centralized solar power towers 459 feet high, which would potentially include FAA-required lighting and a lightening pole that would extend above the top of the towers approximately 5 to 10 feet. Lighting may increase the collision risk because lights can attract nocturnal migrant songbirds. Bright night lighting close to the ground at the ISEGS project site could also disturb wildlife that occurs adjacent to the project site (e.g., nesting birds, foraging mammals, and flying insects).

Operation of a 10-mile transmission line could result in increased avian mortality due to collision with new transmission lines. Mitigation could include installing the transmission line in accordance with the Avian Powerline Interaction Committee (APLIC) Guidelines designed to minimize avian-power line interactions.

Definite conclusions about the potential for significant impacts to biological resources cannot be made in the absence of site-specific survey and project design information.

Comparison to Proposed Project – Biological Resources

Overall, development of a solar project at the Private Land alternative site would likely impact slightly fewer biological resource compared to those of the proposed ISEGS project because approximately 650 acres of the alternative would occur on disturbed, agricultural land. The Private Land alternative site has varying habitat quality for desert tortoise and wildlife and is generally made up of unsuitable to medium quality habitat compared with the proposed ISEGS site which has a high quality desert tortoise and wildlife habitat. The Private Land alternative is preferred over the ISEGS for impacts to biological resources.

Cultural Resources

Environmental Setting. The Private Land alternative is located on a combination of agricultural land, undeveloped BLM land, and open space private land in San Bernardino County, California. The alternative site is located in the Mojave Desert and is located just north of the CDFG Camp Cady Wildlife Area. The California desert has been inhabited for at least 8,000 to 12,000 years and perhaps longer (BLM 2005a). Prehistoric settlement was often centered on lakes, now the dry playas characteristic of the Mojave Desert and Great Basin. The lakes and marsh environments along the edges had abundant plant and animal species providing food, fibers, medicines, tools, clothing, and ritual objects required for daily life (BLM 2005a). Closer to the Private Land alternative, the Mojave River was a significant focus of prehistoric settlement and the principal corridor for prehistoric travel and trade, particularly during the Protohistoric Period (A.D. 1200 to ca. A.D. 1850) (Moratto 1984, pp. 426–430).

From 8,000 to 6,000 years before present, climatic change caused the lakes to dry, and food gathering and land use patterns began that continued into the historic period, including a use of a greater variety of habitats, plants, and animals (BLM 2005a). The bow and arrow may have appeared around 2,000 years ago as evidenced by a shift in projectile point types, and the expansion of bow-and-arrow technology is evidenced by the late prehistoric introduction of the Desert Side-Notched and Cottonwood Triangular points found through the California desert (BLM 2005a). A pattern of exploitation of seasonally available resources resulted in the use of large areas by relatively small populations and left archaeological sites widely scattered (BLM 2005a).

The first documented exploration of the Mojave Desert by nonindigenous people occurred in the mid-1700s by Francisco Garces, a Spanish Franciscan priest looking for a route from Arizona to Northern California (BLM 2005a). Much of the history of this region is because of its use as a corridor, one used by fur trappers and caravans. California was annexed in 1848, the same year that gold was discovered, leading to an influx of prospectors (BLM 2005a). Roads were established to transport goods, people, livestock, food, and ore between the Mojave Desert and Los Angeles, and the western Mojave Desert began to have a large mining industry.

Railroad surveys began in 1853; the San Pedro, Los Angeles, and Salt Lake Line, predecessor to the Union Pacific through the Mojave Desert, was completed in 1905, and the Tonopah and Tidewater finished its line from Ludlow to Beatty, Nevada, in 1907 (BLM 2005a). In 1914, a road was completed to parallel the tracks of the Atlantic & Pacific Railroad, which was the precursor to U.S. 66 (National Trails Highway).

Military bases were established in the desert prior to World War II, and large tracts were set aside for military use, including the MCAGCC (BLM 2005a). Further information regarding this region can be found in the **Cultural Resources** section of the FSA/DEIS.

One California State Historical Landmark is located immediately south of the Private Land alternative. Camp Cady (No. 963-1) was located on the Mojave Road which connected Los Angeles to Albuquerque. Non-Indian travel on this and the nearby Salt Lake Road was beset by Paiutes, Mohaves, and Chemehuevis defending their homeland. To protect both roads, Camp Cady was established by U.S. Dragoons in 1860. The main building was a stout mud redoubt. Improved camp structures were built 1/2 mile west in 1868. After peace was achieved, the military withdrew in 1871. This protection provided by Camp Cady enabled travelers, merchandise, and mail using both roads to boost California's economy and growth (OHP 2009). Much of the camp has been destroyed, and unrelated wooden structures exist onsite. The Camp Cady site today is bare of apparent evidences of early use, because a flood in 1938 washed away all traces of the original adobe structures.

A records search for the Private Land alternative at the San Bernardino Archeological Information Center of the California Historical Resources Information System reveals that the alternative, which is in and adjacent to the Mojave River floodplain, is in a landscape context that has a moderately high frequency of prehistoric archaeological sites. Energy Commission staff conducted the records search on August 5, 2009, focusing on the Private Land alternative and areas four miles to the east and west along the Mojave River. The records search documents the presence of diverse archeological

site types on the alluvial terraces that flank the river. The site types include habitation areas, village sites, and campsites, each of which may have food processing, lithic reduction, burial, and cremation components. Other site types typical on and beyond the terraces include lithic quarry sites, rock art sites, ceramic scatters, and trails.

The known prehistoric archaeological site distribution across the area of the Private Land alternative reflects both the frequency and the diversity of the site types in adjacent areas. Roughly 27 percent of the Private Land alternative appears to have been subject to reliable pedestrian surveys. The surveys document three prehistoric archaeological sites in or immediately adjacent to the area of the alternative, a moderately complex habitation area on the alternative that includes three food processing areas, one campsite, and one ceramic scatter (P1801-14), a village site found adjacent to the alternative in 1966 and destroyed by agriculture prior to 1980 (CA-SBR-2689), and a lithic quarry site related to the exploitation of toolstone available on Harvard Hill on the western portion of the alternative (CA-SBR-1933). The extrapolation of the archaeological site frequency for the known, roughly 27 percent sample of the alternative would appear to indicate the potential presence of three to four times the number of known archaeological sites on the alternative.

Environmental Impacts. The construction and operation of a solar facility on the site of the Private Land alternative would appear likely to destroy one whole known prehistoric archaeological site and part of a second, and may destroy components of a third, and has the further potential to wholly or partially destroy a number of other prehistoric archaeological sites on portions of the alternative that have not yet been subject to pedestrian survey. One would need to establish the historical significance of the three known resources above and any additional ones that would be found as a result of the complete pedestrian survey of the alternative to comment more definitively on whether any of these resources would qualify for treatment under Federal and State regulatory programs. Given the historic significance of the Mojave River corridor during most of prehistory and the character of the diverse archaeological site types known for the Private Land alternative and adjacent areas, it is, however, reasonable to conclude that the alternative would most likely have the potential to destroy significant prehistoric archaeological deposits. Federal and State regulatory programs would require treatment for all such deposits.

One historical archaeological site, Camp Cady (California State Historical Landmark No. 963-1), is known in the vicinity of the Private Land alternative. As the resource is roughly one half of a mile to the south of the alternative, it is relatively unlikely that the presence of a solar facility would result in a significant impact to the particular values for which the resource may be significant. The primary value of the resource probably relates to the information that the careful excavation of the historical archaeological deposits that make up the camp would produce. The construction and operation of a solar facility on the Private Land alternative would not disturb or destroy any of these deposits. The historical archaeological deposits of Camp Cady could also potentially be found to have historical value for the association of the deposits with significant events or patterns in history. Were the deposits found to have such value, the potential for a nearby solar facility to degrade the visual integrity of the resource would have to be taken into account. The resolution of this issue would require further study.

There are a number of known built environment resources (buildings, structure, and linear infrastructure elements) in and near the Private Land alternative. The former San Pedro, Los Angeles, and Salt Lake Railroad, now the Union Pacific Railroad, and segments of the Old Spanish Trail, the Mormon Trail, and the Mojave Road are thought to run through the area of the alternative. Camp Cady Ranch is roughly one half of a mile south of the alternative. The presence of the trail and road segments on the alternative is presently unconfirmed, and the integrity of the railroad, trail and road segments, or Camp Cady Ranch is similarly unconfirmed. Further study of the resources could reveal that a solar facility on the Private Land alternative would have significant physical and visual impacts on historically significant railroad, road, and trail segments that contribute respectively to the historic significance of each overall transportation route, and have a visual impact to Camp Cady Ranch.

Comparison to Proposed Project. The development of a solar facility on the site of the Private Land alternative would most likely have cultural resource impacts that far exceed those of the ISEGS project at the Ivanpah Basin. Whereas the ISEGS project would have a significant impact to a portion of one historical resource, the Hoover Dam-to-San Bernardino transmission line (CA-SBR-10315H), the construction and operation of a solar facility on the Private Land alternative has the real potential to wholly or partially destroy a number of significant prehistoric archaeological sites. The partial destruction or visual degradation of historical archaeological resources and built environment resources are other potential significant impacts of such a facility. More site-specific information about the cultural resources on the Private Land alternative would serve to better qualify this comparison.

Hazardous Materials

Environmental Setting. The topography of the Private Land alternative site is essentially flat, as are the immediately surrounding areas. Sensitive receptors are present within the Private Land alternative site, and a residential community is located adjacent to the southeast corner of the alternative site. Additional rural residences are located 0.5 miles north of the site north of Interstate 15, 2.5 miles west of the site, and 1 mile south of the site.

Access to the Private Land alternative would likely be via Interstate 15 from Barstow to the Harvard Road exit. At Harvard Road, transport would likely turn south onto Harvard Road and would continue southeast for approximately 1 mile through primarily open space and agriculture land.

Environmental Impacts. Hazardous materials use at the Private Land alternative, including the quantities handled during transportation and disposal, would be the same as those of the proposed project. As stated in the **Hazard Materials** section for the proposed project, hazardous materials used during the construction phase of the project would include gasoline, diesel fuel, motor oil, lubricants, and small amounts of solvents and paint. No acutely toxic hazardous materials would be used on site during construction, and none of these materials pose a significant potential for off-site impacts as a result of the quantities on site, their relative toxicity, their physical states, and/or their environmental mobility.

Natural gas would be transmitted to the site via a new pipeline from an existing gas line approximately 3.3 miles north of the Private Land alternative and would likely require another 0.5 to 1.5 miles of pipeline to reach the power block depending on the site layout.

Transportation of hazardous materials to the Private Land alternative site would require passing near residences located in the town of Barstow, approximately 20 miles from the Private Land alternative. However, the transportation would be primarily on Interstate 15 and not on smaller road with residences. The transportation route from Interstate 15 on Harvard Road would be primarily through open space.

Comparison to Proposed Project. The hazardous materials that would be used at the Private Land alternative site would be the same as those used at the proposed ISEGS site; however, the Private Land alternative site has sensitive subgroups within a five-mile radius. As such, the potential impacts at the Private Land alternative would likely be somewhat greater. Compared to the proposed project, selecting the Private Land site would result in slightly greater impacts from transportation of hazardous materials. With adoption of the proposed conditions of certification, the Private Land alternative would comply with all applicable laws, ordinances, regulations, and standards (LORS) and result in no significant impacts to the public.

Land Use

Environmental Setting. The Private Land alternative would be located on private open space land containing a few rural residences and agricultural lands, and would also include approximately 900 acres of unclassified BLM land. The San Bernardino General Plan Land Use designation for the area is Rural Living. The intended use of Rural Living is to provide sites for rural residential uses, incidental agriculture uses, and similar and compatible uses. The primary purpose of the Rural Living Land Use District is to identify areas and encourage appropriate rural development, and prevent inappropriate demands for urban services. Electrical power generation is an allowed use on Rural Living land with a Conditional Use Permit (San Bernardino 2009).

The Private Land alternative would be located on approximately 320 acres of Prime Farmland and approximately 150 acres of Farmland of Statewide Importance (DOC 2006). The Private Land alternative would impact no lands under Williamson Act contracts (San Bernardino County 2008). Approximately 650 acres of the Private Land alternative are or were used for agricultural purposes.

Approximately 900 acres of the Private Land alternative are BLM land, and approximately 2,450 acres are private open space lands. The BLM land is within the BLM Western Mojave Planning Area, the purpose of which is to develop management strategies for the desert tortoise, Mohave ground squirrel and over 100 other sensitive plants and animals throughout the western Mojave Desert.

Approximately five rural residences exist on the Private Land alternative; however, during a site visit it appeared that some of the residences may not be occupied. There is a large private religious camp (Ironwood) located near the alternative site.

Environmental Impacts. Like the ISEGS proposed site, a key land use plan affecting this project is the U.S. Bureau of Land Management's California Desert Conservation Area (CDCA) Plan of 1980, as amended. The Private Land alternative, as stated above, is located within areas of the CDCA West Mojave Plan on land that has not been classified by the BLM. Unclassified lands consist of scattered and isolated parcels of public land in the CDCA which have not been placed within the multiple-use classes. Unclassified land is managed by the BLM on a case-by-case basis. As such, at this time it cannot be concluded whether the project is in conformance with the CDCA Plan.

Additionally, the Private Land alternative would be located within San Bernardino County Land Use designation Rural Living. As stated above, electrical power generation is an allowed use in a Rural Living area with a Conditional Use Permit which would require a General Plan Amendment to apply the Energy Facilities Overlay (San Bernardino 2009).

Based on the site review, there are approximately 650 acres of productive agricultural uses on the Private Land alternative project site or which approximately 320 acres are considered Prime Farmland. The construction and/or operation of the proposed project would result in a removal of approximately 650 acres of actively-used agriculture land. The construction and operation of the solar power plant would eliminate existing agricultural operations and foreseeable future agricultural use. This loss of agricultural lands is a potentially significant impact, and would require a condition of certification potentially requiring purchase of an equivalent number of acres of farmland.

The Private Land alternative would be build on land that currently has approximately five houses and related agricultural facilities located on the site. It is not certain if the houses are currently occupied, and some of the housing structures appeared abandoned during the site visit. The Newberry Springs area has a total of 1,522 housing units (US Census, 2009). The five houses within the Private Land alternative represent less than one percent of the housing units in the Newberry Springs area. If this area were purchased for the purpose of constructing a solar project, the residences would likely be demolished. The landowners cannot be compelled to sell, since BrightSource does not have eminent domain powers, and the current owners would be compensated based on the negotiated sale price of the property. Therefore, while the removal of the five homes by the project would result in a loss of residential dwelling units and associated agricultural facilities, this impact is not considered to be significant.

One group of residences is located within 1,000 feet of the Private Land alternative, east of the intersection of Troy Road and Cherokee Street. Construction activities for the alternative would create temporary disturbance to these residential areas (i.e., heavy construction equipment on temporary and permanent access roads and moving building materials to and from construction staging areas). Conditions of certification to reduce noise and air quality impacts are presented in the Noise and Air Quality sections for the proposed ISEGS site. However, these measures would not eliminate the disturbance to nearby residences. While this disturbance would be temporary at any one location, impacts would be significant if construction was not carefully managed and residents not kept informed.

Comparison to Proposed Project. Selecting the Private Land alternative site would result in greater impacts to land use than would the ISEGS Ivanpah Basin site because

approximately five residences would potentially require demolition. Additionally, approximately 650 acres of agricultural land would be removed from production, and there would be construction and operational impacts to the nearby religious camp. Additional conditions of certification to offset loss of agricultural lands would be required.

Recreation and Wilderness

Environmental Setting. The Private Land alternative site would be located immediately adjacent to the California Department of Fish and Game Cady Camp Wildlife Area. The Cady Camp Wildlife Area is approximately 1,870 acres of desert riparian habitat with opportunities for hiking and bird watching along with dove, quail, and rabbit hunting (DFG 2009). Camping is allowed at the Cady Camp headquarters and at the Harvard Road "dove" field. Cady Camp Wildlife Area hosts a variety of Game Bird Heritage Program Special Hunts such as a Junior Pheasant Hunt and a Family Pheasant Hunt in the 2007-2008 season (DFG 2009).

A number of man-made water ski lakes are located in the vicinity of the Private Land alternative. The nearest lake is located southeast of the eastern border of the Private Land alternative adjacent to the Cady Camp Wildlife Area.

The BLM Manix ACEC is located approximately two miles east of the Private Land alternative. The Manix ACEC was established in 1990 by the BLM to protect paleontological and cultural resources. The site also contains terminus of the Mojave Road, which is used by off-highway vehicles.

Environmental Impacts. The Private Land alternative would be located adjacent to the northern border of the CDFG Cady Camp Wildlife Area, and one to three miles north of ski lakes in the Newberry Springs area. Because of the flat topography and the close proximity of the Private Land alternative to the Cady Camp Wildlife Area, the solar power plant would be visible from the Wildlife Area.

Project construction activities would create a number of temporary conditions that may dissuade recreationists from visiting the Cady Camp Wildlife Area. Noise, dust and heavy equipment traffic generated during construction activities would negatively affect a visitor's enjoyment of the recreation area. The location of construction equipment may temporarily preclude access to recreation areas, especially in the vicinity of Harvard Road and in the Harvard Road "dove" field. Disturbances to recreational activities would potentially cause a temporary reduction of access and visitation during construction activities.

Construction of the 4,000 acres of heliostats and solar power towers would change the character of the Cady Camp Wildlife Area. While the wildlife area is located in an area that is zoned Rural Living, few residences are located immediately adjacent to the wildlife area except on the eastern border. Presence of the heliostats and power towers would significantly contrast with the existing open space and agriculture areas north of the Cady Camp Wildlife Area. The heliostats and power towers would also result in a long-term visual impact to travelers and recreationists in this region. The noise and activity of the solar power plant may potentially scare hunting prey and preclude hunting at the Cady Camp Wildlife Area.

Comparison to Proposed Project. Both the proposed site and the Private Land alternative are located adjacent to Interstate 15, and both are located in areas with existing recreational use. There is a golf course adjacent to the proposed site, and the Ivanpah Dry Lakebed is visited by an estimated 5,000 visitors annually for land sailing. There is a less intense, but still high level of recreational use near the Private Land alternative. Recreation and wilderness impacts would be similar at the Private Land alternative than at the ISEGS site because of the close proximity between the Private Land alternative and the Cady Camp Wildlife Area and the recreational water ski lakes in the communities of Newberry Springs and Harvard. No natural or man-made feature would block the alternative site from view at the wildlife area. Use of the wildlife area as a hunting ground may no longer be possible should the Private Lands alternative be chosen. Overall, recreation impacts at the two sites would be similar.

Noise and Vibration

Environmental Setting. Generally low levels of ambient noise exist along the southern portion of the Private Land alternative area, as this portion of the site is primarily undeveloped open space and not adjacent to the freeway. Low noise levels under 50 dBA generally are expected to occur on these lands, which are used for agriculture with scattered rural residences. Noise levels would be elevated along the northern boundary of the project due to the presence of heavily traveled Interstate 15. For the majority of the Interstate 15 freeway corridor, a 65 dBA contour extends approximately 100 to 150 feet in either direction from the centerline (FRA 2009).

Intermittent noise is expected to occur at the eastern side of the Private Land alternative where the alternative site is be located near a small residential community.

Nearby sensitive receptors include the residential community adjacent to the Private Land alternative southeast corner and the Cady Camp Headquarters which is also used for camping. The nearest residential area would be about 500 feet from the alternative site boundary, immediately adjacent to the southeast corner of the Private Land alternatives between the alternative and the Mojave River.

Environmental Impacts. As stated in the Noise section of this FSA/DEIS, the construction of the ISEGS plant would create noise, or unwanted sound. The character and loudness of this noise, the times of day or night at which it is produced, and the proximity of the facility to sensitive receptors combine to determine whether the facility would meet applicable noise control laws and ordinances and whether it would cause significant adverse environmental impacts.

The noise experienced at any specific receptor during operation of a solar facility on this site would depend on which facility components were closest to the receptor. The heliostat arrays would not create operational noise, but the power block would create more noticeable noise.

If built in accordance to conditions of certification similar to those proposed for the ISEGS site, adverse noise impacts to sensitive receptors from construction and operation would be reduced to less than significant levels.

Comparison to Proposed Project. Given the proximity of both sites to the I-15 freeway, the baseline noise levels are elevated. However, the Private Land alternative would be in a location with more nearby sensitive receptors than the proposed site, so impacts at that site would be more severe at the alternative site.

Public Health and Safety

Environmental Setting. The Private Land alternative site is located in an isolated desert area. The nearest small community is located immediately adjacent to the southeast corner of the Private Land alternative site.

Environmental Impacts. While the meteorological conditions and topography at the site are not exactly the same as at the applicant's proposed site, they are similar enough that the results of air dispersion modeling and a human health risk assessment for the Private Land alternative site would be similar to that found for the proposed site. The cancer risk and hazard indices are much below the level of significance at the point of maximum impact, so the project would be unlikely to pose a significant risk to public health at this location.

Comparison to Proposed Project. There is no significant difference between this location and the proposed site for public health & safety.

Socioeconomics and Environmental Justice

Environmental Setting. Like the proposed ISEGS site, the Private Land alternative is located in San Bernardino County. The demographic characteristics of San Bernardino County are described in the **Socioeconomics and Environmental Justice** section of the FSA/DEIS.

Environmental Impacts. Because of the limited population in Harvard and Newberry Springs, construction workers would most likely be from larger nearby cities such as Victorville and Barstow. The construction workers would most likely have to commute 20 to 50 miles or more daily to reach the construction site due to the limited housing availability in the Harvard and Newberry Springs region. There are no hotels in Newberry Springs, although RV camp sites are available. An additional option would be to erect temporary housing in the immediate area of the Private Land alternative site; however, this would increase the construction impacts and require provision of additional services such as electricity, water, and food. Because it is unlikely that the construction workers would relocate to the Newberry Springs or Harvard region, the Private Land alternative would not cause a significant adverse socioeconomic impact on the area's housing, schools, police, emergency services, hospitals, and utilities.

There would be no adverse socioeconomic impacts since most of the construction and operation workforce is within the regional labor market area, and construction activities are short-term. Benefits from the ISEGS project, should it be built at the Private Land alternative, are likely to be similar to the benefits from ISEGS in the Ivanpah Valley. Benefits include increases in sales taxes, employment, and income for San Bernardino County.

Comparison to Proposed Project. The socioeconomic impacts of the ISEGS project at the Private Land alternative site would be similar to building and operating the project at the proposed site.

Soil and Water Resources

Environmental Setting. Soils in the San Bernardino County Desert Region are primarily sandy gravel with low runoff coefficients and fast percolation (San Bernardino County 2006). The desert habitat of San Bernardino County includes soils that are predominantly sandy gravel and include major dune formations, desert pavement, and dry alkaline lake beds (San Bernardino County 2007).

The entire region is crossed by alluvial wash deposits. Desert soils are susceptible to erosion where disturbed due to the limited vegetation and low moisture content, as well as common high winds and infrequent high-intensity rainfall events that may occur (San Bernardino County 2006).

The Private Land alternative lies within the Lower Mojave River Valley Groundwater Basin (DWR 2004b). The Lower Mojave River Valley Groundwater Basin underlies an elongate east-west valley with the Mojave River flowing occasionally through the valley from the west across the Waterman fault and the existing valley to the east through Afton Canyon. Precipitation is between 4 to 6 inches with the average for the basin near 4 inches. Water-bearing deposits in this basin are predominantly unconfined (DWR 2004b). Wells yield range from 100 to 4,000 gpm and the average yield is about 480 gpm. The basin is bounded by the Camp Rock-Harper Lake, Calico-Newberry and Pisgah fault zones which form barriers or partial barriers to groundwater flow. Historically springs were located on the west side of many of these faults but most are no longer flowing because of a decline in the water table (DWR 2004b). In the northeastern portion of the basin relatively shallow clay layers result in shallow water levels near Camp Cady.

The published total storage capacity of the Lower Mojave River Valley Groundwater Basin varies. DWR calculated the total storage capacity for the Troy and Daggett storage units as 7,950,000 acre feet (DWR, 2004b). The Mojave Water Agency calculated a total storage capacity of approximately 9,010,000 acre feet for the Lower Mojave River Valley Groundwater Basin (DWR 2004b).

Environmental Impacts

Soil Erosion Potential by Wind and Water. As stated in the **Soils and Water** section of this FSA/DEIS, construction activities can lead to adverse impacts to soil resources including increased soil erosion, soil compaction, loss of soil productivity, and disturbance of soils crucial for supporting vegetation and water-dependent habitats. Activities that expose and disturb the soil leave soil particles vulnerable to detachment by wind and water. Soil erosion results in the loss of topsoil and increased sediment loading to nearby receiving waters. Access to the Private Land alternative site would be via the Harvard Road and would not require any additional access road to reach the site. While the volume of earth movement is unknown at this time, the topography and slopes of the Private Land alternative and the Ivanpah Basin site are similar. Therefore, it is expected that the large footprint and extensive grading required for the facilities

would be similar at both the Ivanpah and Private Land alternative sites, and similar erosion and sedimentation control methods would be used at both sites. Because of the high erosion potential of the desert soil, impacts to the soils at the Private Land alternative site would likely be significant and require mitigation similar to the mitigation required at the Ivanpah Basin site. Low Impact Development principles would likely be used at this site, as at the ISEGS site, and grading plans, a Storm Water Pollution Prevention Plan (SWPPP), and a Drainage Erosion and Sediment Control Plan (DESCP) would be required. While grading plans, a SWPPP, and a DESCP would potentially reduce impacts to a less than significant level, near final grading plans, the SWPPP, and the DESCP would need to be prepared and reviewed to be certain this would be feasible.

Storm Water. As stated in the **Soil and Water** section, potentially significant water quality impacts could occur during construction, excavation, and grading activities if contaminated or hazardous soil or other materials used during construction were to drain off site. The Private Land alternative site is in primarily undeveloped area with some farmland. Brush would be cleared prior to grading. The storm water runoff percolates either into the soil or into flows overland off site. Impacts from storm water runoff would likely be similar to those at the Ivanpah Basin site because of the high volume of earth displacement and the long duration for construction. Similar conditions of certification would be required.

Project Water Supply. It is unlikely that groundwater would be encountered during grading activities as the recorded depth to groundwater in the Lower Mojave River Valley Groundwater Basin is between 50 and 800 feet. However, as stated above relatively shallow clay layers result in shallow water levels near the Private Land alternative site. The volume of groundwater required for construction would be similar to that required for constructing the projects at the Ivanpah Basin location; however, there is a general trend in this basin for declining groundwater levels. While it is unknown at this time if there is sufficient groundwater available in the Lower Mojave River Valley Groundwater Basin to meet the construction and operation requirements of the Private Land Alternative, staff expects that water use associated with current agriculture practices would be higher than the annual volume of water required of the project. With the makeup of the Private Land site including 320 acres of Prime Farmland and approximately 150 acres of Farmland of Statewide Importance, the existing water use for agriculture is expected to likely be greater than the average project operational water demand of 100 acre-feet/year.

Wastewater. Groundwater would be needed during construction of the ISEGS project at the Private Land alternative. Once used, this water would be reused to the extent possible and then discharged as wastewater. Improper handling or containment of construction wastewater could cause a broader dispersion of contaminants to soil or groundwater. The discharge of any nonhazardous wastewater during construction would be required to be in compliance with regulations for discharge. Water that could not be reused would be transported to an appropriate treatment facility. With implementation of required regulations, impacts would likely be less than significant.

Comparison to Proposed Project – Soil and Water Resources

Due to the large footprint and extensive grading required for the solar facility at both the ISEGS and Private Land alternative sites, similar erosion and sedimentation control methods would be used at both sites. Impacts to soil and water erosion would be similar at the two sites. Based on the current water use for agriculture, staff would expect that sufficient water is available at the Private Land alternative site.

Traffic & Transportation

Environmental Setting. The Private Land alternative would be located adjacent to Interstate 15. Access to this site would be via Interstate 15 to the Harvard Road exit in Harvard, then approximately 1 mile south on Harvard Road. The Private Land alternative site entrance would most likely be from Harvard Road. A Union Pacific railroad track is located adjacent to Interstate 15. Workers employed to construct the project at this alternative site would most likely commute from Barstow (20 miles) or Victorville (60 miles). Given the freeway access, there would not likely be added traffic on the Interstate 15 east of the site (towards Las Vegas).

Environmental Impacts. Similar to the ISEGS project at Ivanpah Basin, before construction could occur for the Private Land alternative, a construction traffic control and transportation demand implementation program would need to be developed in coordination with Caltrans. This analysis may result in the need to limit construction-period truck and commute traffic to off-peak periods to avoid or reduce traffic and transportation impacts. These impacts would likely be less severe than those of the proposed project because construction at the Private Land alternative would not require travel on Interstate 15 east of Barstow, and the Interstate15 areas with most severe congestion would not be affected. The impacts caused by construction at the Private Land alternative would likely be less than significant through proper coordination with local agencies.

The project would potentially impact the Union Pacific right-of-way because it would be located less than one mile south of an active railroad right of way. Impacts to rail operations would be less than significant through proper coordination with local agencies. Additionally, this rail line could potentially be used as a means of bringing in the materials required for the project.

Additionally, the Private Land alternative would be approximately 0.5 miles from a landing strip located on BLM land. This may require additional marking and lighting along the power towers in order to ensure safety of aircraft.

Comparison to Proposed Project. Impacts to traffic and transportation at the Private Land alternative site would be similar to those at the proposed ISEGS site; including the use of Interstate 15 east of Barstow. However, the Private Land alternative site would not require the use of Interstate 15 east of Barstow for the highly congested Friday afternoon time period. Because of its location closer to sources of workers in the Victor Valley and Barstow, the Private Land alternative site would likely have fewer impacts on traffic and transportation than those the Ivanpah Basin site.

Transmission Line Safety and Nuisance

Environmental Setting. The Private Land alternative would connect with the SCE transmission system by two possible options. The first would be through an interconnection with the existing SCE 115 kV transmission line that crosses the site; this would require a transmission line upgrade to 230 kV. The second option would be to construct a 230 kV transmission line for approximately 10 miles southwest to the existing SCE Cool Water Substation in Daggett. The new transmission line would follow the existing 115 kV corridor. The Private Land alternative site is in uninhabited open space, agriculture land, and some rural residences crossed by a BLM utility corridor. BLM utility corridors are typically between two and five miles wide to provide flexibility in selecting alternative routes for rights-of-way (BLM 1999). As with the ISEGS Ivanpah Valley site, the Private Land alternative would be able to tap into the Kern River Gas Transmission Company pipeline approximately 3.3 miles north of the Private land site.

Environmental Impacts. Similar to the proposed project, this alternative would not be likely to cause transmission line safety hazards or nuisances. As stated in the **Transmission Line Safety and Nuisance** section, the potential for nuisance shocks would be minimized through grounding and other field-reducing measures that would be implemented in keeping with current standard industry practices, and the potential for hazardous shocks would be minimized through compliance with the height and clearance requirements of CPUC's General Order 95. Compliance with Title 14, California Code of Regulations, section 1250, would minimize fire hazards, while the use of low-corona line design, together with appropriate corona-minimizing construction practices, would minimize the potential for corona noise and its related interference with radio-frequency communication in the area around the route. As with the proposed ISEGS transmission lines, the public health significance of any related field exposures cannot be characterized with certainty. The only conclusion to be reached with certainty is that the proposed lines' design and operational plan would be adequate to ensure that the generated electric and magnetic fields are managed to an extent the CPUC considers appropriate in light of the available health effects information.

Comparison to Proposed Project. The Private Land alternative site would potentially require a longer transmission line interconnection with the SCE transmission system should a new transmission line be built. The increased length and proximity to sensitive receptors would likely increase the impact of the transmission interconnection at the Private Land alternative site.

Visual Resources

Environmental Setting. The alternative site parallels Interstate 15, and a 115kV transmission line crosses the alternative site from southwest to northeast. There are few buildings in the area; they include scattered rural residences and the Cady Camp Headquarters are located near the alternative site. The transmission line and the freeway introduce a more developed and industrial feature to the otherwise rural setting.

Nearby views from the Private Land alternative site to the south, west and east are of undisturbed desert landscape crossed by a few unpaved roads, some agriculture lands, and some rural residential areas. A berm crosses the Private Land alternative along the northern boundary, along which are located railroad tracks, approximately one mile

south of I-15. Further views become more residential once the community of Newberry Springs comes into view. Elevation rises to the east of the site, eventually becoming the foothills of the Cady Mountains. More rural communities are located north of Interstate 15 within viewing distance of the site in addition to a number of other major transmission lines paralleling the freeway.

Environmental Impacts. As stated in the **Visual Resource** section, the Energy Commission staff, in coordination with BLM, applied the BLM Visual Resource Management (VRM) system of visual assessment to the proposed ISEGS site at Ivanpah Basin. The existing visual setting baseline under the VRM methodology is characterized in terms of Visual Resource (VR) Classes. Under the VRM system, areas of the project viewshed are delineated and mapped based on broadly uniform characteristics of visual quality, viewers' sensitivity, and distance from project to viewers. These delineated areas are then assigned a VR Class (from I through IV). VR Classes are analogous to Overall Sensitivity ratings under the Energy Commission method and are used to determine an area's visual objective, that is, the level of project-caused contrast that is acceptable, above which contrast could constitute a potentially significant adverse impact. The BLM land areas considered for the Private Land alternative have not been assigned a VR Class so a formal impact determination under BLM's system cannot be made.

For the non-BLM land (the bulk of the Private Land alternative), visual impact analysis would be based on a comparison of the area's visual sensitivity with the added industrial features added by the solar project at this location. With the addition of the project, views of the desert and rural communities would change from a relatively undisturbed desert landscape to a substantially more industrial, highly altered one, dominated by roughly four square miles of mirror-arrays and 459-foot-tall solar collector towers, graded areas, and retention ponds, as well as light rays reflected off ambient atmospheric dust and the bright glow of the receiving portions of the solar collectors. There would be no natural features to block the view of the solar facilities on any side.

The site would be prominently visible from Interstate 15, for both westbound and eastbound traffic. Travelers would see the site from a distance although the berm that is located along the northern boundary of the project would potentially block some of the heliostats from view. The berm is not tall enough to block the solar power towers. . Additionally, because of the shape of the site (see Alternatives – Figure 5B), Interstate 15 would run the entire length of the solar power plant making the visible components more visually intrusive to westbound and eastbound traffic.

The linear facilities associated with the Private Land alternative site include a gas pipeline approximately three miles long and a potential 230-kV transmission line approximately 10 miles long. Construction of the gas pipeline would create a visible scar across the desert landscape that would remain for many years, even with restoration efforts. The transmission line would follow the existing utility corridor and would roughly parallel an existing 115 kV transmission line for 10 miles until reaching the SCE Coolwater Substation and would be prominently visible from Interstate 15. The Private Land alternative interconnection would introduce additional industrial character to the Interstate 15 corridor.

Comparison to Proposed Project. The Private Land site is preferred over the proposed ISEGS site. While the solar power towers at the Private Land alternative site might be slightly more visible to riders along Interstate 15, it would be located in a more urban setting near existing communities and some of the project components would be potentially blocked by an existing berm. The proposed ISEGS site would be visible to heavily used recreation areas including wilderness areas within the Mojave National Preserve. While the Private Land site would be prominently visible to the Cady Camp Wildlife Area, views from this camp to the south and east are already relatively built up due to the communities of Harvard and Newberry Springs which surround the site. As a result, a large solar project in the ISEGS area would create a more dramatic change to the visual environment than would occur at the Private Land site.

The Private Land alternative transmission line would create a visual impact similar to that of the Ivanpah Basin transmission interconnection. The interconnection transmission line at the Private Land alternative would potentially be longer than the Ivanpah Basin transmission interconnection, but would be located adjacent to an existing line in an existing corridor.

Waste Management

Environmental Setting. As stated in the **Waste Management** section, hazardous and nonhazardous solid and liquid waste, including wastewater, would be generated at the ISEGS project during construction and operation of the solar power plant. Waste would be recycled where practical and non-recyclable waste would be deposited in a Class III landfill. The nearest waste disposal facility that could potentially accept the nonhazardous construction and operation wastes generated by the project is the Barstow Sanitary Landfill in Barstow, California. The remaining capacity for the disposal facility is 924,401 cubic yards, and the Barstow Sanitary Landfill Expansion plan is currently undergoing environmental review (CIWMB 2008).

The hazardous waste generated during this phase of the project would consist of electrical equipment, used oils, universal wastes, solvents, and empty hazardous waste materials (BSE 2007a, section 5.14.1.2). Universal wastes are hazardous wastes that contain mercury, lead, cadmium, copper, and other substances hazardous to human and environmental health. Examples of universal wastes are batteries, fluorescent tubes, and some electronic devices. Section 5.14.4.2.2 of the ISEGS AFC discusses the two Class I landfills that accept hazardous wastes and are open in California: the Clean Harbor Landfill (Buttonwillow) in Kern County and the Chemical Waste Management Landfill (Kettleman Hills) in Kings County. The Kettleman Hills facility also accepts Class II and Class III wastes. In total, there is in excess of 11 million cubic yards of remaining hazardous waste disposal capacity at these landfills, with approximately 30 years of remaining operating lifetimes.

Environmental Impacts. Construction at the Private Land alternative site would require excavation of fill material that underlies the site similar to that of the proposed project. Both nonhazardous and hazardous wastes would be created by the construction of the ISEGS project at the Private Land alternative in similar quantities as at the proposed ISEGS site and would be disposed of at appropriate facilities. As with the proposed ISEGS site, the applicant would be required to obtain a unique hazardous waste generator identification number for the site prior to starting construction and would be

required to comply with similar conditions of certification. The project would produce minimal maintenance and plant wastes.

All nonhazardous wastes would be recycled to the extent possible, and nonrecyclable wastes would be regularly transported off site to a local solid waste disposal facility. Generation plant wastes include: oily rags, broken and rusted metal and machine parts, defective or broken electrical materials, empty containers, and other miscellaneous solid wastes, including the typical refuse generated by workers. As with the proposed project, all construction and operation activities would need to be conducted in compliance with regulations pertaining to the appropriate management of wastes. The total amount of nonhazardous waste generated from the project is estimated to be less than 300 cubic yards of solid waste from construction, and approximately 250 cubic yards per year from operation. This would contribute less than 4 percent of the available landfill capacity. The disposal of the solid wastes generated by the ISEGS can occur without significantly impacting the capacity or remaining life of any of these disposal facilities.

Like nonhazardous wastes, hazardous wastes would be recycled to the extent possible. The four tons of hazardous waste from the ISEGS requiring off-site disposal would be far less than the threshold of significance and would therefore not significantly impact the capacity or remaining life of the Class I waste facilities. Similar to the proposed project, the project would need to implement a comprehensive program to manage hazardous wastes and obtain a hazardous waste generator identification number (required by law for any generator of hazardous wastes).

Comparison to Proposed Project. The environmental impacts of waste disposal at the Private Land alternative site would be similar to those at the proposed ISEGS site at the Ivanpah Basin. While the Private Land alternative would be closer to the Barstow Sanitary Landfill, it would also be closer to sensitive receptors, specifically the rural residences that would border the southeast corner of the site.

Worker Safety and Fire Protection

Environmental Setting. The Private Land alternative site would be located within an area that is open space. The area is currently served by the San Bernardino County Fire Department. See the **Worker Safety and Fire Protection** section for more information regarding the San Bernardino County Fire Department. The fire risks of this alternative would be similar to those of the proposed Ivanpah Basin site as both have similar habitat and desert conditions and both sites are adjacent to a heavily used transportation corridor.

Environmental Impacts. Similar to the proposed Ivanpah Basin project, it would be appropriate for a solar plant at Private Land alternative to provide a Project Demolition and Construction Injury and Illness Prevention Program and a Project Operations Safety and Health Program in order to ensure adequate levels of industrial safety. The applicant would also be required to provide safety and health programs for project construction, operation, and maintenance, similar to the requirements for the proposed Ivanpah Basin project site. Also similar to the proposed project, the San Bernardino County fire department would be contacted to assure that the level of staffing, equipment, and response time for fire services and emergency medical services are adequate.

Comparison to Proposed Project. The environmental impact of worker safety and fire protection at the Private Land alternative site would be similar to that at the proposed Ivanpah Basin site.

Engineering Assessment for Private Land Alternative

There would be no difference in the assessment of facility design, power plant efficiency, and power plant reliability, so these areas are not addressed here.

Geology, Paleontology and Minerals

Environmental Setting. The Private Land alternative site is located in an area mapped as Pleistocene nonmarine, dune sand, and alluvium along with limited undivided Miocene nonmarine areas (USGS 2008). No known geologic resources or active mineral resources exist at the Private Land alternative site.

The Manix fault, a left-lateral, strike slip located on the southeast side of and sub-parallel to Interstate 15 in the community of Manix between Barstow and Baker, crosses the site (USGS 2008, FTA 2009). The Manix fault is active; in April 1947 a M6.5 earthquake occurred on the Manix fault (FTA 2009). The length of the surface rupture was approximately 3 miles and the maximum slip was approximately 5 centimeters.

The Bedrock Peak Ground Acceleration (10% in 50 years) at the Private Land alternative site is 0.27g (CGS 2009). This includes faults within 100 miles of the solar plant site and estimates of potential seismic ground motion. The peak bedrock ground acceleration is higher for both the Private Land alternative than for the proposed ISEGS site at Ivanpah Basin. An active fault runs through the Private Land alternative site which has experienced a M6.5 earthquake and the fault is considered capable of producing a M7.0 earthquake (FTA 2009).

Environmental Impacts. Seismic ground shaking is probable at the alternative site because the Manix fault crosses the site. The severity and frequency of ground shaking associated with earthquake activity at the Private Land alternative is higher than at the proposed Ivanpah Basin site. As such, more stringent design criteria may be required for the Private Land alternative in accordance with a design-level geotechnical report and California Building Code (2007) standards. Adequate design parameters for the facility would need to be determined through a site-specific evaluation by a Certified Engineering Geologist or Geotechnical Engineer. Impacts due to seismic hazards and soil conditions would be addressed by compliance with the requirements and design standards of the California Building Code. The potential for liquefaction exists in San Bernardino County in areas where relatively loose, sandy soils exist with high groundwater level during long duration, high seismic ground shaking. While few areas within the desert region of the county have potential for liquefaction, there is potential for liquefaction along the Mojave River and along the Private Land alternative (San Bernardino 2009).

The paleontological sensitivity and potential to encounter significant paleontological resources in Quaternary alluvium at the alternative site and the Ivanpah Basin site is similar. As stated in the **Geology, Paleontology & Minerals** section, construction of the proposed project will include grading, foundation excavation, utility trenching, and

possibly drilled shafts. There exists the probability of encountering paleontological resources. As with the Ivanpah Basin site, the proposed conditions of certification are designed to mitigate any paleontological resource impacts to a less-than-significant level.

Comparison to Proposed Project. With the exception of stronger ground shaking and potential for liquefaction, the Private Land alternative site is subject to geologic hazards of similar magnitude as the Ivanpah Basin site. Strong ground shaking could be effectively mitigated through facility design. The potential to encounter geologic resources and significant paleontological resources at both alternative sites is similar to the Ivanpah Basin site. The conditions of certification provided in the **Geology, Paleontology and Minerals** section would be applicable to the Private Land alternative.

Transmission System Engineering

Locating a solar facility at the Private Land alternative would require re-evaluating the capacity of the SCE transmission lines that would be used for interconnection. This alternative may cause adverse effects to the SCE transmission system and require system upgrades. Moreover, it may not accomplish the project goal to be on line in 2011 because of grid improvement constraints.

Summary of Impacts. The Private Land alternative would have impacts similar to the proposed ISEGS site at Ivanpah Basin for air quality, hazardous materials management, recreation, public health, socioeconomics, transmission line safety and nuisance, waste management, worker safety and fire protection, facility design, power plant efficiency, geology and paleontology, and power plant reliability.

The Private Land alternative would be preferred to the proposed ISEGS site at Ivanpah Basin for biological resources, visual resources, and traffic and transportation. The Private Land alternative would be less preferred than the proposed ISEGS site at Ivanpah Basin for cultural resources, land use (including agriculture), noise, and transmission system engineering.

It is believed that impacts to soils and water at the Private Land alternative would be similar to those at the proposed Ivanpah Basin site; however, it is uncertain if there is groundwater available at the Private Land alternative site.

Rationale for Elimination

Energy Commission staff have determined that the Private Land alternative would not eliminate significant impacts of the project without creating significant impacts of its own.

I-15 Alternative

The I-15 alternative was designed in response to commenter concern regarding the pristine habitat at the proposed ISEGS location. The Sierra Club comment letter (dated June 22, 2009) requested that an alternative be considered that would relocate the project to the land along I-15 that had been proposed by the applicant as the desert tortoise translocation site. Specifically, the Sierra Club comment letter requests an

"…alternative that (1) relocated the Project's three power blocks closer to the areas adjacent to Interstate 15 currently mapped as translocation sites…". Both the Sierra Club and the Western Watersheds Project expressed concern about the viability of the translocation site, stating that major highways have a sink effect that depletes tortoise populations (SC2009d).

The I-15 alternative would relocate the Ivanpah 1, 2, and 3 along the I-15. The I-15 alternative would overlap with much of Ivanpah 1 in order to attain the required acreage for a 400 MW plant. A portion, or all of the Ivanpah 2 and 3, could be relocated into the I-15 alternative study area.

The I-15 alternative would be required to avoid the proposed Caltrans Joint Point-of-Entry Station along I-15. **Alternatives Figure 6** shows the study area which could accommodate a reconfiguration of Ivanpah 1, 2, and 3. The alternative would require a gas line approximately five miles long. The I-15 alternative, as with Ivanpah Site A, would be located on BLM land and one square mile of State land. Section 16 (T16N, R14E) is state land rather than BLM land.

The I-15 alternative would relocate a portion or all of the ISEGS power plant, but would remain within the Ivanpah Valley. As such, most of the impact analysis for the proposed project would not change significantly. Impacts are described herein for the following issues only: biological resources, cultural resources, and visual resources.

Biological Resources

Environmental Setting. The I-15 alternative would relocated the proposed project to land approximately 1,000 feet from the I-15. It would overlap partially with the Ivanpah 1 facility. A description of the vegetation, wildlife, and sensitive habitats found at the Ivanpah Valley is presented in the proposed project setting.

In addition, surveys conducted in 2007 identified 20 individual desert tortoise within the area that would be eliminated from the project under this alternative. However, protocol desert tortoise surveys were not conducted for the alternative.

A reconnaissance survey was conducted on August 15, 2009 at the I-15 alternative study area. The I-15 alternative site is adjacent to the ISEGS and the I-15 freeway and the two sites overlap each other by approximately 25%. Reconnaissance surveys included visiting representative samples of habitat throughout the proposed and alternative site. Access was good and small roads allowed visitation throughout the site. The biologist stopped often to examine the surrounding habitat for quality and evidence of wildlife activity. Field forms were completed which rated micro-relief, soil texture, vegetation, ground cover, plant diversity, likelihood of desert tortoise occurrence, likelihood of special status species occurrence, quality of surrounding habitat, special features and overall quality of habitat for wildlife and desert tortoise. Pictures were taken of the habitat and field notes taken. California Natural Diversity Data Base information was compiled for the site and used to inform the field observer prior to the surveys.

Mojave creosote bush scrub and atriplex scrub are the two dominate habitat types at the I-15 alternative site. The I-15 alternative site is located in high quality relatively undisturbed habitat (creosote bush scrub) for desert tortoises. Although the habitat/plant

community varies somewhat with elevation, slope, and soils throughout the I-15 alternative site it is all high quality tortoise habitat. It is anticipated that the I-15 alternative also provides high quality habitat for other special status species that are known to occur in the area. There is very little difference in value for desert tortoise and other special status species between the ISEGS and I-15 alternative site. It is difficult to value one higher than the other.

Over approximately 60% or more of the I-15 alternative offers good to excellent habitat for the same suite of rare plants found at ISEGS and many or all of the same rare plant taxa found at the ISEGS site are expected to occur on I-15 Alt as well. The plant associations, associated soils, hydrology and microtopography associated with the rare plants at ISEGS site are all present in the I-15 alternative, particularly the portion of the alternative above the 2,750-foot elevation contour, at which point the diversity and microtopography improves and the vegetation reflects the same species composition and structure associated with the ISEGS site rare plant occurrences. The most suitable habitat for rare plants on I-15 alternative occurs between the southern boundary and the 2,750-foot elevation contour. Below that point, nearer to the Primm Valley Golf Course, the topography flattens out, the habitat lacks the microtography and soil textures upon which many of the rare plants depend, and the overall plant diversity is reduced, and important indicators such as the cacti and succulent component drop out of the species composition.

Desert washes are also abundant on the southern 60% of the I-15 alternative, including one example with stands of acacia.

Impacts and Mitigation Measures. The I-15 alternative would not significantly reduce impacts to sensitive plant and wildlife species. While the I-15 alternative would avoid the desert tortoise habitat and desert tortoise at the proposed ISEGS location, it would be located on habitat that is high quality, relatively undisturbed habitat (creosote bush scrub) for desert tortoises. There is very little difference in value for desert tortoise and other special status species between the ISEGS and I-15 alternative site. It is difficult to value one higher than the other. Any impacts to desert tortoise at the I-15 alternative site would require state and federal endangered species “take” authorization.

The I-15 alternative would not reduce impacts to other special-status wildlife species such as burrowing owl, loggerhead shrike, Crissal thrasher, golden eagle, and American badger. The I-15 alternative would not reduce the required compensation for loss of habitat for desert tortoise.

The I-15 alternative would not reduce the impact to special-status plant species that would be directly impacted by construction of the proposed ISEGS project. A good diversity of plants exists at both sites. Without protocol rare plant surveys, it is not possible to compare in detail the alternative to the proposed project. However, the two sites are sufficiently similar that there is little difference between using either site for a solar power plant.

Comparison to Proposed Project. Overall, development of the I-15 alternative site would likely have biological resource impacts similar to those of the proposed ISEGS project. Both projects would have potential for direct take of desert tortoise, and both

would permanently eliminate approximately 3,800 acres of habitat for desert tortoise. Like the proposed ISEGS site, a number of special-status plant and animal species are present at the alternative site and would be impacted by the proposed project. Both sites would contribute to cumulatively significant losses of Mojave Desert plant and wildlife communities.

Cultural Resources

Environmental Setting. The I-15 alternative would place the proposed project approximately 1,000 feet from Interstate Route 15. The subject alternative would be equally distant from Ivanpah dry lake and range across roughly the same elevations as the proposed ISEGS project. A description of the regional setting, which includes subsections on prehistoric, ethnographic, and historic settings appropriate to the alternative, may be found in the "Cultural Resources" section of the present document.

A recent reconnaissance survey reveals that the I-15 alternative, which is in a landscape context nearly equal to that of the proposed ISEGS project, has a moderately low frequency of cultural resources (McDougall and Horne 2009). The reconnaissance survey consisted of archival research, a windshield survey, and a reconnaissance pedestrian survey. Energy Commission consultants conducted the field phases of the investigation from August 8–10, 2009. The primary purpose of the reconnaissance was to produce a reasonably reliable sample of the historical archaeological deposits and the built environment resources (buildings, structure, and linear infrastructure elements) that are on the I-15 alternative. Energy Commission staff felt that the dearth of prehistoric archaeological sites in the project area for the proposed ISEGS project and the equivalent landscape context of the subject alternative were sufficient factual bases to conclude that there were most likely no prehistoric archaeological sites of consequence on the I-15 alternative.

The windshield survey portion of the reconnaissance entailed systematic, slow drive-overs of the dirt roads on the I-15 alternative. Of the numerous designated and undesignated, and improved and unimproved dirt roadways on the alternative, apparently only those that were evident on the most recent US Geological Survey 7.5-minute series topographic quadrangles were driven. Any apparent cultural modification to the landscape or topographic anomaly that the surveyors found during the course of the windshield survey was inspected on foot.

Energy Commission staff sought a higher resolution of survey data for the portion of the area of the I-15 alternative where staff intuitively felt that the probability of the presence of historical archeological deposits and built environment resources was higher. This area was on the higher or proximal portions of the coalescing alluvial fans along the base of Clark Mountain, and nearer the focus of late nineteenth and early twentieth century lode mining in the Clark Mountain Range than the project area for the proposed ISEGS project. Staff chose an approximately 0.75 square mile area to sample this landscape context. The survey method chosen, although spare in coverage, was one that staff thought would be sufficient to identify evidence of major mining activity, such as adits, shaft landings and headframes, tailings piles, ore processing stations, or provisioning points. A pair of surveyors walked parallel transects 15 meters apart over the sample area, every approximately 150 meters along one boundary of the area. Ten dual transects in this fashion covered the 0.75 square mile sample.

The net result of the reconnaissance survey was the discovery of three historic mining resources, a segment of the historic “Road to Bullion Mine,” and a westerly extension of the historical “Ivanpah to Providence Road”. The three mining resources include a solitary mining adit and tailings piles, a large mining prospect pit with tailings piles and an apparent discovery monument, and an apparent mining claim boundary marker. Two previously recorded cultural resources (CA-SBR-7689/H and CA-SBR-10803H) found in the records search for the proposed ISEGS project (see “Literature and Records Search” subsection of the “Cultural Resources” section of the present document) were also relocated and compared to the extant site records for those resources. These resources, a segment of the historic Arrowhead Trail Highway and a historic stock-loading facility, are outside of the ISEGS project area.

Impacts and Mitigation Measures. The construction and operation of a solar facility on the site of the I-15 alternative has the potential to wholly or partially destroy seven known historical archaeological sites and built environment resources. One would need to establish the historical significance of these resources and any additional ones that would be found as a result of the complete pedestrian survey of the alternative to comment more definitively on whether any of these resources would qualify for treatment under Federal and State regulatory programs. The three mining resources, while not immediately appearing to be of historical significance, may, nonetheless, be significant as contributing elements to a broader historic mining district. This potential association and the integrity of each of the individual resources would require further study to conclude more formal determinations of the historical significance of the resources. The absence of any association among the mining resources and datable artifacts, however, makes a determination of the historical significance of these resources rather unlikely. The physical integrity of the three historic road segments found in the area of the subject alternative each appears to have already been compromised, thus appearing to negate the potential for the segments to contribute to the potential historic significance of the respective overall transportation routes of which each is a part. The historic stock-loading facility does not appear likely, upon initial review, to be of historical significance. The initial conclusions here on the historical significance of the road segments and the stock-loading facility would also need the support of further study to decide more definitively whether Federal and State regulatory programs would require treatment for these cultural resources. Staff tentatively concludes that the construction and operation of a solar facility on the site of the I-15 alternative would most likely not result in consequential impacts to historically significant cultural resources.

Comparison to Proposed Project. The development of a solar facility on the site of the I-15 alternative would most likely have cultural resource impacts analogous to those of the proposed ISEGS project. The area of the alternative is in a landscape context that is roughly equivalent to that of the ISEGS project area where prehistoric archaeological sites are almost absent and where historical archaeological sites and built environment resources are sparse and of equivocal historic value. The I-15 alternative appears to have a moderately low overall sensitivity for cultural resources.

Visual Resources

Environmental Setting. The I-15 alternative would relocate the proposed project approximately 1,000 feet north of the I-15. The I-15 alternative would be adjacent to I-15

for approximately 4.5 miles. A description of the regional landscape, project viewshed, landscape units, VRM classes, KOPs, scenic quality and viewer sensitivity can be found in the setting for the proposed project.

Impacts and Mitigation Measures. The I-15 alternative would relocate approximately 4,000 acres of heliostats and seven power towers to an area adjacent to the I-15. As stated in the **Visual Resources** section of this FSA/DEIS, viewer numbers on this segment of highway are extremely high, particularly on Friday evenings and other peak periods, although the recreational destination for the majority of such motorists is Las Vegas rather than the Mojave Desert, thus the level of concern with scenic quality is likely to be moderate or low.

This alternative would still create visual impacts that would not meet the visual objectives of the BLM Visual Resource Management assessment method at key viewpoints, which is essentially consistent with findings that would be obtained under the Energy Commission visual assessment method. The strong level of contrast to I-15 motorists along the Ivanpah Valley would not meet the Class III visual objectives for all of I-15, and would represent a potentially significant visual impact. No available mitigation measures were identified to fully address this impact.

Additionally, like the proposed ISEGS project, the I-15 alternative would not conform with the applicable goals and policies of the San Bernardino General Plan Conservation and Open Space Elements. As with the proposed project, the I-15 alternative would have significant unavoidable adverse impacts.

While no available mitigation measures would reduce the impacts to less than significant levels, the same Conditions of Certification as those recommended for the proposed project apply to this alternative.

Glare. The thousands of heliostats in each field focus the sun's rays on the power tower receiver boiler, located at the top of a power tower with the receiver situated between 400 and 459 feet high. In the event of a heliostat technical malfunction that resulted in sunlight being directed away from the power tower receiver and into the sky, the luminance of light reflected from a single heliostat would be extremely bright and would be temporarily blinding when viewed directly. The receiver will also be extremely bright. However, staff does not consider the potential for glare from heliostats or the power tower receiver to pose a significant hazard to motorists on adjacent roadways including I-15 or air traffic flying above or adjacent to the site. Glare, while not representing a hazard, could represent a strong, potentially visually dominant feature as seen from various viewpoints including I-15 and Primm Valley Golf Course. The solar facility could be visible from southbound I-15 for as far away as 10 miles, and the bright receivers could be perceived as a nuisance to the public and distracting to drivers. The severity of this impact is difficult to define in the absence of operational projects of this technology. However, as stated in the **Traffic and Transportation** section of this FSA/DEIS, the intensity of reflected light and solar radiation diminishes as distance from the source increases. As such, with power towers for the I-15 alternative located in closer proximity to I-15 than it would be for the proposed ISEGS site, the level of solar radiation would be greater for the I-15 alternative for motorists on I-15.. Impacts to pilots would be the same for the I-15 alternative as for the proposed ISEGS site.

Comparison to Proposed Project. The proposed project creates significant visual impacts that cannot be mitigated in locations including viewpoints on I-15, the Mojave National Preserve, and the Stateline Wilderness Area due to adverse effects on the existing visual character and quality of the project's visual setting. Glare from the heliostats and power towers, while not representing a hazard, could represent a strong, potentially visually dominant feature as seen from the viewpoints named above and would contribute to the strong overall level of contrast experienced from those locations. The I-15 alternative would also cause significant visual impacts that cannot be mitigated in locations including viewpoints on I-15, the Mojave National Preserve, and the Stateline Wilderness Area due to adverse effects on the existing visual character and quality of the project's visual setting. With the proximity of the I-15 alternative within I 1,000 feet from the I-15.,the I-15 alternative would be adjacent to the I-15 for approximately 4.5 miles and as such would be more visible to traffic along I-15 than the proposed project. The I-15 alternative's effects from glare would also be as pronounced or greater than the proposed project in representing a strong, potentially visually dominant feature and in contributing to the strong overall level of contrast experienced from the locations noted above.

Summary of Impacts. The I-15 alternative would be less preferred than the proposed ISEGS site at Ivanpah Basin for visual resources. The I-15 alternative would have similar impacts as the proposed ISEGS site for biological resources, and cultural resources.

Rationale for Elimination

The I-15 alternative has been eliminated from further consideration by the Energy Commission because it would not reduce or eliminate impacts that occur at the proposed site.

Ivanpah Site A Alternative

Ivanpah Site A was identified by BrightSource in the AFC as a potential alternative site. It was not pursued as the proposed site because it is located partly on state land, further complicating the land leasing and permitting process; had a longer interconnection with the Kern River gas transmission line; would require more grading; and was found to be slightly less environmentally preferred by the applicant (BSE 2007a). It is located adjacent to and southwest of the proposed ISEGS site in the Ivanpah Valley, in the southern portion of the NEMO Planning Area; see **Alternatives Figure 1**. Ivanpah Site A overlaps the ISEGS site in a portion of BLM sections totaling approximately one square mile, and it also includes one section (Section 16) of state land under the jurisdiction of the California State Lands Commission.

The setting of Ivanpah Site A is very similar to that of the ISEGS site, as illustrated by the close proximity and overlapping of the two sites. They are both adjacent to the Ivanpah Dry Lake and the Primm Valley Golf Club, northeast of the Mojave National Preserve and approximately five miles from the California/Nevada border. The elevation of Ivanpah Site A is between 3,600 feet and 3,100 feet, as compared with between 3,150 to 2,850 feet for the proposed site. The sites share similar habitats and similar biological and cultural concerns (BSE 2007a). Both Ivanpah Site A and the proposed

site would be visible from the Mojave National Preserve, Interstate 15, and the Clark Mountains.

Environmental Assessment. Ivanpah Site A would require a vast amount of land and would result in the permanent loss of approximately 3,800 acres of desert habitat in the same region as the proposed ISEGS site. Given the proximity of Ivanpah Site A to the proposed ISEGS, it is reasonable to assume that the impacts to desert tortoise and barrel cacti would occur and be similar at both sites in the approximately one square mile of overlapping region between the two sites.

Impacts to land use and recreation at the Ivanpah Site A would be similar to impacts of the proposed ISEGS site because they are both equally distant from the Ivanpah Dry Lake and other recreational activities in the Ivanpah Valley. Like the proposed ISEGS site, Ivanpah Site A is located within the CDCA and NEMO Planning Areas and may conflict with these plans. Ivanpah Site A would also be located on some state lands, which may cause permitting difficulties (BSE 2007a).

Both the proposed ISEGS site and Ivanpah Site A would have a large footprint and require extensive grading, potentially resulting in erosion and runoff. However, the Ivanpah Site A has a somewhat greater slope, being located nearer to the Clark Mountains, and would therefore require somewhat greater grading and would potentially have a greater impact to soils and water. Ivanpah Site A is the same distance as the proposed ISEGS site from Ivanpah Dry Lake and would be visible from the dry lake, a resource frequently used for recreation (BSE 2007a). Additionally, because Ivanpah Site A is closer to the Mojave National Preserve than the proposed ISEGS site (less than one mile away) it would also result in visual impacts to the preserve and to recreationists within the preserve (including from the Clark Mountains) that are similar to those at the proposed site. Given the size of the power plants and the height of the receiver power towers, approximately 459 feet tall for the three power plants, visual impacts would be considerable and similar to those at the proposed ISEGS site. In addition, Ivanpah Site A is closer to I-15 than the ISEGS facility, so visual impacts would be greater for passing motorists.

Summary of Impacts. Due to the proximity between the ISEGS site and the Ivanpah Site A, impacts of the Ivanpah Site A would be similar to the proposed project. However, Ivanpah Site A would be closer to Interstate 15 and to the Mojave National Preserve. This results in increased visibility from these sensitive areas. Also, a longer interconnection with the Kern River gas transmission line would be required, thereby increasing any impacts associated with the linear connection, including ground disturbance.

Rationale for Elimination

Energy Commission staff have found that this alternative would not avoid or substantially lessen one or more of the significant effects of the project. This alternative would not reduce impacts of the proposed project without creating more severe impacts of its own.

Ivanpah Site C Alternative

Ivanpah Site C was identified in the AFC as a site considered by BrightSource. It was not pursued as the proposed site because the interconnections to both the Kern River gas transmission line and SCE transmission line would be longer, the site offered little flexibility for layout revisions, and the site was considered to have greater environmental concerns than the proposed ISEGS site (BSE 2007a).

Site C alternative is located southeast of the proposed ISEGS site, bordering Interstate 15 on the north and west and Nipton Road (Highway 164) to the south; see **Alternatives Figure 1**. It would be bordered by the Ivanpah Dry Lake to the east. It has similar characteristics to the ISEGS site, with an average elevation of between 2,950 and 2,600 feet and a similar slope. Given the proximity of the sites, it is reasonable to assume that they have similar habitat characteristics. The transmission interconnection would also be similar to that at the ISEGS site. Ivanpah Site C would border the Mojave Desert Preserve to the south.

The site would be located in a Desert Wildlife Management Area, established to protect denser populations of desert tortoise (BSE 2007a). Longer interconnections with the Kern River gas transmission line and the SCE transmission line would be required due to the site's greater distance from these utilities.

Environmental Assessment. Ivanpah Site C would result in the permanent loss of approximately 4,000 acres of desert habitat. Given the proximity of Ivanpah Site C and the proposed ISEGS site at Ivanpah Basin, the impacts on biological resources and sensitive species habitat would be about the same. Given that the Ivanpah Site C would be located in a Desert Wildlife Management Area, impacts to desert tortoise may be greater than at the proposed ISEGS site. Impacts to land use and recreation at the Ivanpah Site C would also be similar to impacts of the proposed ISEGS site due to its proximity to Ivanpah Dry Lake and recreational off-highway vehicle use. Ivanpah Site C would be located entirely on BLM land and would be within the CDCA and NEMO Planning Areas and may conflict with these agencies' plans.

Ivanpah Site C is immediately adjacent to the Ivanpah Dry Lake on the east side, which is used more frequently than the west side for large recreational events (Downing 2008). Ivanpah Site C borders the Mojave National Preserve, a National Park Service unit with high value for recreation and preservation of views. In addition, Ivanpah Site C borders both the I-15 and Nipton Road and would cause greater visual impacts to passing motorists than the proposed site.

Summary of Impacts. Due to the proximity of the proposed ISEGS site and the Ivanpah Site C, many impacts of the Ivanpah Site C would be similar to those of the proposed site. However, Ivanpah Site C would be more visible from I-15 and Nipton Road. Also, because Ivanpah Site C is located in a Desert Wildlife Management Area, the potential for impacts to desert tortoise may be greater. Longer interconnections with the Kern River gas transmission line and the SCE transmission line would be required, with associated increased ground disturbance and visual impacts. The greater proximity to the Ivanpah Dry Lake could increase cultural resource impacts as more cultural artifacts may be present.

Rationale for Elimination

Energy Commission staff have found that this alternative would not reduce impacts of the proposed project without creating more severe impacts of its own.

West of Clark Mountain Alternative

At the request of the National Parks Conservation Association and National Park Service, a site west of Clark Mountain was considered as a means of reducing visual impacts to the Mojave National Preserve. Two broad valleys west of Clark Mountain offer slopes consistent with solar requirements: the Silurian Valley (north of Baker, which is used by the Army for desert warfare training based in the National Training Center at Fort Irwin) and the Shadow Valley immediately west of the Clark Mountain Range. The Silurian Valley is bisected by State Highway 127, which is a major access road for Death Valley National Park.

Although there is land west of Clark Mountain that fits the site selection criteria for a solar energy project, much of the land immediately west of the Clark Mountain Range in Shadow Valley is located in the Eastern Mojave Desert Tortoise Recovery Unit and within a Desert Wildlife Management Area and therefore, while it may meet the site selection criteria, it would not be viable as an alternative to the ISEGS site. Further east of Shadow Valley, among the Shadow Mountains, the topography is such that a contiguous 400-MW solar thermal power plant would not have the suitable ground slope requirement and is therefore not viable for solar energy projects. Suitable land for a solar project exists in the Silurian Valley; however, existing solar and wind applications have already requested use of this land. The solar and wind project applications in the area west of Clark Mountain pending before BLM are the following (BLM 2008b and BLM 2008c):

- Solar Investments VI LLC, solar trough technology (6,400 acres);
- FPL Energy LLC, parabolic trough technology (7,680 acres);
- Solar Investments Inc., parabolic trough technology (9,600 acres);
- Solar Investments XI LLC, parabolic trough technology (10,000 acres);
- Pacific Wind Development LLC (Iberdrola), wind turbines (6,623 acres).

West of the Silurian Valley is the Fort Irwin National Training Center, which is not considered to be available for a large solar project.

Rationale for Elimination

Energy Commission staff have found that an alternative at the West of Clark Mountain area is not feasible due to the existing applications on that site, and the lack of other available land for a major solar facility.

Reduced Acreage Alternative

Multiple comments on the PSA expressed concern regarding impacts of the ISEGS project on the high quality habitat, special-status plant species, and endangered wildlife species. Additional commenters expressed concern regarding the viability of mitigation for the loss of sensitive plants because translocation of the adult plants in the desert is

often unsuccessful. The comments on behalf of the Wilderness Society and the Natural Resources Defense Council requested further study of the ISEGS project site including careful consideration of alternative configurations, in addition to consideration of alternative sites. The Sierra Club San Gorgonio Chapter states that the project configuration was defined prior to completion of surveys of the biological resources and the project has been proposed in an area of very high quality habitat for wildlife and special-status plant species (SC2009d).

In response to these comments a Reduced Acreage alternative was considered. The Reduced Acreage alternative would be located entirely within the ISEGS 4,073 acre footprint and would be designed to avoid development in those areas where sensitive plant occurrences are densest, to lessen the required mitigation, and to reduce the need for desert tortoise translocation. The Reduced Acreage alternative would reduce the total ISEGS footprint by an undetermined amount.

Rationale for Elimination

The Reduced Acreage alternative was developed as a means of reducing biological impacts, while still achieving a viable, though smaller, project. In place of this alternative, mitigation has been included in Condition of Certification **BIO-18** in the **Biological Resources** section of the FSA/DEIS that would establish performance standards for plant avoidance and would require the applicant to avoid the most valuable biological habitat during final project design, which would achieve the same objective as the Reduced Acreage alternative. As such, this alternative is not considered further.

Other Site Alternatives Eliminated

The following alternatives were considered by the applicant, but were not retained for full analysis in the AFC; they are also not analyzed in this FSA/DEIS as explained in **Alternatives Table 6**.

Alternatives Table 6
Alternatives Not Carried Forward for Further Analysis

Site	Reasons Eliminated
Carrizo Plain	Carrizo Plain was eliminated from consideration due to poor solarity and poor gas and water infrastructure. In addition, potential site control difficulties meant the site was not considered economically viable.
Harper Lake	Harper Lake was eliminated from consideration because gaining site control was considered to be time consuming and risky.
Lucerne Lake	Lucerne Lake was eliminated from consideration because the site was too small and did not provide adequate site control; therefore, the site was not economically viable.
Rabbit Lake	Rabbit Lake was eliminated from consideration because the site was too small and did not provide adequate site control; therefore, the site was not economically viable.
Jean Lake	Jean Lake was eliminated from consideration because the site contained a pending application by a different applicant and is located in Nevada, potentially creating jurisdictional complications for CEC.
Ivanpah Site B	Ivanpah Site B was eliminated from consideration because the site contained a pending application with BLM by a different applicant.

Source: BSE 2007a.

ALTERNATIVE SOLAR GENERATION TECHNOLOGIES

Alternative solar generation technologies were evaluated as potential alternatives to the proposed project. Although alternative solar generation technologies would achieve most of the project objectives, each would have different environmental or feasibility concerns. The following solar generation technologies are considered in this analysis:

- parabolic trough technology
- Stirling dish technology
- linear Fresnel technology
- photovoltaic technology

Among the solar thermal technology alternatives, the linear Fresnel alternative has the potential for least impacts due to its more compact configuration (reducing ground disturbance); however, the technology is proprietary and is not available to other developers. The distributed solar alternative would have fewer impacts than the proposed project because it would be located on already existing buildings or on already disturbed land. However, achieving 400 MW of distributed solar PV or solar thermal would depend on additional policy support, manufacturing capacity, and lower cost than currently exists to provide the renewable energy required to meet the California Renewable Portfolio Standard requirements so additional technologies, like utility-scale solar thermal generation, are also necessary.

Parabolic Trough Technology

A parabolic trough system converts solar radiation to electricity by using sunlight to heat a fluid, such as oil, which is then used to generate steam. The plant consists of a large field of trough-shaped solar collectors arranged in parallel rows, normally aligned on a north-south horizontal axis. As illustrated in the photo below. Each parabolic trough collector has a linear parabolic-shaped reflector that focuses the sun's direct beam radiation on a linear receiver, also referred to as a heat collection element located at the focus of the parabola. Heat transfer fluid within the collector is heated to approximately 740°F as it circulates through the receiver and returns to a series of heat exchangers where the fluid is used to generate high-pressure steam. The superheated steam is then fed to a conventional reheat steam turbine/generator to produce electricity.

A solar trough power plant generally requires land with a grade of less than 1 percent. On average, 5 to 8 acres of land are required per MW of power generated. A parabolic trough power plant would include the following major elements.

- **Parabolic Trough Collectors**. The parabolic trough collectors rotate around the horizontal north/south axis to track the sun as it moves through the sky during the day. Reflectors, or mirrors, focus the sun's radiation on a linear receiver/heat collection element, which is located along the length of the collector.
- **Solar Boiler.** Solar boilers are designed differently than conventional gas-fired boilers in that they are fueled with hot oil instead of hot gases. This design is similar to any shell and tube heat exchanger in that the hot heat transfer fluid is circulated through tubes and the steam is produced on the shell side.
- **Heat Transfer Fluid Oil Heater**. Due to the high freezing temperature of the solar field's heat transfer fluid (54°F), to eliminate the problem of oil freezing, an oil heater would be installed and used to protect the system during the night hours and colder months.

Parabolic trough power plants are the most established type of large solar generator. They exist in several places, including the following examples:

- **Nevada SolarOne** (illustrated in **Alternatives Figure 8**) near Boulder City, Nevada, has been in operation since June 2007. It cost of more than $260 million dollars and generates 64 MW. It is the largest concentrating solar power plant to be built in the last 17 years and is the third largest plant of its kind in the world (Nevada SolarOne 2008).
- **Sunray Energy, Inc. Solar Energy Generating System** is located in Daggett, adjacent to an abandoned power tower facility. It generates 44 MW and is shown in **Alternatives Figure 8**.
- **Kramer Junction Solar Energy Generating System** is located about 30 miles west of Barstow. The solar energy generating system projects are a series of utility-scale solar thermal electric power plants, which were designed and developed in the mid-1980s by LUZ Industries. The facility can produce 165 MW at full capacity (Solel 2008).

Environmental Assessment. Approximately 2,000 to 3,200 acres of land would be required for a 400-MW solar trough power plant, resulting in a permanent loss of natural desert habitat similar to the habitat loss created by the proposed solar tower technology.

If the solar trough technology were used at Ivanpah, somewhat greater acreage may be required because the proposed site is crossed by several desert washes. Parabolic troughs require a more level ground surface, so the entire solar trough power plant would be graded, removing all vegetation from the area. This results in a somewhat more severe effect on biological resources than the ISEGS project, which would not require grading over the entire site.

The size and height of the solar trough mirrors (each approximately 28 feet high) would cause visual impacts from Interstate 15 and Ivanpah Dry Lake. The plant would also be visible from the Primm Golf Course, immediately east of the ISEGS site and slightly elevated. While the solar trough technology would not have the approximately 459-foot-tall solar power towers, the number of solar troughs and the large acreage required would still introduce prominent and reflective structures.

Solar trough plants require water to generate the steam that powers the turbines. The technology uses a closed-loop circulation that requires some boiler make-up water to replace water lost in the system. Water is also required to wash the mirrors for both types of technologies. If wet cooling were used, the cooling towers would require approximately 600 acre-feet/year (AFY) per 100 MW of capacity. Dry cooling would use significantly less water, approximately 18 AFY per 100 MW (NRDC 2008a).

Because of the extensive grading required for a solar trough plant, soil erosion could be more severe than that of the ISEGS project. The parabolic trough solar plant uses a heat transfer fluid to collect the heat from each parabolic trough collector and convey it to the solar boiler. The project would still require use of I-15 for commuting workers during both construction and operation.

Summary of Impacts. The large land area needed for a solar trough power plant would likely be less than ISEGS, but more intensive in terms of ground disturbance.. Because of the more intensive use of the land and the grading required to achieve a 1 percent grade, there could be more severe impacts to biological resources including vegetation, than would occur with the ISEGS facility. In addition, due to the large size of the power plant and the use of taller parabolic trough mirrors (approximately 28 feet high when at their maximum tilt) compared to the approximately 12 foot high heliostats for ISEGS, the visual impact could be greater, although the visual impact for ISEGS is significant and cannot be mitigated from some locations. Use of a heat transfer fluid as would be conveyed in miles of pipelines from the parabolic trough collectors to the solar boiler would create a potential for spill of a hazardous material into soil or water, which would not be present with ISEGS. Impacts to northbound I-15 traffic congestion on Friday afternoons and evenings would also not change, and would remain cumulatively considerable and significant during project construction and operation.

Rationale for Elimination

While solar trough technology is a viable renewable technology and would likely reduce the footprint of the project on the order of 25 – 35%, it would not significantly reduce the

impacts of the ISEGS. Therefore, this alternative technology is eliminated from further consideration.

Stirling Dish Technology

The Stirling dish technology converts thermal energy to electricity by using a mirror array to concentrate and focus sunlight on the receiver end of a Stirling engine. The curved dishes that focus the sun's energy are approximately 45 feet tall and occupy a maximum horizontal space of approximately 1,135 square feet (0.026 acres), with an anchored footprint of 12.5 square feet (assumed 4-foot diameter caisson). See **Alternatives Figure 8** for an illustration. The internal side of the receiver heats hydrogen gas, which expands. The pressure created by the expanding gas drives a piston, crankshaft, and drive shaft. The drive shaft turns a small electricity generator. The entire energy conversion process takes place within a canister the size of an oil barrel. The generation process requires no water, and the engine does not produce emissions as no combustion takes place. Each concentrator consists of one Stirling engine mounted above one mirror array. Once installed, each concentrator requires very little maintenance aside from periodic washing of the mirrored surfaces of the dish.

In general, the Stirling system requires 7 to 9 acres of land per MW of power generated. Based on literature search, a 400-MW Stirling engine field would require from 2,800 acres to 3,600 acres of land. However, for two proposed solar thermal power plants using Stirling engine technology currently being considered by BLM and the Energy Commission, SES Solar 1 and 2, the land use per MW of installed capacity is about the same as ISEGS, and thus would require about the same footprint as ISEGS (See Efficiency Table 1 in the **Power Plant Efficiency** section of this document.

Site preparation involves sinking a cement base with an embedded pedestal to support the dish (SES 2008). Each Stirling dish generates 25 kilowatts (KW) of power, so 16,000 dishes would be required to generate 400 MW. Each dish includes two major elements:

- **Solar Concentrator.** Large parabolic concentrators include 89 mirror facets attached to a frame by three point adjusting mounts (SES 2008). They are designed in five subassembly units for ease of transport and installation on site. Two small motors are attached to the pedestal and programmed to swivel the dish on two axes, following the sun’s progress across the sky during the day.
- **Power Conversion Unit.** The Stirling engine’s cylinder block incorporates four sealed cylinder assemblies along with coolers, regenerators, and heater heads (SES 2008). Concentrated solar energy heats up self-contained gas (hydrogen) in the power conversion unit, causing the gas to expand into the cylinders, moving the cylinders, and generating electricity. This cycle is repeated over and over as the engine runs at a steady rate of 1,800 rpm (SES 2008). Power is generated by heat transfer from the concentrated solar rays to the working gas in the engine’s heater head, which converts the heat energy into mechanical motion.

The generator of each unit in a utility-scale project is connected by underground transmission line to a small substation where the power can be transformed into a higher voltage for more efficient transmission across the grid.

Environmental Assessment. The land area required for a 400-MW Stirling engine power plant is similar to that required for the proposed ISEGS project. However, it is not necessary to grade the entire parcel as only the 18-inch diameter pedestal of the Stirling engine requires level ground. It would still be necessary to grade permanent access roads between every two rows of Stirling engines due to the need for regular washing of the mirrors. This grading would cause removal of vegetation. Additionally, because the proposed Ivanpah site is crossed by several desert washes, the installation of 16,000 Stirling engines could require a larger total acreage of land, resulting in a greater loss of habitat.

Due to the size and height of the Stirling mirrors, impacts to visual resources would be similar or greater to those of ISEGS. While the Stirling engine technology would not require the approximately 459-foot-tall solar power towers, the 16,000 Stirling engines would introduce an industrial character and transformation of the site with the 45 foot tall engines. There would be less grading for the Stirling engine structures, but the numerous access roads required for cleaning the energy systems would create a high contrast between the disturbed area and its surroundings. The project would still require use of I-15 for commuting workers during both construction and operation.

Summary of Impacts. The large area needed for a Stirling engine power plant would be comparable to the land requirement for the ISEGS power plant. Although grading requirements for the Stirling engines and solar concentrators are relatively small, like ISEGS, grading for access roads would be extensive because access roads are required for every other row of Stirling engines (SES 2008b). For these reasons, recreation and land use, and biological resources impacts would be similar to those of the ISEGS facility. In addition, due to the extent of the facility and the height of each concentrator, visual impacts would not be significantly reduced by this alternative and may be greater considering that the 45-foot high solar concentrators would be more pronounced than the approximately 12-foot high heliostats. However, the Stirling technology does not require power towers or a turbine. Impacts to northbound I-15 traffic congestion on Friday afternoons and evenings would also not change, and would remain cumulatively considerable and significant during project construction and operation.

Rationale for Elimination

Because no substantial reduction in impact has been identified, the Stirling dish technology has been eliminated from further consideration as an alternative technology.

Linear Fresnel Technology

A solar linear Fresnel power plant converts solar radiation to electricity by using flat moving mirrors to follow the path of the sun and reflect its heat on the fixed pipe receivers located about the mirrors. During daylight hours, the solar concentrators focus heat on the receivers to produce steam, which is collecting in a piping system and delivered to steam drums located in a solar filed and then transferred to steam drums in a power block (Carrizo 2007). The steam drums transferred to the power block will be used to turn steam turbine generators and produce electricity. The steam is then cooled, condensed into water, and recirculated back into the process.

In general, the linear Fresnel technology requires 4 – 5 acres of land per MW of power generated, which is about half the land required by the other solar technologies. A 400-MW solar linear Fresnel field would require approximately 1,600 – 2,000 acres of land.

Each row-segment is supported by large hoops that rotate independently on metal castors. Rotation of the reflectors would be driven by a small electrical pulse motor. Reflectors are stowed with the mirror aimed down at the ground during the night. The major components are:

- **CLFR Solar Concentrator.** A solar Fresnel power plant would use Ausra's CLFR technology which consists of slightly curved linear solar reflectors that concentrate solar energy on an elevated receiver structure. Reflectors measure 52.5 by 7.5 feet (Carrizo 2007). There are 24 reflectors in each row. A line is made up of 10 adjacent rows and operates as a unit, focusing on a single receiver (Carrizo 2007).
- **Receiver Structure.** The receiver structure is approximately 56 feet tall (Carrizo 2007). It would carry a row of specially coated steel pipes in an insulated cavity. The receiver would produce saturated steam at approximately 518°F from cool water pumped through the receiver pipes and heated (Carrizo 2007). The steam would drive turbines and produce electricity.

Environmental Assessment. Though the Fresnel solar technology would require less acreage per MW of electricity produced than the ISEGS power tower plant, the Fresnel technology would still require the removal of approximately 1,600 – 2,000 acres of desert habitat. The mirrors are placed close together, so grading of the entire 1,600 acres would likely be required. Also, because the proposed Ivanpah site location is crossed by several desert washes, the engineering of the Fresnel siting may require a larger acreage than would otherwise be expected.

The Fresnel receiver structure is approximately 56 feet high and is required for every 10 rows of mirrors. Additionally, steam drums about 58 feet tall would be required to collect the steam from the receiver structure. The steam turbine generators would be roughly 60 feet tall and the air-cooled condensers, 115 feet tall. Due to the height of the many project facilities, impacts to visual resources would be similar to those of the proposed ISEGS facility.

Linear Fresnel plants would require water to generate the steam that powers the turbines. The technology uses a closed-loop circulation that requires some make-up water to replace water lost in the system. Water would also be required to wash the mirrors. If wet cooling were used, the cooling towers would require approximately 600 acre feet per year per 100 MW. Dry cooling would use significantly less water, approximately 12.3 acre feet per year per 100 MW (NRDC 2008b). The project would still require use of I-15 for commuting workers during both construction and operation.

Summary of Impacts. Although the linear Fresnel technology would require grading of the entire project site, the plant would require only 1,600 – 2,000 acres, about half the acreage required by the ISEGS project to generate the same amount of power. While visual and ground disturbance impacts would be reduced due to the smaller footprint, the ground disturbance would be more intense within the project boundaries and the visual impacts of the solar field could be more pronounced when comparing the 56-foot

high receivers to the approximately 12-foot high heliostats for ISEGS. Impacts to northbound I-15 traffic congestion on Friday afternoons and evenings would also not change, and would remain cumulatively considerable and significant during project construction and operation.

Rationale for Elimination

The Fresnel solar technology is a proprietary technology owned by Ausra, Inc. and could not be developed by BrightSource at the Ivanpah site. Therefore, while this technology offers environmental advantages in terms of a footprint that could be only about half the size of ISEGS, it is not available to the ISEGS applicant, so is not considered to be feasible at the Ivanpah site.

Solar Photovoltaic Technology – Utility Scale

A solar photovoltaic (PV) power generation facility would consist of PV panels that would absorb solar radiation and convert it directly to electricity. Major PV facilities have been suggested using two general technologies:

- Thin film installed on fixed metal racks, as proposed by First Solar (see **Alternatives Figure 9**)
- Concentrating photovoltaics installed in elevated groups of panels that track the sun. These technologies are available from companies such as SunPower and Amonix. SunPower's PowerTracker technology consists of a single-axis mechanism that rotates the PV panels to follow the sunlight. The Amonix technology allows tracking on two axes. See **Alternatives Figure 9**.

Photovoltaics are used frequently in smaller scale, but have been used infrequently for larger scale power generation. Examples of existing larger PV facilities are:

- Nellis Air Force Base (Nevada): Over 72,000 solar panels, generating 14 MW of energy, were constructed between April and December 2007, by Sunpower Corp. on 140 acres of Nellis land (Whitney 2007).
- GreenVolts (Tracy, CA): GreenVolts is building a 2MW facility near the intersection of Interstates 580 and 205 to demonstrate the commercial viability of its concentrating photovoltaic technology. The facility is comprised of CarouSol devices which magnify the sun rays 625 times onto a composite solar cell. It is expected be on line in 2009 (Nauman 2008).

Because PV technologies vary, the acreage required per MW of electricity produced from a large solar PV power plant is wide ranging and likely to change as technology continues to develop. The land requirement varies from approximately 3 acres per MW of capacity for crystalline silicon to more than 10 acres per MW produced for thin film and tracking technologies (NRDC 2008c). Therefore, a nominal 400-MW solar PV power plant would require between 1,600 and 4,000 acres.

Utility-scale solar PV installations require land with less than 3 percent slope. Solar photovoltaics do not require water for electricity generation. Some water may be required to wash the solar panels to maintain efficiency, approximately 2-10 acre feet per year of water may be required for a 100 MW utility solar PV installation or 8 to 40

acre feet for a 400 MW installation (NRDC 2008c). The SunPower-CA Valley Solar Ranch states that the facility would use approximately 11.6 AFY for a 250 MW PV facility, which would equal less than 20 AFY for a 400 MW PV facility (SLO 2009).

Solar PV arrays and inverters would be approximately 15 to 20 feet high; however, some components of the solar PV facility, such as collector power lines or a transmission interconnection may be significantly taller (SLO 2009).

As with any large solar facility, additional operational components may be required. The SunPower-California Valley Solar Ranch would require such operational components as electrical equipment, collector power lines, access roads, a substation, an operation and maintenance building, and water tanks, among others (SLO 2009).

Environmental Assessment. A utility scale solar PV facility would create a number of significant effects similar to those created by the ISEGS facility.

If utility scale solar PV technology were built at the Ivanpah Valley, approximately 1,600 to over 4,000 acres may be required, depending on the technology. Because the proposed site is crossed by several desert washes, it is likely that additional acreage would be required to site the solar PV arrays away from significant washes. Additionally, solar PV technology requires ground surface with less than 3 percent slope, as such it is likely that the entire site would be graded, removing all vegetation from the area. This results in a somewhat more severe effect on biological resources than the ISEGS project, which would not require grading over the entire site.

The size and height of the solar PV arrays would likely be visible from nearby regions, such as Interstate 15 and the Ivanpah Dry Lake due to the large size of the solar PV facility. The facility would also be visible from the Primm Golf Course, immediately east of the ISEGS site and slightly elevated. The large number of solar PV arrays, access roads, and interconnection power lines required for a 400 MW solar facility would introduce prominent industrial features; however, the solar PV technology would not introduce components as tall as the approximately 459-foot-tall solar power towers or the cooling towers as with the solar power tower technology. Additionally, because most PV panels are black to absorb sun, rather than mirrored to reflect it, glare would not be created as with the mirrors required for the power tower, Fresnel, and trough technologies.

Because the solar PV technology does not require any water for cooling or steam generation, the technology uses less water than solar concentrating technologies. Water would be required for washing the solar PV arrays. Approximately 20 AFY would be required instead of the approximately 78 AFY for the solar power tower technology (SLO 2009).

More extensive grading would be required for a solar PV facility than a solar power tower facility. Because solar PV facilities require land with only 3 percent slope and the solar panels are grouped more densely together, it is likely that more grading would be required for a solar PV facility than for a solar power tower facility to establish man-made stormwater conveyance channels. This would not achieve the low-impact development approach as is proposed with ISEGS that would minimize grading and

would largely avoid disturbance to the ephemeral drainages. Additionally, many miles of permanent access roads would be required for washing and maintenance of the solar panels. The extensive grading would likely create greater erosion concerns than those of the ISEGS project. The project would still require use of I-15 for commuting workers during both construction and operation.

Summary of Impacts. The large land area required for PV development would result in similar impacts to recreation, land use, biological resources, and likely greater impacts to soil and water resources as those of the ISEGS facility. In addition, the large facility would be highly visible and would still have unavoidable significant adverse visual impacts. Impacts to northbound I-15 traffic congestion on Friday afternoons and evenings would also not change, and would remain cumulatively considerable and significant during project construction and operation.

Rationale for Elimination

While utility scale solar PV technology is a viable renewable technology, its use would not reduce major impacts of the ISEGS facility because of its visual prominence, the extent of land and access roads required, and the more extensive grading and stormwater management system required. Therefore, this technology was eliminated from detailed analysis.

Distributed Solar Technology

Distributed solar generation is generally considered to use PV technology, but at slightly larger scales, distributed solar can also be implemented using solar thermal technologies.

Rooftop Solar Systems

A distributed solar photovoltaic (PV) alternative would consist of PV panels that would absorb solar radiation and convert it directly to electricity. The PV panels could be installed on residential, commercial, or industrial building rooftops or in other disturbed areas. In order to be a viable alternative to this project, there would have to be a sufficient number of panels to provide 400 MW of capacity.

California currently has 441 MW of distributed solar PV systems which cover over 40 million square feet (CPUC 2008b). During 2008, 158 MW of distributed solar PV was installed in California, doubling the amount installed in 2007 (78 MW) (CPUC 2009). While small distributed solar PV systems are relatively common in California, large distributed solar PV installations are less so. Examples of proposed rooftop PV systems to attain large amounts of energy are the following:

- Southern California Edison (Fontana, CA): Over 33,000 solar panels were attached to a 600,000-square-foot commercial roof, generating 2 MW of energy, using thin film PV technology provided by First Solar; this is the first installment of a planned installation of 3.5 million PV panels that would generate 250 MW of capacity (SCE 2008).
- San Diego Gas & Electric (San Diego, CA): Solar Energy Project is designed to install up to 80 MW of solar PV which would include parking structures and tracking systems on open land (SDG&E 2008).

- Pacific Gas & Electric (San Francisco, CA): PG&E launched a five-year program to develop 500 MW of solar PV power. The program would consist of 250 MW of utility-owned PV generation and an additional 250 MW to be built and operated by independent developers under a streamlined regulatory process. PG&E's program targets mid-sized projects, between 1 to 20 MWs, mounted on the ground or rooftop within its service area (PG&E 2009).
- City of San Jose (San Jose, CA): The City of San Jose is considering the development and implementation of 50 MW of renewable solar energy on city facilities and/or land (San Jose 2009). San Jose's Green Vision lays out a goal of achieving 100% of the city's electricity from renewable energy by 2020; as part of this project, the City issued a solicitation for the installation of 50 MW of energy on City facilities and/or land in June of 2009 (San Jose 2009). The City anticipates that City facilities with appropriate solar access including parking lots, garages, lands and landfills would be eligible for solar installation.
- Like utility-scale PV systems, the acreage of rooftops or other infrastructure required per MW of electricity produced is wide ranging. As stated above, California has approximately 40 million square feet (approximately 920 acres) of distributed solar PV accounting for 441 MW installed (CPUC 2008b). However, based on SCE's use of 600,000-square-feet for 2 MW of energy, 120 million square feet (approximately 2,750 acres) would be required for 400 MW.
- Most rooftop PV systems in California are crystalline systems, and result in approximately 15 percent of sunlight converted to energy (SB 2009). The newer technology is thin film, which converts approximately 5 to 10 percent of sunlight to energy.
- San Bernardino County is estimated to have the technical potential for over 2,000 MW of distributed solar PV (CEC, 2007b). However, the location of the distributed solar PV would impact the capacity factor of the distributed solar PV.[2] Capacity factor depends on a number of factors including the insolation[3] of the site. Because a distributed solar PV alternative would be located throughout the state of California, the insolation at some of these locations may be less than in the Mojave Desert. The Renewable Energy Transmission Initiative (RETI) assumed a capacity factor of approximately 30 percent for solar thermal technologies and tracking solar photovoltaic and approximately 20 percent capacity factor for rooftop solar PV which is assumed to be non-tracking (B&V 2008; CEC 2009).

Distributed Solar Thermal Systems

Solar thermal technology, specifically Concentrated Solar Power (CSP) technology, has also been adapted for use at distributed locations. In August 2009, eSolar began operations of a new distributed solar power tower technology. This technology uses small, flat mirrors which track the sun and reflect the heat to tower-mounted receivers that boil water to create superheated steam (eSolar 2009). An example of the eSolar system is the Sierra SunTower, located in Lancaster, CA, which will produce 5 MW of

[2] The capacity factor of a power plant is a percentage that tells how much of a power plant's capacity is used over time (CEC 2008a)

[3] Insolation is the total amount of solar radiation striking a surface exposed to the sky (CEC 2008a).

energy on 20 acres of land for SCE (eSolar 2009). Each eSolar module locates one tower, one thermal receiver, and 12,000 mirrors on ten acres of land and produces 2.5 MW of power. Additionally, eSolar has developed a larger module, a 46 MW CSP plant that would include sixteen towers, a turbine generator set, and a steam condenser which would be located on approximately 160 acres (eSolar 2009).

An additional example of a distributed solar trough power plant technology is the Andasol 1 power plant in Spain. Andasol 1, generating 50 MW of power, went online in November 2008 (Solar Millennium 2008). The Andasol plant includes thermal storage systems which absorb a portion of the heat produced in the solar field during the day and can run the turbines for approximately 7.5 hours at full load, regardless of the solar conditions at the time (Solar Millennium 2008). The Andasol 1 solar field is approximately 510,000 square meters or 127 acres (Solar Millennium 2008). This does not include the ancillary facilities.

Both these technologies have been implemented recently and are described here as an example of the evolving distributed solar technologies.

Environmental Assessment

Installations of 400 MW distributed solar PV would require between 40 to 120 million square feet. Distributed solar PV is assumed to be located on already existing structures or disturbed areas so little to no new ground disturbance would be required and there would be few associated biological impacts.

Minimal grading or new access roads would be required and relatively minimal maintenance and washing of the solar panels would be required. As such, it is unlikely that the rooftop solar PV alternative would create erosion impacts. Relatively large amounts of water would be required to wash the solar panels, especially with larger commercial rooftop solar installations; however, the commercial facilities would likely already be equipped with drainage systems. Therefore, the wash water would not contribute to runoff or to erosion.

Because most PV panels are black to absorb sun, rather than mirrored to reflect it, glare would not create visual impacts as with the power tower, Fresnel, and trough technologies. Additionally, the distributed solar PV alternative would not require the additional operational components, such as dry-cooling towers, substations, transmission interconnection, maintenance and operation facilities with corresponding visual impacts. Solar PV panels would be visible to passing residents and may be viewed by a larger number of people.

Rationale for Elimination

Building 400 MW of distributed solar PV would require an even more aggressive deployment of PV at more than double the historic rate of solar PV than the California Solar Initiative program currently employs. Additional legislation for increased incentives may be required to achieve this level of penetration.

The RETI Discussion Draft Paper *California's Renewable Energy Goals – Assessing the Need for Additional Transmission Facilities,* addresses the likelihood of a scenario of sufficient distributed solar PV to remove the need for utility scale renewable

development. This discussion paper identified the factors likely to influence the pace of large scale deployment of distributed solar PV: subsidies, feed-in tariffs, manufacturing and installation cost, and manufacturing scale-up.

- **Subsidies**. PV installations have been subsidized by a variety of programs. Go Solar California (GSC) program is projected to add approximately 3,000 MW of grid-connected PV capacity by 2016 but the GSC subsidies are designed to decline over time and be eliminated by 2016. The assumption underlying the GSC program is that the subsidies will increase installations and thereby manufacturing experience, which will in turn lower costs to a level at which PV generation is competitive with other sources of electricity. In 2008, Congress extended the 30% federal solar investment tax credit for eight years, to 2016, and made it available to utilities, thus opening the way to utility company ownership of relatively large-scale urban PV installations. This is expected to further bolster installation of PV (and other solar equipment). The GSC program is perhaps the most ambitious PV subsidy program in the U.S., and should support continued rapid growth of PV deployment in California. But if the federal investment tax credit is not extended beyond 2016 and if California PV subsidies decline through 2016 and are absent thereafter, it may be difficult PV installations to meet current targets.
- **Feed-in Tariffs.** Feed-in tariffs (FIT) are fixed long-term prices for renewable energy. In California, the CPUC has approved FITs for installations up to 1 MW and is actively considering, in one of its RPS proceedings, an expanded FIT program. In its 2008 Integrated Energy Policy Report Update, the California Energy Commission recommended that the Public Utilities Commission implement a system of feed-in tariffs for projects up to 20 MW. Legislation introduced in the California Senate would create a Feed-in Tariff program in statute. The proposed legislation would also set payment at the Market Price Referent, a proxy measure for the cost of non-renewable energy, but allow the CPUC to adjust the payment rate to reflect the value of electricity generated on a time of delivery basis. The proposed legislation would, however, cap the cumulative generating capacity able to receive the FIT rate at 500 MW. Recent changes have been made to the FIT. In October, 2009 Governor Schwarzenegger signed Senate Bill 32, which amends the feed-in tariff and raises the project size cap to 3 MW from 1.5 MW and increases the statewide cap to 750 MW.
- **Manufacturing and Installation Cost.** There are signs that the cost of PV installations will continue to decline, perhaps substantially. “Thin film” PV collectors are less expensive to manufacture than conventional crystalline silicon modules. Given sufficient sales volume, economies of scale in thin film (and other PV technology) manufacturing could reduce the cost of PV installation and energy generated, perhaps to levels comparable to current energy prices. Thin film PV is less efficient than crystalline silicon PV and therefore requires substantially more collector area (i.e., many more commercial or residential rooftops or ground area) to generate comparable amounts of electric energy. According to a study of PV system costs over the period 1998-2007, systems completed in 2006 or 2007 that were less than 2 kW in size averaged $9.00/Watt, while systems larger than 750 kW averaged $6.80/Watt. PV installed in residential new construction is significantly less expensive relative to retrofit installations. Widespread expansion of distributed PV beyond current programs, however, would require a large number of retrofit

installations. No matter how it is installed, relying heavily on PV greatly increases the total cost of meeting state renewable energy and GHG targets.

- **Manufacturing Scale-Up.** Shipments of "thin film" PV collectors totaled approximately 500 MW globally in 2008. While PV manufacturing plants are expected to develop quickly, the availability of financing and raw material supply would need to increase proportionally to match an increased demand. Because the worldwide demand for PV is expected to continue to increase along with demand throughout the United States, the competition for this demand may affect the cost and schedule for increasing the use of distributed solar PV.

Investor owned utilities, residential, and commercial deployment of distributed solar PV have increased rapidly in the last two years and contribute to the viability of this alternative. However, achieving 400 MW of distributed solar PV would depend on additional policy support, manufacturing capacity, and lower cost than currently exists. Additionally, while it is possible to achieve 400 MW of distributed solar PV, the Energy Commission's Intermittency Analysis Project Final Report assumes 3,100 MW of concentrated solar power in addition to 2,900 MW of solar PV, or a total of 6,000 MW of solar power (CEC 2007c). Achieving 6,000 MW of solar PV to provide the renewable energy required to meet the California Renewable Portfolio Standard requirements would be challenging so additional technologies, like solar thermal generation, are also necessary.

ALTERNATIVE RENEWABLE TECHNOLOGIES

Non-solar renewable generation technologies were considered as potential alternatives to the proposed project. The following renewable generation technologies were considered in this analysis:

- wind energy
- geothermal energy
- biomass energy
- tidal energy
- wave energy

The non-solar renewable technologies alternatives (wind, geothermal, biomass, tidal, wave) would either be infeasible at the scale of the ISEGS project, or would not eliminate significant impacts caused by the ISEGS project without creating significant impacts in other locations. Specifically, wind energy that would be viable at some locations in the Mojave Desert could create significant impacts to biological, visual, cultural, and water and soils resources.

Wind Energy

Wind carries kinetic energy that can be utilized to spin the blades of a wind turbine rotor and an electrical generator, which then feed alternating current (AC) into the utility grid. Most state-of-the-art wind turbines operating today convert 35 to 40 percent of the wind's kinetic energy into electricity. A single 1.5-MW turbine operating at a 40 percent capacity factor generates 2,100 MWh annually. Modern wind turbines represent viable

renewable alternatives to large solar energy projects within the region as exemplified by the number of wind projects applications pending to BLM within both California and Nevada. The BLM has received approximately 96 applications for wind projects within the California Desert District as of November 2008, for use of over 750,000 acres of land (BLM 2008b).

Wind turbines currently being manufactured have power ratings ranging from 250 watts to 5 MW, and units larger than 7 MW in capacity are now under development (AWEA 2008). The average capacity of wind turbines installed in the United States in 2007 was 1.65 MW (EERE 2008).

The perception of wind as an emerging energy source reached a peak in the early 1980s, when wind turbine generators to convert wind power into electricity were being installed in California at a rate of nearly 2,000 per year. Progress slowed a few years later, however, as start-up tax subsidies disappeared and experience demonstrated some deficiencies in design. At the present time, technological progress again has caught up, contributing lower cost, greater reliability, and reason for genuine optimism for the future.

The technology is now well developed and can be used to generate significant amounts of power. There are now approximately 2,490 MW of wind being generated in California (AWEA 2008).

Environmental Assessment. Wind turbines can create environmental impacts, as summarized below (AWEA 2008):

- Wind energy requires between 5 and 17 acres per MW of energy created. As such a nominal 400-MW power plant would require between 2,000 and 6,800 acres. However, wind turbine “footprints” typically use only 5 percent of the total area, or approximately 100 to 340 acres for a 400-MW power plant.
- Erosion can be a concern in certain habitats such as the desert or mountain ridgelines. Standard engineering practices can be used to reduce erosion potential.
- Birds collide with wind turbines. Avian deaths, particularly raptors, are a significant concern depending on raptor use of the area.
- Wind energy can negatively impact birds and other wildlife by fragmenting habitat, both through installation and operation of wind turbines themselves and through the roads and power lines that are required.
- Bats collide with wind turbines. The extent of bat mortality depends on turbine placement and bat flight patterns.
- Visual impacts of wind turbines can be significant, and installation in scenic and high traffic areas can result in strong local opposition. Other impressions of wind turbines are that they are attractive and represent clean energy.

Summary of Impacts. Approximately 2,000 to 6,800 acres of land would be required for a 400-MW wind electricity power plant. While wind plants would not necessarily impact the same types of wildlife and vegetation as the ISEGS solar power tower plant, the significant acreage necessary for a 400-MW wind plant would still cause significant

habitat loss in addition to potentially significant impacts from habitat fragmentation and bird and bat mortality.

Wind turbines are often over 400 feet high for 2-MW turbines. As such, any wind energy project would be highly visible, which is of special concern in scenic areas.

Rationale for Elimination

While wind electricity generation is a viable and important renewable technology in California, it would not reduce the large-scale ground disturbance and visual impacts associated with the ISEGS project. Therefore wind generation was eliminated from further consideration.

Geothermal Energy

Geothermal technologies use steam or high-temperature water obtained from naturally occurring geothermal reservoirs to drive steam turbine/generators. There are vapor dominated resources (dry, super-heated steam) and liquid-dominated resources where various techniques are utilized to extract energy from the high-temperature water.

Geothermal plants account for approximately 5 percent of California's power and range in size from under 1 MW to 110 MW. Geothermal plants typically operate as baseload facilities and require 0.2 to 0.5 acre per MW, so a 400-MW facility would require up to 200 acres. California is the largest geothermal power producer in the United States, with about 1,800 installed capacity; in 2007, 13,000 gigawatt hours of electricity were produced in California (CEC 2008). Geothermal plants provide highly reliable baseload power, with capacity factors from 90 to 98 percent.

Geothermal plants must be built near geothermal reservoir sites because steam and hot water cannot be transported long distances without significant thermal energy loss. Geothermal power plants are operating in the following California counties: Lake, Sonoma, Imperial, Inyo, Mono, and Lassen.

Environmental Assessment. Concerns regarding geothermal power plants include land use, water use, visibility, and hazardous materials, specifically gaseous emission. Geothermal power projects use less land than almost any other energy source, typically from about 0.2 to 0.5 acres per MW; however, geothermal plants must be built where the resource is since the steam cannot be piped long distances without significant heat loss. This results in a highly secure and predictable fuel supply and some inflexibility in siting. It may also result in a long interconnection requirement to reach a transmission system.

Drilling and operation of geothermal wells may also potentially degrade local groundwater aquifers. Geothermal wells are typically cased and cemented in a manner that precludes contamination of aquifers. Hot water and steam can only flow into the bottom of a geothermal well, significantly below cold water aquifers, and are confined within one to three layers of casing cemented almost all the way down the well. If there were a natural connection (or one created by drilling) between the reservoir and a cold water aquifer, it could destroy the commercial viability of the geothermal reservoir. Operators avoid inflow of cold waters into a geothermal reservoir, or vice versa, both to comply with regulatory protections of groundwater aquifers and to protect the geothermal reservoir.

Geothermal plants can cause visual impacts; however, this can be reduced by careful siting of the power plant, using the natural screening of topography and trees, by painting facilities to blend with the surroundings and by locating them away from sensitive viewsheds. Very efficient water-cooled cooling towers can be designed so that vapor plumes from cooling towers are barely visible except on very cold, clear days.

Geothermal plant can also produce waste and byproducts that can have significant impacts. The most significant and potentially harmful gas generally encountered in geothermal systems is hydrogen sulfide (H_2S), which, at concentrations higher than 30 parts per million (ppm), is a toxic substance (CEC 2003). It can cause a variety of problems including dizziness, vomiting, and eventually death if one is exposed for long periods of time. In stronger concentrations above 100 ppm, H_2S can be fatal. H_2S is heavier than air and can accumulate in low-lying areas (equipment pits, ravines, and other depressions) and become concentrated over time.

H_2S releases could potentially be of concern during drilling, well testing, and plant start-up and shut-down operations, although recent technology improvements in atmospheric separators can significantly decrease emissions and noise during these operations. H_2S is now often abated at geothermal power plants, resulting in a conversion of close to 100 percent of the H_2S into elemental sulfur (GEA 2007). Since 1976, H_2S emissions have decreased from 1,900 pounds per hour to 200 pounds per hour despite an increase in geothermal power production from 500 MW to 2,000 MW (GEA 2007).

Rationale for Elimination

Geothermal generation is a commercially available technology and is important for California's renewable energy future because it provides baseload power. However, it is limited to areas with geologic conditions resulting in high subsurface temperatures. Even in areas where such conditions are present, there have been concerns about the reliability and corrosiveness of the steam supply. Additionally, while the technology is available, there are not enough geothermal resources to provide the renewable energy required to meet the California Renewable Portfolio Standard requirements, so additional technologies, like solar thermal generation, would also be required.

Biomass Energy

Electricity can be generated by burning organic fuels in a boiler to produce steam, which then turns a turbine; this is biomass generation. Biomass can also be converted into a fuel gas such as methane and burned to generate power. Wood is the most commonly used biomass for power generation. Major biomass fuels include forestry and mill wastes, agricultural field crop and food processing wastes, and construction and urban wood wastes. Several techniques are used to convert these fuels to electricity, including direct combustion, gasification, and anaerobic fermentation. Biomass facilities do not require the extensive amount of land required by the other renewable energy sources discussed, but they generate much smaller amounts of electricity.

Currently, nearly 19 percent of the state's renewable electricity derives from biomass and waste-to-energy sources (CEC 2007). Most biomass plant capacities are in the 3- to 10-MW range and typically operate as baseload capacity. The average size of a sales generation biomass plant is 21 MW (CBEA 2008). Unlike other renewables, the

locational flexibility of biomass facilities would reduce the need for significant transmission investments. Solid fuel biomass (555 MW) makes up about 1.75 percent of the state's electricity, and landfill gas generation (260 MW) makes up about 0.75 percent. Existing landfills not now producing electricity from gas could add a maximum of about 170 MW of new generation capacity (CBEA 2008).

Environmental Assessment. Generally, small amounts of land are required for biomass power facilities; however, a biomass facility should be sited near a relatively large source of biomass in order to minimize the cost of bringing the biomass waste to the facility.

Operational noise impacts may be a concern, originating from truck engines as a result hauling operations coming from and going to the facility repeatedly on a daily basis. Other operations of the biomass facilities, while internal to the main structure, can result in increased noise due to the material grinding equipment.

The emissions due to biomass fuel-fired power plant operation are generally unavoidable. Direct impacts of criteria pollutants could cause or contribute to a violation of the ambient air quality standards. Significant impacts can potentially occur for PM10 and ozone because emissions of particulate matter and precursors and ozone precursors would contribute to existing violations of the PM10 and ozone standards. Biomass/biogas facility emissions could also adversely affect visibility and vegetation in federal Class I areas or state wilderness areas, which would significantly deteriorate air quality related values in the wilderness areas. Toxic air contaminants from routine operation would also cause health risks that could locally adversely affect sensitive receptors.

Rationale for Elimination

Most biomass facilities produce only small amounts of electricity (in the range of 3 to 10 MW) and so could not meet project objectives. Biomass facilities also generate significant air emissions and require numerous truck deliveries to supply the plant with the waste. Also, in waste-to-energy facilities, there is some concern regarding the emission of toxic chemicals, such as dioxin, and the disposal of the toxic ash that results from biomass burning. Therefore, this technology is not analyzed in detail as an alternative to the ISEGS project.

Tidal Energy

The oldest technology to harness tidal power for the generation of electricity involves building a dam, known as a *barrage*, across a bay or estuary that has large differences in elevation between high and low tides. Water retained behind a dam at high tide generates a power head sufficient to generate electricity as the tide ebbs and water released from within the dam turns conventional turbines.

Certain coastal regions experience higher tides than others. This is a result of the amplification of tides caused by local geographical features such as bays and inlets. In order to produce practical amounts of power for tidal barrages, a difference between high and low tides of at least 5 meters is required. There are about 40 sites around the world with this magnitude of tidal range. The higher the tides, the more electricity can be

generated from a given site and the lower the cost of electricity produced. Worldwide, existing power plants include a 240-MW plant in France, a 20-MW plant in Nova Scotia, and a 0.5-MW plant in Russia (EPRI 2006).

Tidal Fences

Tidal fences are effectively barrages that completely block a channel. If deployed across the mouth of an estuary, they can be very environmentally destructive. However, in the 1990s, their deployment in channels between small islands or in straights between the mainland and islands has increasingly been considered a viable option for generation of large amounts of electricity.

The advantage of a tidal fence is that all the electrical equipment (generators and transformers) can be kept high above the water. Also, by decreasing the cross-section of the channel, current velocity through the turbines is significantly increased.

The first large-scale commercial fences are likely to be built in Southeast Asia. The most advanced plan is a scheme for a fence across the Dalupiri Passage between the islands of Dalupiri and Samar in the Philippines, agreed upon by the Philippine government and Energy Engineering Company of Vancouver, Canada in late 1997. The site, on the south side of the San Bernardino Strait, is approximately 41 meters deep (with a relatively flat bottom) and has a peak tidal current of about 8 knots. As a result, the fence is expected to generate up to 2,200 MW of peak power (with a base daily average of 1,100 MW) (Osborne 2000).

Tidal Turbines

Tidal turbines are the chief competition to the tidal fence. Looking like an underwater wind turbine, they offer a number of advantages over the tidal fence. They are less disruptive to wildlife, allow small boats to continue to use the area, and have much lower material requirements than the fence.

Tidal turbines function well where coastal currents run at 2 to 2.5 meters per second (slower currents tend to be uneconomic while larger ones stress the equipment). Such currents provide an energy density four times greater than air, meaning that a 15-meter-diameter turbine will generate as much energy as a 60-meter-diameter windmill. In addition, tidal currents are both predictable and reliable, a feature which gives them an advantage over both wind and solar systems. The tidal turbine also offers significant environmental advantages over wind and solar systems; the majority of the assembly is hidden below the waterline, and all cabling is along the sea bed.

There are many sites around the world where tidal turbines could be effectively installed. The ideal site is close to shore (within 1 kilometer) in water depths of about 20 to 30 meters. In April 2007, the first major tidal-power project was installed in the United States off New York City's Roosevelt Island (Fairley 2007). Turbines such as those used in New York City use in-flow turbines, thereby lessening the environmental impacts. A study conducted in 2006, *System Level Design, Performance, Cost and Economic Assessment – San Francisco Tidal In-Stream Power Plant*, concluded that a tidal plant located under the Golden Gate Bridge could create approximately 35 MW of power with no significant impacts to the environment and recommended further

research and development into both ocean energy technology and a pilot project in San Francisco (EPRI 2006a).

Environmental Assessment. Tidal technologies, especially tidal fences, have the potential to cause significant biological impacts, especially to marine species and habitats. Fish could be caught in the unit's fins by the sudden drop in pressure near the unit. The passageways, more than 15 feet high and probably sitting on the bay floor, could squeeze out marine life that lives there or alter the tidal flow, sediment build-up, and the ecosystem in general. Even the in-flow turbines can have environmental impacts on marine systems. The in-flow turbines off New York City must undergo environmental monitoring for 18 months to ensure the turbines will not create environmental impacts to the river's marine wildlife. Also, depending on the location of the tidal technology, commercial shipping could be disrupted during construction.

The reduced tidal range (difference between high and low water levels) resulting from tidal energy generation can destroy inter-tidal habitat used by wading birds. Sediment trapped behind the barrage could also reduce the volume of the estuary over time.

Rationale for Elimination

Tidal fence technology is a commercially available technology, although limited to areas that are adjacent to a body of water with a large difference between high and low tides, and it creates significant environmental impacts to ocean ecosystems. In-flow tidal turbines are a relatively new technology and are not considered an alternative to the ISEGS project because they are an unproven technology at the scale that would be required to replace the proposed project. Additionally, the environmental impacts of tidal turbines are still under review, as demonstrated by the pilot project under environmental monitoring in New York.

Wave Energy

Wave power technologies have been around for nearly 30 years. Setbacks and a general lack of confidence have contributed to slow progress towards proven devices that would have a good probability of becoming commercial sources of electrical power.

The highest energy waves are concentrated off the western coasts in the 40^{o} to 60^{o} latitude range north and south. The power in the wave fronts varies in these areas between 30 and 70 kilowatts per meter (kW/m) with peaks to 100 kW/m in the Atlantic southwest of Ireland, the Southern Ocean and off Cape Horn. Many wave energy devices are still in the research and development stage and would require large amounts of capital to get started. Additional costs from permitting and environmental assessments also make wave energy problematic (WEC 2007). Nonetheless, wave energy is likely to increase in use within the next 5 to 10 years.

The total power of waves breaking on the world's coastlines is estimated at 2 to 3 million megawatts. In favorable locations, wave energy density can average 65 MW per mile of coastline. Three approaches to capturing wave energy are:

- **Floats or Pitching Devices.** These devices generate electricity from the bobbing or pitching action of a floating object. The object can be mounted to a floating raft or to a device fixed on the ocean floor.

- **Oscillating Water Columns.** These devices generate electricity from the wave-driven rise and fall of water in a cylindrical shaft. The rising and falling water column drives air into and out of the top of the shaft, powering an air-driven turbine.
- **Wave Surge or Focusing Devices.** These shoreline devices, also called "tapered channel" or "tapchan" systems, rely on a shore-mounted structure to channel and concentrate the waves, driving them into an elevated reservoir. Water flow out of this reservoir is used to generate electricity, using standard hydropower technologies.

In December 2007, PG&E signed a power purchase agreement with Finavera Renewables, which had planned to operate a wave farm approximately 2.5 miles off the coast of Eureka, California. The agreement was for 2 MW of power beginning in 2012. On October 16, 2008, the California Public Utilities Commission rejected PG&E's request for approval of a renewable resource procurement contract with Finavery Renewables because, among other reasons, the CPUC concluded the project had not been shown to be viable. As stated in the decision, there is significant uncertainty surrounding wave technology and the wave energy industry is at a beginning stage (CPUC 2008). The CPUC did authorize up to $4.8 million for PG&E to undertake its WaveConnect project in D.09-01-036. WaveConnect is designed to document the feasibility of a facility that converts wave energy into electricity by using wave energy conversion (WEC) devices in the open ocean adjacent to PG&E's service territory.

Environmental Assessment. The environmental impacts of wave power have yet to be fully analyzed. A recent study published by the U.S. Department of Commerce and National Oceanic and Atmospheric Administration listed a number of potentially significant environmental impacts created by wave power (Boehlert 2008). These include (Boehlert 2008):

- Significant reduction to waves with possible effects to beaches (e.g. changes to sediment transport processes).
- The use of buoys may have positive effects on forage fish species, which in turn could attract larger predators. Structures need to reduce potential entanglement of larger predators, especially marine turtle species.
- Modifications to water circulation and currents may result in changes to larval distribution and sediment transport.
- Wave energy development may affect community structures for fish and fisheries.
- Lighting and above-water structures may result in marine bird attraction and collisions and may alter food webs and beach processes.
- A diversity of concerns would arise regarding marine mammals including entanglement issues.
- Energy-absorbing structures may affect numerous receptors and should avoid sensitive habitats.
- Chemicals used in the process must be addressed both for spills and for a continuous release such as in fouling paints.
- New hard structures and lighting may break loose and increase debris accumulation.

- Impacts on fish and marine mammals caused by noise coming from the buoys should be understood and mitigated.
- Electromagnetic effects may affect feeding or orientation and should be better understood.
- Impact thresholds need to be established. As projects scale up in location or implementation, new risks may become evident.

Rationale for Elimination

Wave energy is new and may not be technologically feasible. Additionally, wave power must be located where waves are consistently strong; even then, the production of power depends on the size of waves, which result in large differences in the amount of energy produced. Wave technology is not considered an alternative to the ISEGS project because is an unproven technology at the scale that would be required to replace the proposed project and because it may also result in significant environmental impacts as evidenced in the “Environmental Assessment” discussion.

ALTERNATIVE METHODS OF GENERATING OR CONSERVING ELECTRICITY

Nonrenewable generation technologies that require use of natural gas, coal, or nuclear energy would not achieve the key project objective for ISEGS: to safely and economically construct and operate a nominal 400-megawatt, renewable power generating facility in California capable of selling competitively priced renewable energy consistent with the needs of California utilities.

While these generation technologies would not achieve this key objective, they are presented here in brief for the benefit of the public and decision makers. Conservation and demand-side management is also briefly addressed in this section.

The following topics are considered in this analysis:

- natural gas
- coal
- nuclear energy
- conservation and demand-side management

Of the nonrenewable generation alternatives (natural gas, coal, and nuclear), only the natural gas-fired power plants would be viable alternatives within California. However, gas-fired plants would fail to meet a major project objective: to construct and operate a renewable power generating facility in California capable of selling competitively priced renewable energy consistent with the needs of California utilities and would therefore not achieve the purpose and need of the project. Because these alternatives would not support renewable power generation within California, and could have significant environmental impacts of their own, they were eliminated from further consideration.

Natural Gas Generation

Natural gas power generation accounts for approximately 22 percent of all the energy used in the United States and comprises 40 percent of the power generated in California (CEC 2007). Natural gas power plants typically consist of combustion turbine generators, heat recovery steam generators, a steam turbine generator, wet or dry cooling towers, and associated support equipment. An interconnection with a natural gas pipeline, a water supply, and electric transmission are also required.

A gas-fired power plant generating 400 MW would generally require less than 40 acres of land.

Environmental Assessment. Natural gas power plants may result in numerous environmental impacts such as the following.

- Overall air quality impacts would increase because natural gas-fired power plants contribute to local violations of PM10 and ozone ambient air quality standards, and operational emissions could result in toxic air contaminants that could adversely affect sensitive receptors. Net increases in greenhouse gas emissions due to natural gas-firing in the conventional power plants would also be significant.
- Environmental justice may be a concern. Gas-fired power plants tend to be located in developed urban areas that are zoned for heavy industry. In some instances, low-income and minority populations are also located in such areas.
- In order to avoid land use impacts, natural gas-fired power plants must be consistent with local jurisdictions' zoning.
- Several hazardous materials, including regulated substances (aqueous ammonia, hydrogen, and sulfuric acid), would be stored at a natural gas power plant during operation. Aqueous ammonia would be stored in amounts above the threshold quantity during the final stages of construction, initial start-up, and operations phase. Transport of hazardous materials during power plant operation includes delivery of aqueous ammonia and removal of wastes. During operation, the aqueous ammonia transporter would be required to obtain a Hazardous Material Transportation License in accordance with California Vehicle Code section 32105 and would be required to follow appropriate safety procedures and routes.
- Cultural impacts can be severe depending on the power plant siting; however, because natural gas power plants require significantly fewer acres per megawatt of power generated, impacts to cultural resources would be expected to be fewer than with solar facilities.
- Power plant siting may result in the withdrawal of agriculture lands. However, because natural gas power plants require significantly fewer acres per megawatt of power generated, impacts to agriculture would be expected to be less than with solar facilities should they be sited on agriculture lands.
- Visual impacts may occur with natural gas power plants because they introduce large structures with industrial character. The most prominent structures are frequently the cooling towers, which may reach 100 feet tall, and the power plant stacks, which may reach over 100 feet tall. Visible plumes from the cooling tower would also potentially occur.

Rationale for Elimination

Although natural gas generation is clearly a viable technology, it is not a renewable technology, so it would not attain the objective of generating renewable power meeting California's renewable energy needs. The air quality impacts of gas-fired plants include greenhouse gases and are one major reason that California's Renewable Portfolio Standard was developed. Therefore, this alternative is not considered in detail as an alternative to the ISEGS project.

Coal Generation

Coal-fired electric generating plants are the cornerstone of America's central power system. Traditional coal-fired plants generate large amounts of greenhouse gases. New "clean coal technology" includes a variety of energy processes that reduce air emission and other pollutants from coal-burning power plants. The Clean Coal Power Initiative is providing government co-financing for new coal technologies that help utilities meet the Clear Skies Initiative to cut sulfur, nitrogen, and mercury pollutants by nearly 70 percent by 2018. The Clean Coal Power Initiative is now focusing on developing projects that utilize carbon sequestration technologies and/or beneficial reuse of carbon dioxide (DOE 2008). However, these technologies are not yet in use.

In 2006, approximately 15.7 percent of the energy used in California came from coal fired sources; 38 percent of this was generated in state, and 62 percent was imported (CEC 2007). The in-state coal-fired generation includes electricity generated from out-of-state, coal-fired power plants owned by and reported by California utilities (CEC 2007). In 2006, California enacted SB 1368 (Perata, Chapter 598, Statutes of 2006), which prohibits utilities from making long-term commitments for electricity generated from plants that create more carbon dioxide (CO_2) than clean-burning natural gas plants (CEC 2007).

Environmental Assessment. Coal-fired power plants may also result in numerous environmental impacts such as the following.

- Overall, air quality impacts would increase because coal-fired power plants contribute carbon dioxide, sulfur dioxide, nitrogen oxides, mercury, and fly ash (USEPA 2008a). Mining, cleaning, and transporting coal to the power plants generates additional emissions. Average emissions of a coal-fired power plant are 2,249 pounds per megawatt hour of carbon dioxide, 13 pounds per megawatt hour of sulfur dioxide and 6 pounds per megawatt hour of nitrogen oxides (EPA 2008a). Net increases in greenhouse gas emissions due to coal-firing in the conventional power plants would be significant.
- Health risks associated with power plants have also been documented, including problems associated with exposure to fine particle pollution or soot, an increase in asthma, and an increase in non-fatal heart attacks.
- Large quantities of water are generally required to produce steam and for cooling. When coal-fired power plants use water from a lake or river, fish or other aquatic life can be impacted (EPA 2008).

Rationale for Elimination

Although coal generation is a viable technology, it is not a renewable technology, so it would not attain the objective of generating renewable power meeting California's renewable energy needs. Existing technology for coal-fired plants results in high greenhouse gas emissions. Therefore, coal generation was eliminated from detailed analysis.

Nuclear Energy

Due to environmental and safety concerns, California law currently prohibits the construction of any new nuclear power plants in California until the California Energy Commission finds that the federal government has approved and there exists a demonstrated technology for the permanent disposal of spent fuel from these facilities (CEC 2006). In June 1976, California enacted legislation directing the Energy Commission to perform an independent investigation of the nuclear fuel cycle. This investigation was to assess whether the technology to reprocess nuclear fuel rods or to dispose of permanently high-level nuclear waste had been demonstrated and approved and was operational (Public Resources Code 25524.1 (a) (1), 25524.1 (b), and 25524.2 (a)). After extensive public hearings, the Energy Commission determined that it could not make the requisite affirmative findings concerning either reprocessing of nuclear fuel or disposal of high-level waste. This information was published in a report: *Status of Nuclear Fuel Reprocessing, Spent Fuel Storage and High-level Waste Disposal*, Energy Commission publication P102-78-001, January 1978.) As a result, the development of new nuclear energy facilities in California was prohibited by law.

It has been more than 25 years since the last comprehensive Energy Commission assessment of nuclear power issues. The *Nuclear Power in California: 2007 Status Report* was published in October of 2007, and gives a detailed description of the current nuclear waste issues and their implications for California. This was prepared as part of the development of the Energy Commission's *2007 Integrated Energy Policy Report* (CEC 2007a).

Rationale for Elimination

The permitting of new nuclear facilities in California is currently illegal, so this technology is infeasible.

Conservation and Demand-Side Management

Conservation and demand-side management consist of a variety of approaches to reduction of electricity use, including energy efficiency and conservation, building and appliance standards, and load management and fuel substitution. In 2005 the Energy Commission and CPUC's Energy Action Plan II declared cost effective energy efficiency as the resource of first choice for meeting California's energy needs. The Energy Commission noted that energy efficiency helped flatten the state's per capita electricity use and saved consumers more than $56 billion since 1978 (CPUC 2008). The investor-owned utilities' 2006-2008 efficiency portfolio marks the single-largest energy efficiency campaign in U.S. history, with a $2 billion investment by California's energy ratepayers (CPUC 2008). However, with population growth, increasing demand for

energy, and the need to reduce greenhouse gases, there is a greater need for energy efficiency.

The CPUC, with support from the Governor's Office, the Energy Commission, and the California Air Resources Board, among others, adopted the California Long-Term Energy Efficiency Strategy Plan for 2009 to 2020 in September 2008 (CPUC 2008). The plan is a framework for all sectors in California including industry, agriculture, large and small businesses, and households. Major goals of the plan include:

- All new residential construction will be zero net energy by 2020;
- All new commercial construction will be zero net energy by 2030;
- Heating, ventilation, and air conditioning industries will be re-shaped to deliver maximum performance systems;
- Eligible low-income customers will be able to participate in the Low Income Energy Efficiency program and will be provided with cost-effective energy efficiency measures in their residences by 2020.

Rationale for Elimination

Conservation and demand-side management is important for California's energy future and cost effective energy efficiency is considered as the resource of first choice for meeting California's energy needs. However, with population growth and increasing demand for energy, conservation and demand-management alone is not sufficient to address all of California's energy needs. Additionally, it will not provide the renewable energy required to meet the California Renewable Portfolio Standard requirements, so technologies, like solar thermal generation, would be required.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Applicant Comments. The applicant submitted a PSA comment letter (dated and docketed January 23, 2009) to the CEC. The letter addresses the following subjects related to the alternatives analysis.

- The applicant made a number of revisions to the summary description of the proposed project. The summary description is no longer included in Alternatives and can be found in the **Project Description** section of this document. The applicant's comments on the project description were included in Section B.1 where applicable.
- The applicant states that the AFC listed eight project objectives and that the alternatives section only lists three basic objectives which do not coincide with the applicant's list. The applicant states that it is unclear if the shorter list is a summary or synthesis of the eight basic project objectives and states that under CEQA it is the applicant's basic project objectives that frame the Alternatives analysis. The applicant states that the three basic objectives presented in the PSA misrepresent the applicant's basic objectives, especially with regard to schedule, and that therefore these three objectives are inconsistent with CEQA and should be deleted.

After considering the eight objectives set forth by BrightSource in the ISEGS AFC, the Energy Commission identified three basic project objectives as stated in the section entitled Alternatives Screening Methodology. The three basic project objectives

identified by the lead agencies were then used to shape the alternatives analysis in accordance with CEQA requirements. The alternatives analysis did not misrepresent the applicant objectives but rather considered these objectives when developing the agency identified basic project objectives.

Both CEQA and NEPA provide guidance on selecting a reasonable range of alternatives for evaluation in an EIR or equivalent and EIS, and the requirements are similar. As discussed in the CEQA Guidelines, "[t]here is no ironclad rule governing the nature or scope of the alternatives to be discussed other than the rule of reason." (CEQA Guidelines § 15126.6(a); see also 40 C.F.R. § 1502.14(a).) Further, the range of *potential* alternatives to the proposed project shall include those that could feasibly accomplish most of the basic objectives of the project…" "even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly." (CEQA Guidelines § 15126.6(b) & (c).)

As stated in the BLM NEPA Handbook (H-1790-1), the purpose and need statement for an externally generated action must describe the BLM purpose and need, not an applicant's or external proponent's purpose and need (40 CFR 1502.13). The BLM NEPA Handbook further states that while the applicant's purpose and need may provide useful background information, the applicant's purpose and need must not be confused with the BLM purpose and need for action. The BLM action triggers the NEPA analysis and it is the BLM purpose and need for action that will dictate the range of alternatives and provide a basis for the rationale for eventual selection of an alternative in a decision.

Sierra Club and California Native Plant Society Comments. The Sierra Club San Gorgonio Chapter and Desert Committee and the California Native Plant Society (CNPS) requested that the Private Land Alternative be given full consideration, and that the CEC and BLM consider placing solar facilities on private, disturbed lands. The CNPS further states that the rationale for eliminating a project located on private lands because of time and economic funds is not justifiable. The Renewable Energy and Transmission Initiative (RETI) process is currently reviewing the viability of compiling a number of parcels into one parcel large enough for a solar facility. The RETI Final Phase 2A report states that areas having more than 20 different owners per two-square mile area were deemed unlikely to be developed. The Private Land alternative has approximately 70 parcels although the number of different owners of the parcel is unknown. This notwithstanding, a Private Land alternative was given full consideration. However, because of land use and aviation constraints, a Private Land alternative entirely on disturbed lands with no land use constraints was not found. As such, many of the impacts on the Private Land Alternative would not significantly lessen the impacts that would occur at the ISEGS Ivanpah Basin site without creating impacts of its own.

Several commenters requested that the CEC and BLM consider an alternative that would create energy at the point of use, thereby eliminating the need to transport the energy over long distances. The discussion of technologies eliminated now includes a Solar Photovoltaic Technology – Distributed Solar PV section which discusses distributed generation that would create solar energy at the point of use. It concludes that achieving 400 MW of distributed solar PV would depend on additional policy support, manufacturing capacity, and lower cost than currently exists to provide the

renewable energy required to meet the California Renewable Portfolio Standard requirements so additional technologies, like solar thermal generation, are also necessary.

Defenders of Wildlife Comments. The Defenders of Wildlife stated in the comment letter dated February 4, 2009, that the project's range of alternatives should include at a minimum an environmentally preferred alternative, a no action alternative, and an alternative that provides for power generation close to the power consumption. The alternatives analysis includes a no action alternative and a distributed solar photovoltaic alternative which would create energy at the point of use. The Alternatives Section Conclusion presents a comparison of alternatives and identifies which is the environmentally preferred alternative.

Wilderness Society and Natural Resource Defense Council Comments. The Wilderness Society and NRDC stated in the comment letter dated February 4, 2009 that alternative configurations and alternative sites should be considered. During the environmental review process the CEC and BLM made a series of requests for a more detailed project description from the Applicant. During this exercise, the proposed project underwent a number of revisions to the locations of project components to improve project operations and to lessen impacts to other land uses and to the existing resources. A list of the changes to the project description is found in the **Project Description** section of this document. Alternatives sites for the ISEGS project are discussed in this section.

California Native Plant Society Comments to the PSA. The CNPS submitted a PSA comment letter (dated and docketed February 6, 2009) to the CEC. The letter addresses the following subjects related to cumulative impact analysis. Responses to each comment are presented below, by comment number.

- Already degraded habitat should be prioritized for development of alternative energy facilities (Comment 8) and a private land alternative cannot be dismissed because acquisition would be challenging (Comment 13) – see response above regarding the Private Land alternative.
- The Broadwell Lake alternative is a viable alternative (Comment 13)
- The PSA dismisses meaningful evaluation for the biological impacts for the Siberia East and Broadwell Lake alternatives (Comment 13)
- The "no project" alternative should not be dismissed; the no project alternative is a valid choice for the CEC because of the many other projects to approve in appropriate locations that minimize impacts to biologically diverse habitat (Comment 13).

Comment 13. The Broadwell Lake alternative is a viable alternative. The CNPS also commented that given that the Broadwell Lake alternative is under application by the project proponent it is appropriate to consider it as a viable alternative contrary to the determination presented in the PSA. The CNPS argues that since the project proponent has an application to put an energy facility at the Broadwell site the argument for the inability to approve the location as a viable alternative would imply that the CEC would not be able to approve a project at that location in the future.

The Energy Commission did not state that the Broadwell Lake alternative was not a viable alternative. The staff's analysis of the Broadwell Lake alternative concludes that the site does meet the siting criteria and would be viable. As stated in Section B.2.5, the Energy Commission does not have the authority to approve an alternative or require BrightSource to move the proposed project to another location, even if it identifies an alternative site that meets the project objectives and avoids or substantially lessens one or more of the significant effects of the project. The implementation of an alternative site would require that the applicant submit a new AFC, including revised engineering and environmental analysis. This more rigorous AFC-level analysis of any of the alternative sites could reveal environmental impacts; nonconformity with laws, ordinances, regulations, and standards; or potential mitigation requirements that were not identified during the more general alternatives analysis presented herein.

Comment 13. The PSA dismisses meaningful evaluation for the biological impacts for the Siberia East and Broadwell Lake alternatives.

The CNPS stated in a comment letter dated February 6, 2009 that the cactus diversity and density in the Ivanpah Basin location was unique to all alternatives analyzed. The CNPS further states that the PSA dismisses any meaningful evaluation of biological impacts for the Siberia and Broadwell alternatives and that a legitimate and equal analysis of effects to biological resources must be presented. The FSA/DEIS states that conclusions regarding the biological resources at these sites cannot be known without site specific surveys.

Comment 13. The "no project" alternative should not be dismissed.

The CNPS states the "no project" alternative should not be dismissed using the justification presented by the CEC staff and that the Ivanpah Basin location is inappropriate for a development at the scale proposed. The commenter further states the "no project" alternative is a valid choice for CEC to make because there will be many other projects approved that minimize and avoid impacts to biologically diverse habitats and that are closer to the energy consumption regions.

CEQA Guidelines (Section 15126.6(e)(3)(C)) state that after defining the no project alternative, "the lead agency should proceed to analyze the impacts of the no project alternative by projecting what would reasonably be expected to occur in the foreseeable future if the project were not approved…" The "no project" alternative did project likely scenarios that could occur should the ISEGS project not be built which include the likelihood that other renewable and non-renewable project would get built. However, the "no project" alternative has been revised to expand on what the impacts of the other projects may be should the "no project" alternative be chosen.

The Sierra Club comment letter (dated June 22, 2009) requested that the FSA/DEIS consider an alternative that would relocate the project to a site adjacent to the I-15 in the area that the applicant considered for the tortoise translocation. The I-15 alternative is evaluated above.

CONCLUSIONS

In this analysis of the Ivanpah Solar Electric Generation Station (ISEGS) project, 23 alternatives to the ISEGS project have been developed and evaluated. These include eight alternative site locations, a range of different solar and renewable technologies, generation technologies using different fuels, and conservation/demand-side management. Of the 23 alternatives, the only alternative that was determined to be both feasible and have the potential to result in lesser impacts was the No Project/No Action alternative.

After a comprehensive evaluation, no alternative site locations were found to offer reduced impacts as compared with the proposed site.

Alternative solar thermal technologies (parabolic trough, Stirling dish, utility scale solar photovoltaics, and linear Fresnel) were considered. As with the proposed distributed power tower technology, these technologies would not substantially reduce visual impacts or biological resources impacts, though land requirements vary among the technologies. Rooftop solar photovoltaic (PV) facilities would likewise require extensive acreage, although rooftop PV could minimize the need for undisturbed open space. However, increased deployment of rooftop solar PV faces challenges in manufacturing capacity, cost, and policy implementation.

Other generation technologies (wind, geothermal, biomass, tidal, wave, natural gas, and nuclear) were also examined as possible alternatives to the project. These technologies would either be infeasible at the scale of the ISEGS project, or would not eliminate significant impacts caused by the ISEGS project without creating their own significant impacts in other locations. A natural gas plant would contribute to greenhouse gas emissions and would not meet the project's renewable generation objective. Construction of new nuclear power plants is currently prohibited under California law.

Conservation and demand side management programs would likely not meet the state's growing electricity needs that could be served by the ISEGS project. In addition, these programs would not provide the renewable energy required to meet the California Renewable Portfolio Standard requirements.

Staff also believes that the No Project/No Action alternative is not superior to the proposed project. This alternative would likely delay development of renewable resources or shift development to other similar areas, and would lead to increased operation of existing power plants that use non-renewable technologies.

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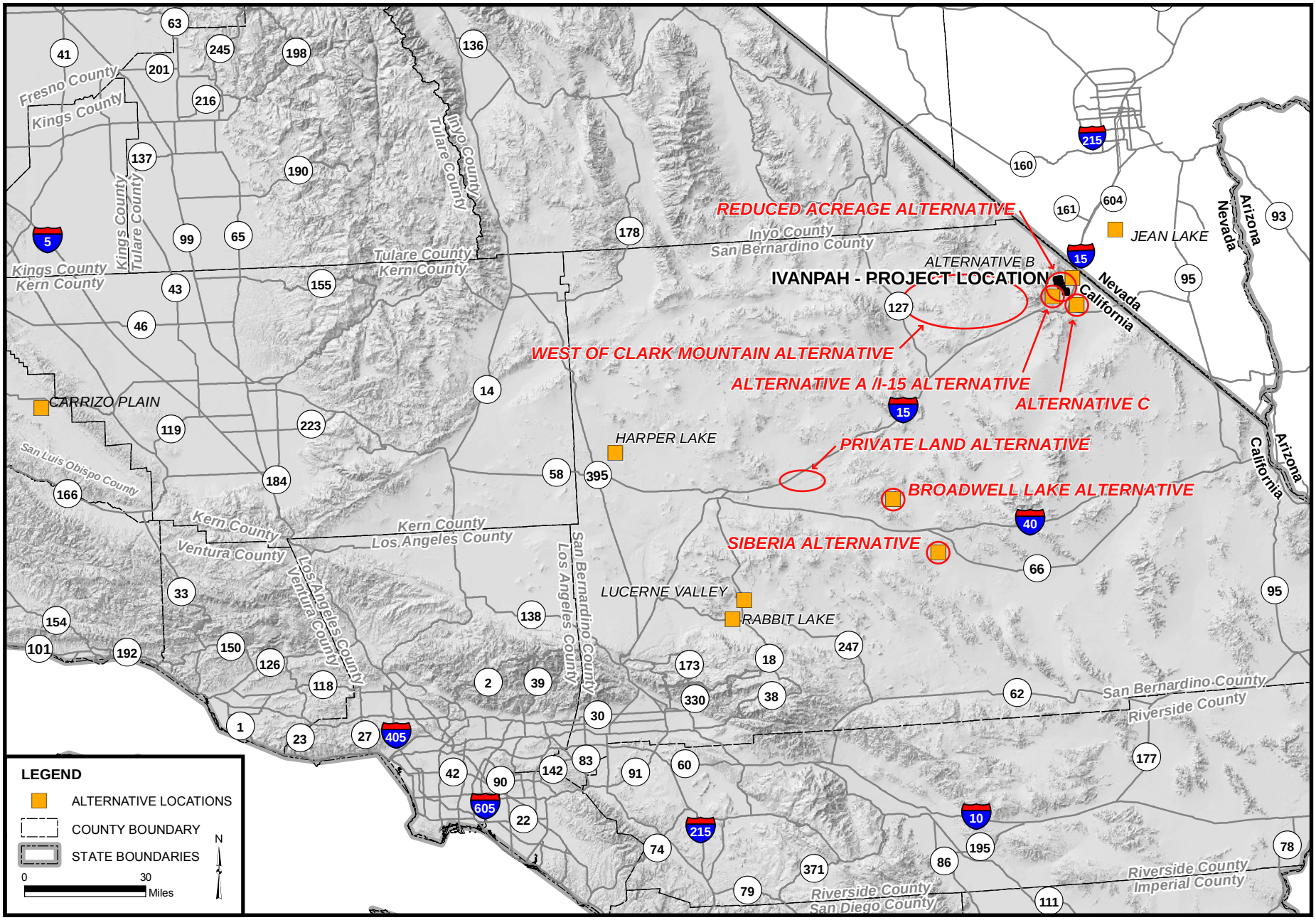
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ALTERNATIVES - FIGURE 1

ISEGS - Locations of Alternatives Eliminated (in red)

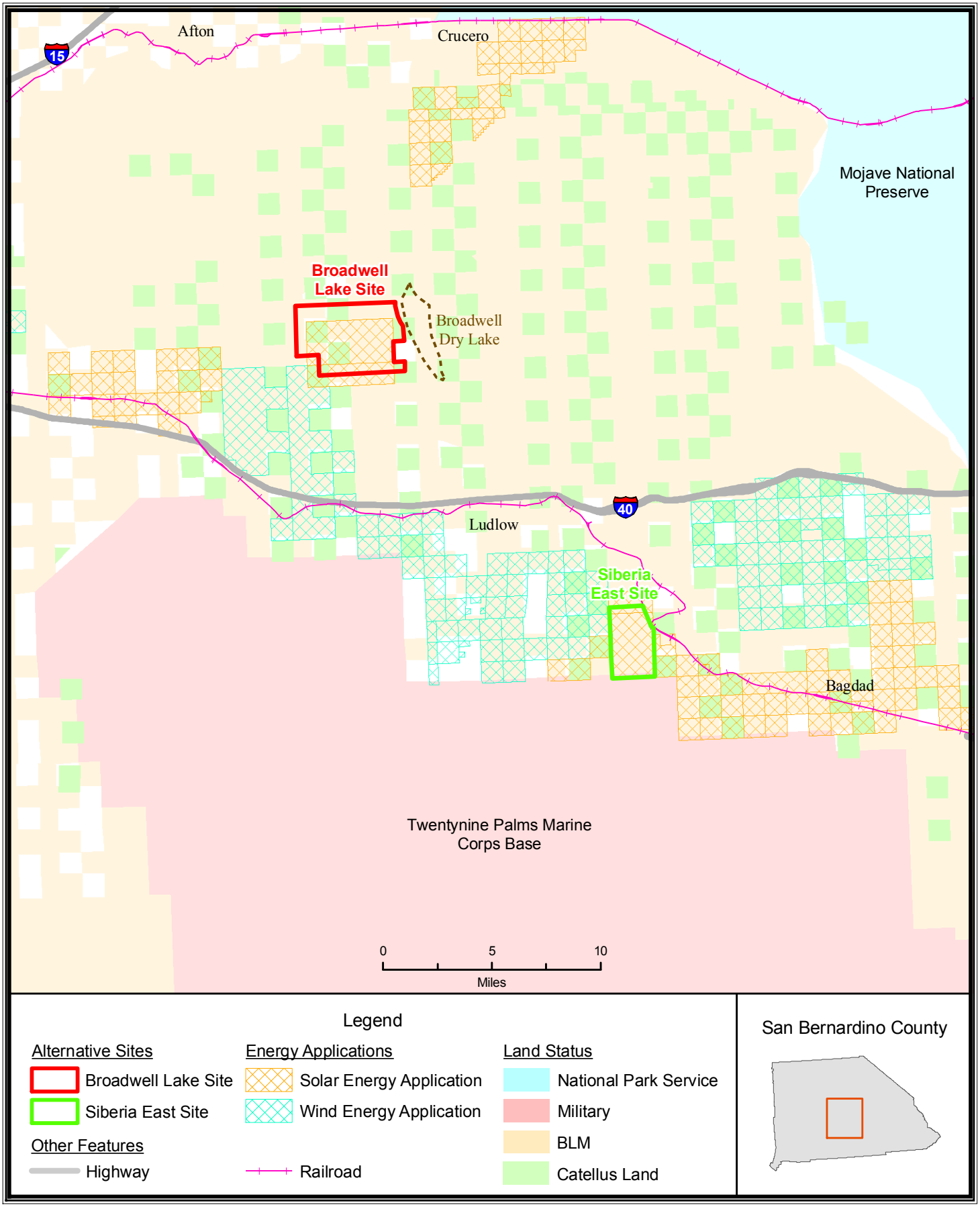


U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009

SOURCE: BSE, 2007a

ALTERNATIVES - FIGURE 2

ISEGS - Alternative Regional Locations

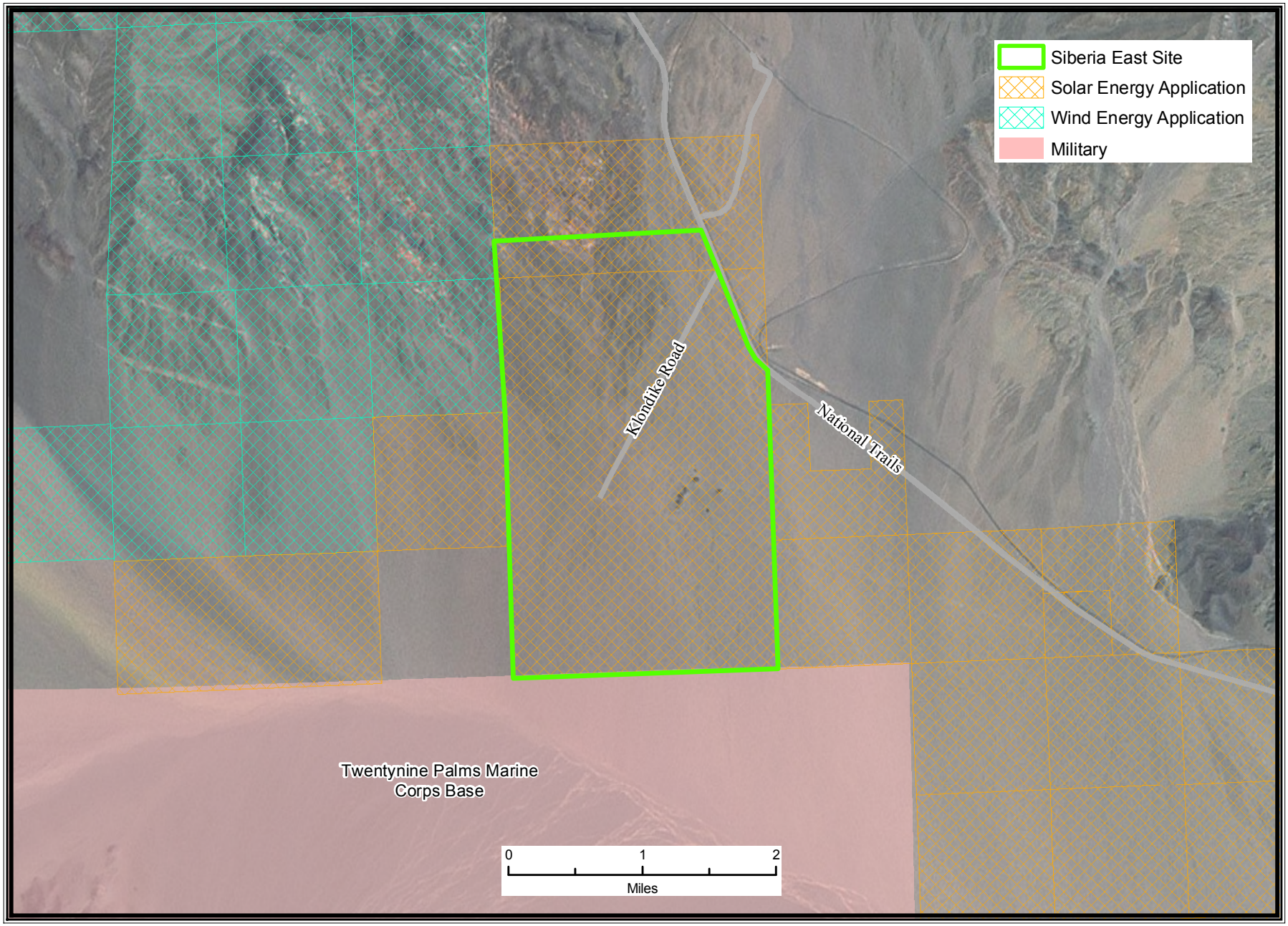


U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009

SOURCE: BLM, 2008

ALTERNATIVES - FIGURE 3

ISEGS - Siberia East Alternative



OCTOBER 2009

ALTERNATIVES

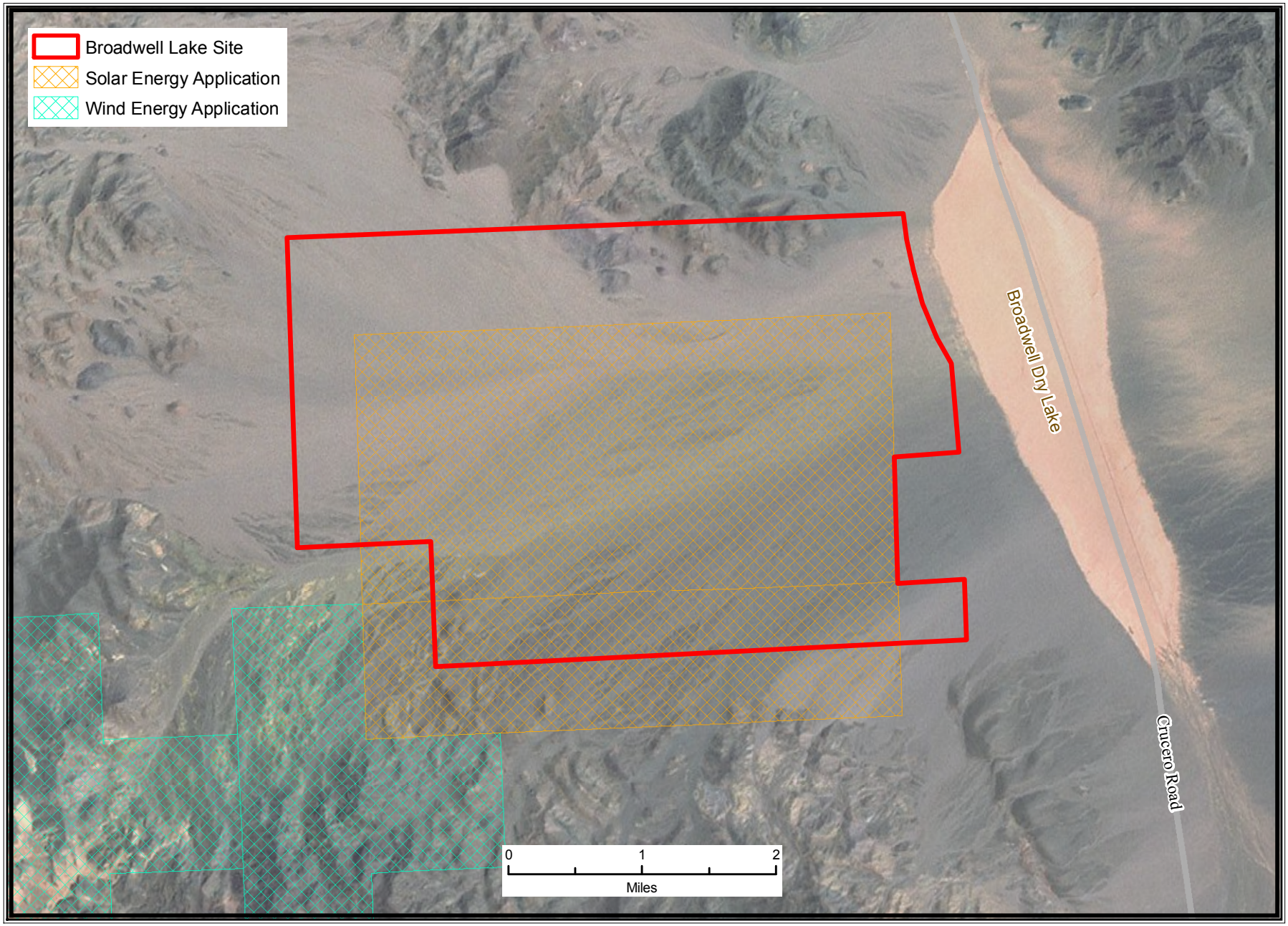
U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009

SOURCE: BLM, 2008

ALTERNATIVES - FIGURE 4

ISEGS - Broadwell Lake Alternative

OCTOBER 2009



ALTERNATIVES

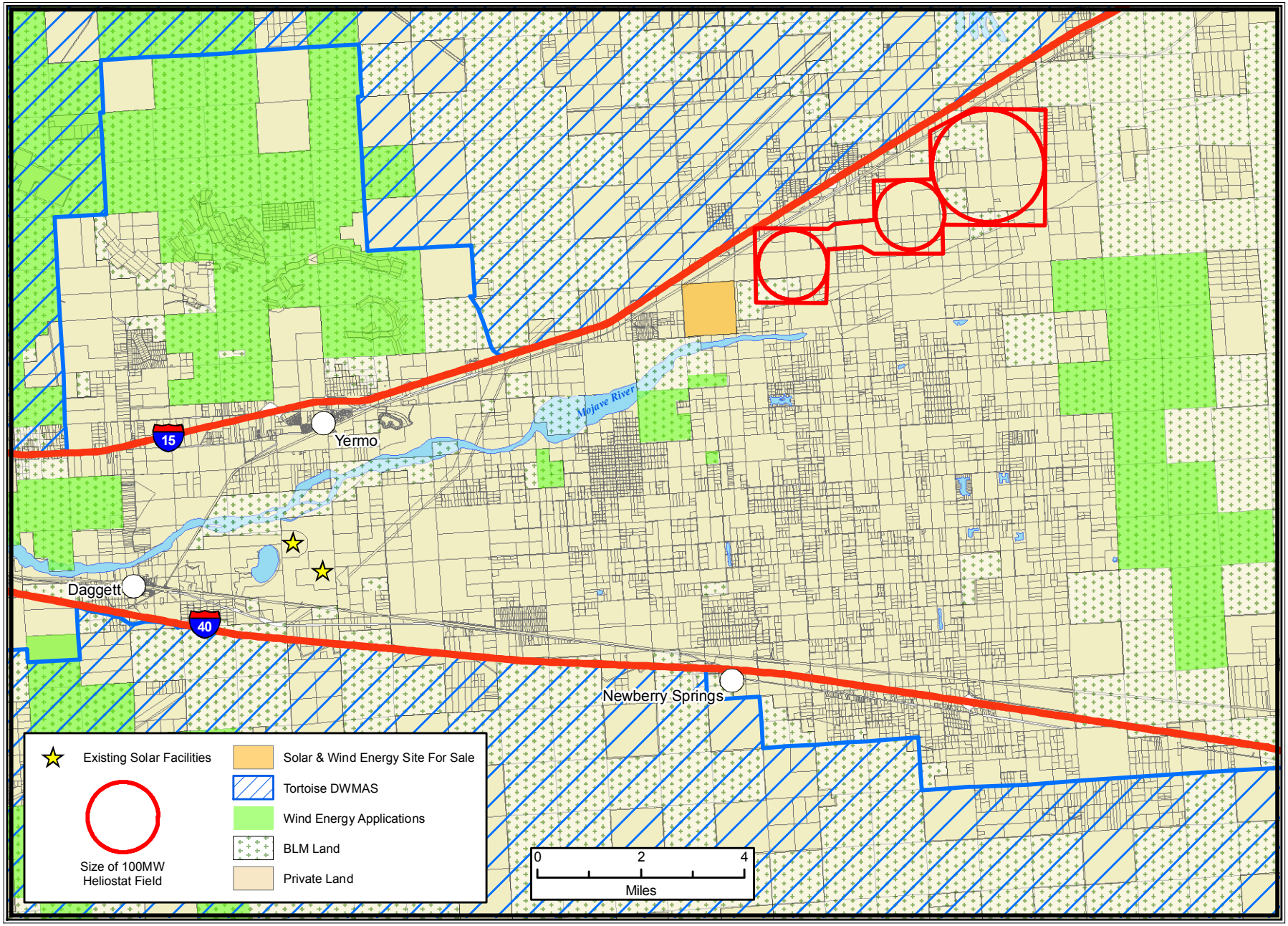
U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009

SOURCE: BLM, 2008

ALTERNATIVES - FIGURE 5A

ISEGS - Private Land Alternative

OCTOBER 2009



ALTERNATIVES

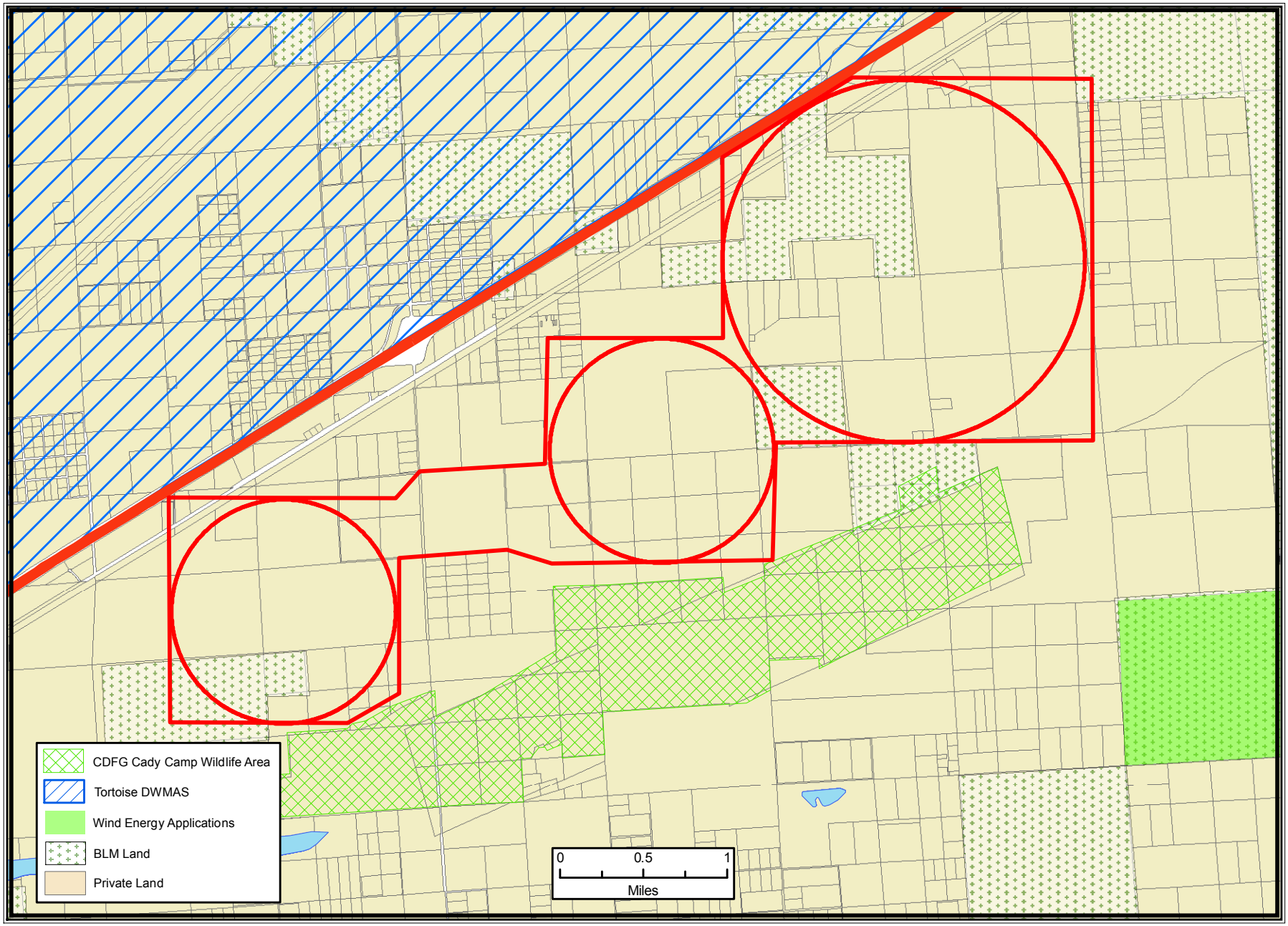
U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009

SOURCE: California Energy Commission - Tele Atlas Data - San Bernardino County

ALTERNATIVES - FIGURE 5B

ISEGS - Private Land Alternative Detail

OCTOBER 2009



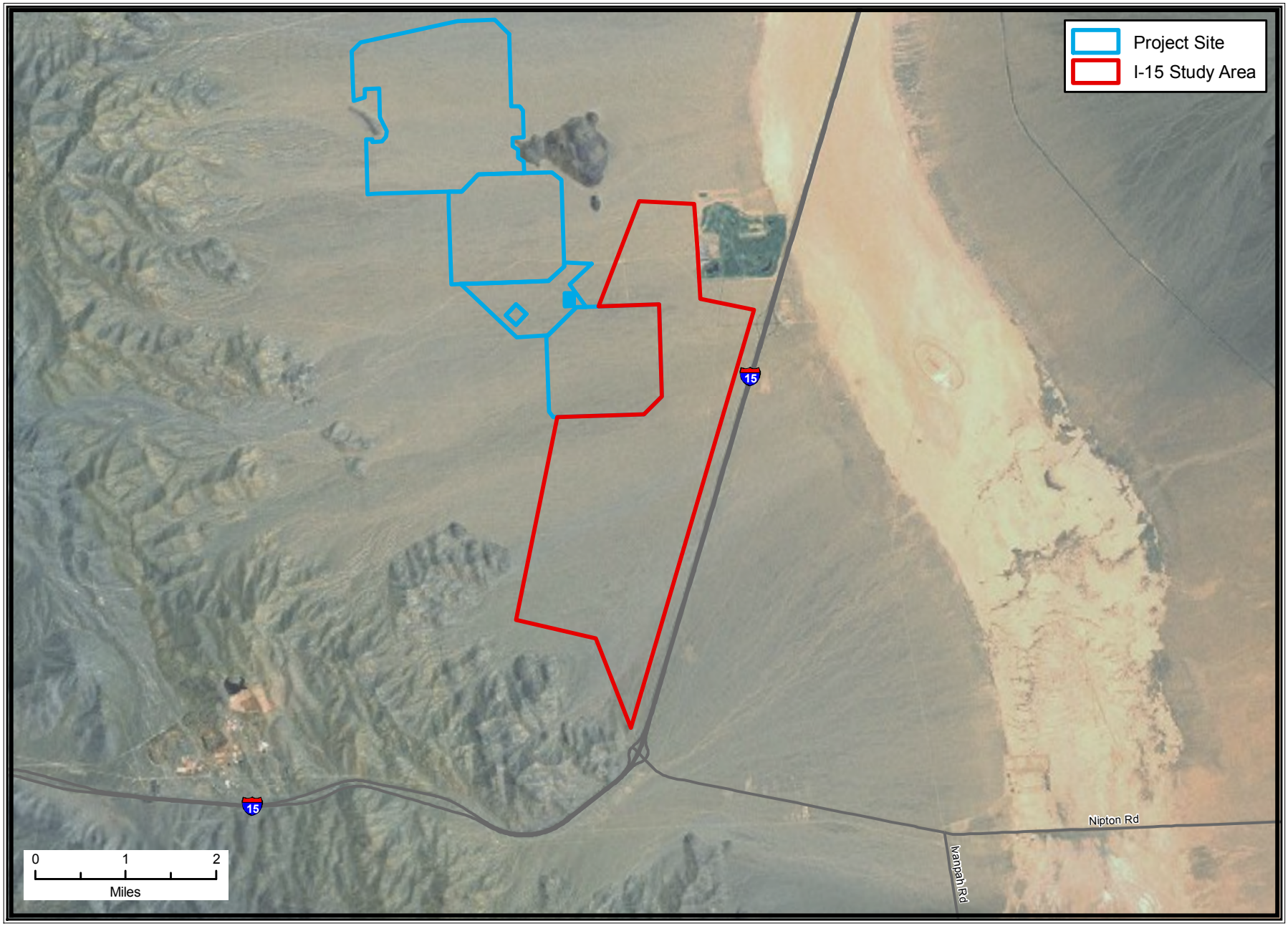
ALTERNATIVES

U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009

SOURCE: California Energy Commission - Tele Atlas Data - San Bernardino County

ALTERNATIVES - FIGURE 6

ISEGS - I-15 Alternative



OCTOBER 2009

ALTERNATIVES

U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009

SOURCE: California Energy Commission

ALTERNATIVES - FIGURE 7

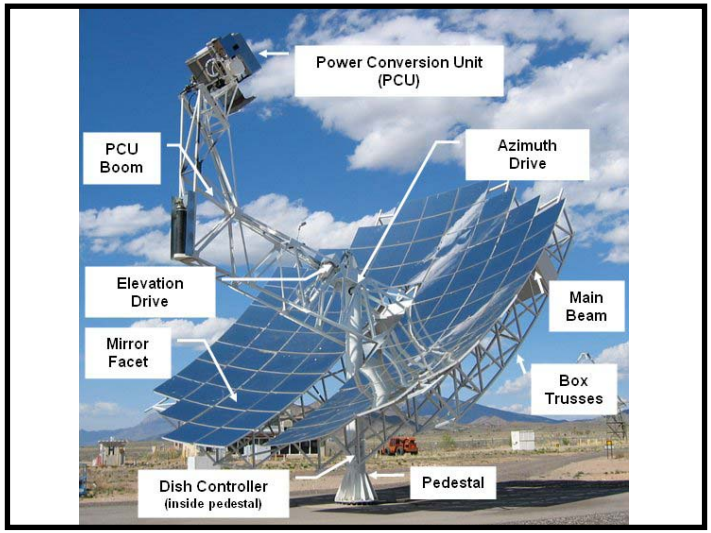
ISEGS - Solar Generation Technologies



Parabolic through technology as used in Daggett, CA



Parabolic through technology in a 64 MW field
(Nevada SolarOne in Boulder City, NV)



Stirling Dish

SOURCE:Sunray Energy, Inc., SolarOne website, Stirling Energy Systems website

ALTERNATIVES - FIGURE 8

ISEGS - Linear Fresnel and Photovoltaic Technologies



Linear Fresnel Technology



First Solar's thin film solar photovoltaic field



Canon Solar Partners proposes to use the 35 kW Amonix System



SunPower's PowerTracker Solar in Gwangju City Power Plant, South Korea - 1 MW

SOURCE: Wikipedia.org, Fresnel_reflectors_ausra.jpg, www.optisolar.com/topaz.htm, Canon 2008, www.sunpowercorp.com/For-Power-Plants.aspx

CUMULATIVE SCENARIO

Prepared by Susan V. Lee

REQUIREMENTS FOR CUMULATIVE IMPACT ANALYSIS

Preparation of a cumulative impact analysis is required under both CEQA and NEPA. "Cumulative impact" is the impact on the environment that results from the incremental impact of the proposed project when considered with other past, present, and reasonably foreseeable future actions regardless of which agency (federal or non-federal) or person undertakes such other actions (40 CFR §1508.7).

Under CEQA Guidelines, "a cumulative impact consists of an impact which is created as a result of the combination of the project evaluated in the EIR together with other projects causing related impacts" (14 Cal Code Regs §15130(a)(1)). Cumulative impacts must be addressed if the incremental effect of a project, combined with the effects of other projects is "cumulatively considerable" (14 Cal Code Regs §15130(a)). Such incremental effects are to be "viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects" (14 Cal Code Regs §15165(a)(3)). Together, these projects comprise the cumulative scenario which forms the basis of the cumulative impact analysis.

CEQA also states that both the severity of impacts and the likelihood of their occurrence are to be reflected in the discussion, "but the discussion need not provide as great detail as is provided for the effects attributable to the project alone. The discussion of cumulative impacts shall be guided by standards of practicality and reasonableness, and shall focus on the cumulative impact to which the identified other projects contribute rather than the attributes of other projects which do not contribute to the cumulative impact" (14 Cal Code Regs §15130(b)).

DEFINITION OF A CUMULATIVE PROJECT SCENARIO

Cumulative impacts analysis is intended to highlight past actions that are closely related either in time or location to the project being considered, catalogue past projects and discuss how they have harmed the environment, and discuss past actions even if they were undertaken by another agency or another person. Most of the projects listed in the cumulative projects tables (Cumulative Tables 1, 2, and 3 at the end of this section) have, are, or will be required to undergo their own independent environmental review under either CEQA.

Under CEQA, there are two acceptable and commonly used methodologies for establishing the cumulative impact setting or scenario: the "list approach" and the "projections approach." The first approach would use a "list of past, present, and probable future projects producing related or cumulative impacts" (14 Cal Code Regs §15130(b)(1)(A)). The second approach is to use a "summary of projections contained in an adopted general plan or related planning document, or in a prior environmental document which has been adopted or certified, which described or evaluated regional or area wide conditions contributing to the cumulative impact" (14 Cal Code Regs §15130(b)(1)(B)). This

Final Staff Assessment/Draft Environmental Impact Stated (FSA/DEIS) uses the "list approach" for purposes of state law to provide a tangible understanding and context for analyzing the potential cumulative effects of the project.

Under NEPA, an EIS must provide a sufficiently detailed catalogue of past, present, and reasonably foreseeable future projects, and provide an adequate analysis of how these projects, in conjunction with the proposed action, are thought to have impacted or are expected to impact the environment. While NEPA requires an adequate cataloging of past projects, it also requires a discussion of consequences of those past projects. NEPA is designed to inform decision making and through disclosure of relevant environmental considerations, permit informed public comment.

In order to provide a basis for cumulative analysis for each discipline (e.g., biological resources, air quality), this section provides information on other projects in both maps and tables. Projects are defined within a geographic area that has been identified by the Energy Commission and the Bureau of Land Management (BLM) as covering an area large enough to provide a reasonable basis for evaluating cumulative impacts for all disciplines, as shown in three maps and accompanying tables. However, the area of cumulative effect varies by resource. For this reason, each discipline has identified the geographic scope for the discipline's analysis of cumulative impacts. **Cumulative Figures 1, 2, and 3** are on the following pages, and **Cumulative Tables 1, 2, and 3** are presented at the end of this section.

- **Cumulative Impacts Figure 1**, **Regional Renewable Applications,** and **Cumulative Impacts Table 1, Regional Renewable Energy Projects**. The analysis of cumulative effects for some disciplines requires consideration of the numerous solar and wind development applications for use of BLM land, including approximately 1 million acres of the California Desert. Additional BLM land in Nevada and Arizona also has approximately 78 applications for solar and wind projects. Private and state lands have also been targeted for renewable solar and wind projects. The use of this additional land should be considered for some disciplines where applicable. This is because, as stated in the BLM NEPA Handbook (H-1790-1), the geographic scope of a cumulative effect will often extend beyond the scope of the direct effects of a project and should consider ecologically relevant boundaries, such as habitats, rather than political boundaries (CEQ, 1997).
- **Cumulative Impacts Figure 2**, **Regional Renewable Applications (Detail)** illustrates the challenges of siting large renewable projects in the desert. This map shows the boundaries of the renewable applications in the eastern Mojave Desert as well as the current land use designations of BLM and non-BLM land in this portion of the desert region. This map highlights land uses that may not be appropriate for large scale renewable projects (e.g., National Park Service land, wilderness areas, desert wildlife management areas), and shows the limited land areas that remain after these potentially incompatible areas are removed from consideration for renewable development.
- **Cumulative Impacts Figure 3, Ivanpah Valley Existing and Future/ Foreseeable Projects** and **Cumulative Impacts Tables 2 and 3** list foreseeable future projects in the immediate Ivanpah area. Table 2 presents existing projects in the Ivanpah Valley, and Table 3 presents future foreseeable projects in the Ivanpah Valley area.

Both tables indicate each project name and project type, as well as its location and status. Table 2 presents information regarding past actions that is designed to be useful and relevant to the analysis of cumulative effects. The applicant's list of existing projects in the Ivanpah Valley was considered when compiling Table 2 (Existing projects in the Ivanpah Valley); see Section 5.2.10 of the AFC which includes a variety of activities ranging from construction and continued use of major highways and secondary roads, unimproved roads and trails, pipelines, the Union Pacific Railroad, casinos and retail businesses, recreation opportunities including the Primm golf course and use of the Ivanpah Dry Lakebed, transmission lines and substations and other facilities developed around the Nevada communities of Jean and Primm (BSE 2007a).

LIKELIHOOD OF RENEWABLE PROJECT APPROVAL AND CONSTRUCTION

NEPA and CEQA require that cumulative analysis consider both the severity of impacts and the likelihood of their occurrence. The numerous renewable projects now described in applications to the BLM and on private land are competing for utility Power Purchase Agreements, which will allow utilities to meet the state-required Renewable Portfolio Standard. While **Cumulative Impacts Figures 1 and 2** and **Table 1** show a very large number of applications to BLM, it is unlikely that all of these projects will be constructed for the following reasons:

- Not all developers will develop the detailed information necessary to meet BLM and Energy Commission standards. Most of the solar projects with pending applications are proposing generation technologies that have not been implemented at large scales. As a result, preparing complete and detailed plans of development (PODs) is difficult, and completing the required NEPA and CEQA documents is especially time-consuming and costly.
- As part of approval by the appropriate Lead Agency under CEQA and/or NEPA (generally the Energy Commission and/or BLM), all regulatory permits must be obtained by the applicant or the prescriptions required by the regulatory authorities incorporated into the Lead Agency's license, permit or right-of-way grant. The large size of these projects may result in permitting challenges related to endangered species, mitigation measures or requirements, and other issues.
- Also after project approval, construction financing must be obtained (if it has not been obtained earlier in the process). The availability of financing will be dependent on the status of competing projects, the laws and regulations related to renewable project investment, and the time required for obtaining permits.

While not all the renewable projects currently proposed will be constructed, a number of existing policies and incentives encourage renewable energy development. These incentives lead to a greater number of renewable energy proposals. Example of incentives for developers to propose renewable energy projects on private and public lands in California, Nevada and Arizona, include the following:

- U.S. Treasury Department's Payments for Specified Energy Property in Lieu of Tax Credits under §1603 of the American Recovery and Reinvestment Act of 2009 (Public Law 111-5) - Offers a grant (in lieu of investment tax credit) to receive

funding for 30% of their total capital cost at such time as a project achieves commercial operation (currently applies to projects that begin construction by December 31, 2010 and begin commercial operation before January 1, 2017).

- U.S. Department of Energy (DOE) Loan Guarantee Program pursuant to §1703 of Title XVII of the Energy Policy Act of 2005 - Offers a loan guarantee that is also a low interest loan to finance up to 80% of the capital cost at an interest rate much lower than conventional financing. The lower interest rate can reduce the cost of financing and the gross project cost on the order of several hundred million dollars over the life of the project, depending on the capital cost of the project.

APPROACH TO CUMULATIVE IMPACT ANALYSIS

This FSA/DEIS evaluates cumulative impacts within the analysis of each resource area, following these steps:

1. Define the geographic scope of cumulative impact analysis for each discipline, based on the potential area within which impacts of the ISEGS project could combine with those of other projects.

2. Evaluate the effects of the ISEGS project in combination with past and present (existing) projects in the Ivanpah Valley.

3. Evaluate the effects of the ISEGS project with foreseeable future projects that occur within the area of geographic effect defined for each discipline.

Each of these steps is described below.

Geographic Scope of Cumulative Analysis

The area of cumulative effect varies by resource. For example, air quality impacts tend to disperse over a large area, while traffic impacts are typically more localized. For this reason, the geographic scope for the analysis of cumulative impacts must be identified for each resource area.

The analysis of cumulative effects considers a number of variables including geographic (spatial) limits, time (temporal) limits, and the characteristics of the resource being evaluated. The geographic scope of each analysis is based on the topography surrounding the ISEGS project and the characteristics of each resource.

In addition, each project in a region will have its own implementation schedule, which may or may not coincide or overlap with the ISEGS project's schedule. This is a consideration for short-term impacts from the ISEGS project. However, to be conservative, the cumulative analysis assumes that all projects in the cumulative scenario are built and operating during the operating lifetime of the ISEGS project.

Project Effects in Combination with Foreseeable Future Projects

Each discipline evaluates the impacts of the proposed project on top of the current baseline—the past, present (existing), and reasonably foreseeable or probable future projects near the Ivanpah site as illustrated in **Cumulative Impacts Figure 3, Ivanpah Valley Existing and Future/Foreseeable Projects** and listed in **Table 2 Existing**

Projects in the Ivanpah Valley and **Table 3 Future Foreseeable Projects in the Ivanpah Valley Area**.

Reasonably foreseeable projects that could contribute to the cumulative effects scenario depend on the extent of resource effects, but could include projects in the immediate Ivanpah area as well as other large renewable projects in the California, Nevada, and Arizona desert regions. These projects are illustrated in **Cumulative Impacts Figures 1, 2, and 3**.

Ivanpah area projects are illustrated in **Cumulative Impacts Figure 3, Ivanpah Valley Existing and Future Foreseeable Projects.** As shown in the map and table, there are a large number of projects in the immediate area around Ivanpah whose impacts could combine with those of the proposed ISEGS project. As shown on **Cumulative Impacts Figure 1** and in **Table 1**, solar and wind development applications for use of BLM land have been submitted for approximately one million acres of the California Desert Conservation Area. Additional BLM land in Nevada also has applications for solar and wind projects, as shown in Figure 1.

Analysis of Cumulative Impacts

The analysis presented for each discipline (e.g., air quality, biological resources) describes the geographic area of effect for that discipline and the potential cumulative effects of the ISEGS project with the other existing and reasonably foreseeable or probable future projects defined on the tables and maps presented in this section. Where appropriate, conditions of certification (mitigation measures) are recommended to reduce cumulative effects.

Cumulative Impacts Tables 1, 2, and 3 on the following pages were assembled using the following information:

- Table 1, Regional Renewable Energy Projects, identifies solar and wind renewable projects as listed on the BLM California Desert District Alternative Energy website (BLM 2008). These projects are indicative of the kind of development that could occur at a regional level. Renewable solar and wind projects have also been proposed on public lands in Nevada and Arizona.
- Table 2, Existing Projects in the Ivanpah Valley, identifies existing projects within the Ivanpah Valley. These projects were identified through a variety of sources including the San Bernardino and Clark County websites, BLM website and personal communication, personal communication with Clark County personnel, and individual project websites.
- Table 3, Future Foreseeable Projects in the Ivanpah Valley, identifies future foreseeable projects within the Ivanpah Valley. These projects were identified through a variety of sources including the San Bernardino and Clark County websites, BLM website and personal communication, personal communication with Clark County personnel, and individual project websites.

RESPONSE TO AGENCY AND PUBLIC COMMENTS ON THE PSA

This section responds first to comments on the cumulative scenario received from the applicant followed by responses to all other comments received.

The applicant submitted a PSA comment letter (dated and docketed January 23, 2009) to the CEC. The letter addresses the following subjects related to cumulative impact analysis. Responses to each comment are presented below, by comment number.

- The definition of a cumulative impact as defined by 14 Cal Code Regs §15065(a)(3) (Comment 20)
- The projects listed in Tables 1 and 2 of the cumulative impacts approach (Comment 21)
- The appropriate geographic scope of the cumulative analysis (Comments 22 - 26)
- The likelihood of the development of the renewable projects currently under BLM review (Comment 27 - 30)

COMMENT 20

The applicant states that the definition of a cumulative effect should include the words "probable future projects" as defined by California law (14 Cal Code Regs §15065(a)(3)) and should consider the incremental effects of an individual project when combined with probable future projects.

The CEQA definition of a cumulative effect was included in the **Cumulative Scenario** section of the PSA, second paragraph, page 5-1, which states that the cumulatively considerable effects are to be "viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects". The definition the applicant refers to in the first paragraph of page 4-1 which uses the term "reasonably foreseeable future actions" is taken from the NEPA (40 CFR §1508.7). The reference to NEPA has been added to the first paragraph of page 5-1. In the analysis of cumulative effects, future projects are characterized as reasonably foreseeable or probable future projects to accommodate both federal and state definitions.

The applicant further states that to find a cumulative effect significant, the analysis must focus on the combined effects of the ISEGS project with past, present, and reasonably foreseeable future projects. The applicant gives as an example, that "to find a significant cumulative Visual effect, the Ivanpah SEGS project and the other past, present, and reasonably foreseeable probable future project must be in the same viewing area." The BLM NEPA Handbook (H-1790-1), states that the geographic scope of a cumulative effect will often extend beyond the scope of the direct effects of a project. As the applicant notes, the direct impact to visual resources would occur within the ISEGS project viewshed. However, the ISEGS project location within the CDCA and the Mojave Desert affects the unique and highly valued scenic resources of those regions, as stated in the **Visual Resources** section. These scenic resources would be impacted by the development of numerous renewable projects within and outside of the ISEGS project viewshed, as visitors to the Mojave Desert and the CDCA may traverse multiple

viewsheds during one visit. Therefore, the cumulative effect of viewing a number of renewable projects could be considerable.

The applicant is correct in noting that the cumulative impacts and geographic scope of cumulative impacts, especially in regard to the renewable projects in the CDCA, Nevada and Arizona, must be considered independently for each resource.

The applicant states that the PSA finds potentially significant cumulative effects between the ISEGS project and other projects dispersed throughout the west. The applicant notes that the **Land Use** section identifies regional impacts from the ISEGS project when combined with future solar and wind development in southeastern California, southern Nevada and western Arizona which the applicant feels is not consistent with CEQA and NEPA requirements for analysis of potential combined effects because it does not look at the potential effects of the ISEGS project with specifically identified projects in southern Nevada and western Arizona.. The Land Use Cumulative Impact Analysis has been revised. It concludes that the project would result in a significant unavoidable land use impact in the Ivanpah Valley when combined with other foreseeable projects and lists the most significant of these projects.

COMMENT 21

The applicant states that when using a list of past, present, and probable projects producing related or cumulative impacts, including, if necessary those projects outside the control of the agency, factors to consider are location and type of the projects. The applicant states that there is no discussion or explanation of why the projects in Table 1 are listed and that the discussion with respect to the Projects in Table 2 is extremely cursory.

The projects listed in Table 1 were included because, as it states on page 4-2, the analysis of cumulative effects for some disciplines requires consideration of the numerous solar and wind development applications for use of BLM land, including approximately one million acres of the CDCA. Additional BLM land in Nevada and Arizona also has applications for solar and wind projects and the use of this additional land should be considered for some disciplines. The applicant is correct in noting that the distant projects in the CDCA or in Nevada and Arizona will not be applicable for each discipline, and the effects of renewable projects in the CDCA would only be considered if they would combine with the effects of the proposed project for the resources affected. For this reason, not all disciplines consider the ISEGS project to contribute to cumulative regional effects in the CDCA or when combined with projects in Nevada and Arizona. This information has been included in the discussion of Table 1 above in Defining a Cumulative Project Scenario.

The projects listed in Table 2 and Table 3 were compiled with the aid of the BLM and CEC and were specifically screened to 1) include projects that may have effects that would combine with those of the ISEGS project and 2) only include projects that were probable future projects.

Table 2 lists existing projects that are either ongoing or active in the Ivanpah Valley and gives a brief description of each of the projects. Further details regarding the list of

projects included in Table 2 and further information regarding the projects themselves can be found above, in the Definition of a Cumulative Project Scenario and in Table 2 below.

Table 3 lists reasonably foreseeable or probable future projects that are likely to occur in the Ivanpah Valley and gives a brief description of each of the projects. Further details regarding the list of projects included in Table 3 and further information regarding the projects themselves can be found above, in the Definition of a Cumulative Project Scenario and in Table 3 below.

COMMENT 22, 23, 24, 25, AND 26

These comments address the geographic scope of the Cumulative Analysis.

The applicant states that according to the U.S. Environmental Protection Agency (USEPA) guidance for consideration of cumulative impacts under NEPA, "the geographic boundaries should not be extended to the point that the analysis becomes unwieldy and useless for decision-making," and that they should focus on the natural units that constitute the resources of concern. The applicant states that inclusion of projects in Nevada and Arizona would make the geographic boundaries unwieldy and useless. While the **Cumulative Scenario** states that the geographic boundaries should focus on the natural units for the resources of concern for each discipline, this would not preclude a geographic scope for some specific resources that includes a consideration of the renewable projects under review by the BLM in the CDCA, Nevada, or Arizona. The BLM NEPA Handbook H-1790-1, states that "if the boundaries are defined to broadly, the analysis becomes unwieldy; if they are defined too narrowly, significant issues may be missed, and decision-makers will be incompletely informed about the consequences of their actions (Section 6.8.3)." The BLM NEPA Handbook refers the reader to the federal Council on Environmental Quality (CEQ) Cumulative Effects Guidelines which specifically note that cumulative impact boundaries should consider ecologically relevant boundaries rather than political boundaries (CEQ, 1997). These guidelines suggest possible geographic areas such as species habitat or ecosystems for resident wildlife, and breeding grounds, migration routes, wintering areas or total range of affected population units for migratory wildlife (CEQ, 1997).

The applicant notes that the **Cumulative Scenario** section correctly states that the first step for a cumulative analysis is to define the geographic scope of cumulative impact analysis for each discipline. The applicant states that this step is not completed because of the inclusion of Table 1, Solar and Wind projects in the CDCA, which the applicant feels are outside the potential area wherein impacts of ISEGS could combine with other projects. As stated previously, while the projects defined in Table 1 would not combine with the effects of each resource, the loss of approximately one million acres of desert land would combine with the loss of approximately 4,065 acres of land through the implementation of the ISEGS project and would cause cumulative effects to some of the resource areas. As stated above, if the geographic scope is defined too narrowly, significant issues may be missed, and decision-makers will be incompletely informed about the consequences of their actions (BLM, 2008). While we agree that for some disciplines, if geographic boundaries are extended the analysis may become unwieldy

and useless for decision-making, this is not true for all disciplines. We have explained our rationale for the extent of geographic boundaries for each discipline in the individual discipline analysis.

COMMENT 27

The applicant notes that there are 17 potential projects within the Ivanpah Valley region and that this number should not be characterized as a "large number" of projects. The applicant further states that the effects of these projects would only be significant if they would combine with the effects of the proposed project. The applicant gives an example that states that projects that cannot be seen will not interact with the visual impacts of the ISEGS project. As stated above, the ISEGS project is located in the CDCA and the Mojave Desert, which are unique and highly valued scenic resources as stated in the **Visual Resources** section. This scenic resource would be impacted by the numerous renewable projects within and outside of the ISEGS project viewsheds, as visitors to the Mojave Desert and the CDCA may traverse numerous viewsheds during a visit and the cumulative effect of viewing a number of renewable projects could be considerable.

COMMENT 28

The applicant states that while solar and wind development applications for use of BLM land have been submitted for approximately one million acres of the CDCA, a Plan of Development letter does not mean that the project is a reasonably foreseeable project. Both CEQA and NEPA have guidelines as to how to limit probable future projects. In 14 Cal Code Regs §15130 it states, "When analyzing the cumulative impacts of a project under 15130 (b)(1)(A), the Lead Agency is required to discuss not only approved projects under construction and approved related projects not yet under construction, but also unapproved projects currently under environmental review with related impacts or which result in significant cumulative impacts. The analysis should include a discussion of projects under review by the Lead Agency and projects under review by other relevant public agencies, using reasonable efforts to discover, disclose, and discuss the other related projects." The BLM NEPA Handbook gives further guidance for defining "reasonably foreseeable" cumulative projects to include projects for which there are "existing decisions, funding, formal proposals, or which are highly probable, based on known opportunities or trends (Section 6.8.3.4)". A Plan of Development can be considered a formal proposal.

The Cumulative Scenario states explicitly that it is unlikely that all the renewable projects would be constructed and gives concrete reasons for this expectation. At this time it would be speculative for the CEC and BLM to guess how many and which of these projects may or may not be built. As such, the CEC and BLM have listed all the renewable projects with applications for use of BLM land in the CDCA but explained that it is unlikely they would all be built. The uncertainty about the number of renewable projects that would be built was further emphasized in the cumulative analysis of the individual resource areas; see for example Cumulative Analysis for the **Air Quality** and **Land Use**.

The applicant further states that the majority of the projects mentioned in the Cumulative Scenario are outside the geographic boundaries of the area impacted by the ISEGS project and that the reference to Nevada is not explained. The CEQ states that

choosing the boundaries of the cumulative effects analysis should consider the ecologically relevant boundary, such as a watershed, rather than political boundaries such as a county line (CEQ, 1997). Due to the ISEGS project location, approximately four miles from the California/Nevada border, and the diverse nature of the resources affected by the ISEGS project, the cumulative impacts may well include renewable projects in southern Nevada or western Arizona. For example, as stated in the **Biological Resources** section, the development of renewable resources in the California or Nevada deserts would lead to a cumulative loss of desert habitat for desert plants and wildlife, including the desert tortoise, to which the ISEGS project and Nevada projects would contribute.

COMMENT 29

As the applicant stated, it is unlikely that all the projects listed in Table 1 and shown on Figures 1 and 2 would be built. The applicant's discussion related to the number of megawatts required to meet the 33 percent renewable goal in California by 2020 is appreciated; however, it is not possible for the CEC and BLM to speculate as to the percentage of megawatts of renewable power that may ultimately be sited on BLM land in the CDCA. It would be equally speculative of the CEC and BLM to speculate as to how many of the projects listed in Table 1 and shown on Figures 1 and 2 would be required to meet the California renewable portfolio standard (RPS) and how many of the projects may not be required to meet the RPS and therefore would not be built. As such, both Table 1 and Figures 1 and 2, are shown only to inform the reader where land in California and Nevada has been identified for potential renewable resources and for use in the individual resource analysis when considering if the development of some of the projects would result in a cumulative effect to the resource. It is not assumed that all 48,531 MW of renewable energy projects identified in Table 1 would be built; see pg 5-3, Likelihood of Renewable Project Approval and Construction.

COMMENT 30

The applicant states that PPM Energy is in the CAISO queue for a 63 MW project, rather than a 75 MW project as stated in Table 3, Row J. Information regarding the PPM Energy project was taken from the BLM renewable applications (BLM Wind Energy Applications, November 2008, application number CACA 44988). The CAISO queue does not identify projects by name; it identifies the point of interconnection only and as such cannot be used to identify individual projects. The information in Table 3, Row J will remain as is.

Additional Comments on the PSA

Commenters, including the Defenders of Wildlife (January 23, 2009), the California Native Plant Society (February 6, 2009), stated that the cumulative analysis of the ISEGS project must consider the renewable impacts of the renewable energy projects in the region and must consider foreseeable growth in the area, including Primm. As stated above in the Analysis of Cumulative Impacts, the list approach for the ISEGS project included renewable projects in the ISEGS region and through the California Desert as well as in Clark County, Nevada. Foreseeable development in Primm, Nevada was included in Table 3. Future Foreseeable Projects in the Ivanpah Valley Area and these projects were included on Cumulative Impacts Figure 3.

An additional commenter letter was submitted by Defenders of Wildlife on July 29, 2009 that included a list of reasonable foreseeable future projects in the Ivanpah Valley. Most of these projects were included in the existing and future foreseeable tables published in the PSA in December 2008 and were considered in the cumulative analysis for each discipline. The two additional solar projects identified in the comment letter and located in Nevada have been included to the list of future foreseeable projects. It should be noted that the Cogentrix 1,000 MW solar project site conflicts with the proposed Ivanpah Airport site.

The Center for Biological Diversity commented that the cumulative analysis should include further discussion regarding the DesertXpress project. Details regarding potential DesertXpress alignments have been updated in Table 3 and the potential alignment north of Ivanpah 3 has been included in Cumulative Figure 3.

Table 1. Regional Renewable Energy Projects

BLM Field Office	Number of Projects & Acres	Total MW
Solar Energy		
Barstow Field Office	• 18 projects • 144,901 acres	• 12,625 MW
El Centro Field Office	• 8 projects • 61,198 acres	• 5,570 MW
Needles Field Office	• 17 projects • 238,800 acres	• 15,700 MW
Palm Springs Field Office	• 18 projects • 126,345 acres	• 11,100 MW
Ridgecrest Field Office	• 5 projects • 31,743 acres	• 2,935 MW
TOTAL – CA Desert	• **66 projects** • **602,987 acres**	• **47,930 MW**
Wind Energy		
Barstow Field Office	• 27 projects • 196,780 acres	• n/a
El Centro Field Office	• 8 projects • 49,506 acres	• n/a
Needles Field Office	• 8 projects • 111,931 acres	• n/a
Palm Springs Field Office	• 4 projects • 5,852 acres	• n/a
Ridgecrest Field Office	• 16 projects • 94,872 acres	• n/a
TOTAL – CA Desert District	• **63 projects** • **458,941 acres**	• n/a

Source: BLM 2009

Table 2. Existing Projects in the Ivanpah Valley					
ID #	Project Name; Agency ID	Location	Ownership	Status	Project Description
1	Bighorn Electric Generating Station	Primm, Nevada (approximately 4 miles northeast of the proposed project)	Reliant Energy Wholesale Generation, LLC	Existing, producing energy since 2004	Operating 570 MW natural gas power plant, uses dry cooling system
2	Primm Casinos: Buffalo Bill's, Primm Valley, Whiskey Pete's	I-15 at state line, NV 31900 Las Vegas Blvd. South. Primm (approximately 4 miles northeast of the proposed project)	Terrible's Primm Valley Casino Resorts (MGM Mirage)	Existing, undergoing renovation	Two existing Resort and Casinos and one existing Hotel and Casino
3	Primm Valley Golf Course	3 miles south of state line in California, (less than one mile from project site)	Terrible's Primm Valley Casino Resorts (MGM Mirage)	Existing	Existing golf course located south of the California/Nevada border along I-15, opened in 1997, approximately 22-acres
4	Primm Outlet Mall	Primm, Nevada 32100 Las Vegas Blvd. S. Primm, NV (approximately 4 miles northeast of the proposed project)	Fashion Outlets (MGM Mirage)	Existing since 1998	Existing shopping outlet with over 100 stores. Connected to the Primm Casinos by monorail, approximately 359,000 square feet of leasable area and 1,600 parking spaces. More than one million vehicles pass the Fashion Outlets per month.
5	Recreation Activities	Ivanpah Dry Lake (approximately 1 mile from proposed project)	BLM	Ongoing	Approximately 200 casual use permits are issued annually (these cover between 1 individual to 6 individuals) and approximately 5000 annual visitors. Approximately 12 Permitted and Organized events occur on the Dry Lake annually on both east and west sides. (Approximately 50% of these permitted and organized events occur on the west side and 50% on the east side, although the largest of the events tend to occur on the east side of the Dry Lake.) Permits are also given out that include use of both sides. Examples of such events include Championship Racing Archery events Kite buggying Land Sailing

Table 2. Existing Projects in the Ivanpah Valley					
ID #	Project Name; Agency ID	Location	Ownership	Status	Project Description
6	Molycorp (Now Chevron-Texaco)	Mountain Pass, Sulphide Queen Property	Chrevron-Texaco	Ongoing, expected to continue until mid-2020.	Existing mining operation on Mountain pass, property was acquired by Molycorp in 1950 and has been mined since, Molycorp was acquired by Unocal in 1977 which was acquired by Chevron-Texaco in 2005.
7	Colosseum Mine	12 miles west of Primm, Nevada (approximately 6 to 7 miles from Ivanpah site)	Lac Minerals	Inactive – as of early 1990s. Remedial action undergone.	Mining facilities occupy 284 acres on a 3,316 acre private parcel. Located within the East Mojave National Scenic Area and Clark Mountain ACEC.
8	Clark Mountain and Crescent Peak Allotment 10 Year Lease CA-690-EA06-25	Northern Clark Mountain Range (surrounds the proposed project)	Allotment #09003	Ongoing	Grazing Lease – expires 2016. Project would remove 4,065 acres of Clark Mountain Grazing Allotment.
9	Molycorp (Now Chevron Environmental Management Company) Evaporation pond	Southeast of the Ivanpah Dry Lake (Approximately 3.25 miles from project)	Molycorp	Active, undergoing improvements	During summer of 1995 and 1996, releases were experienced in the 13.mile long pipeline that carries waste discharge to the evaporation pond. With the exception of two minor and localized areas of contamination spill-related material was removed by the fall of 2000.
10	AT&T Fiber-optic replacement of cables	Along the west side of the Ivanpah Dry Lake and of I-15	AT&T	Environmental Assessment of project was released in July 2008.Project is expected to be completed before permitting for Ivanpah SEGS is finished.	Existing direct buried fiber-optic cable will be replaced from Nevada border to the Halloran Summit, including a segment adjacent to the ISEGS project to the west of the Ivanpah Dry Lake. Use existing 10 foot ROW with some temporary larger ROW for where existing cable must be replaced.
11	Existing 115-kV transmission line from El Dorado substation	Through Ivanpah SEGS site	SCE	Active	SCE 115 kV ROW is located at ISEGS proposed site. This 115 kV is located in the BLM transmission corridor. An additional BLM corridor is located north of the ISEGS proposed site.
12	Molycorp (Now Chevron Environmental Management Company) pipeline	Runs from Molycorp south of I-15, through the Mojave National Desert Preserve to the Evaporation pond	Molycorp	Active	13-mile long pipeline that runs between the Molycorp mine and the evaporation pond. Experienced approximately 230,000 gallons of wastewater.

Table 3. Future Foreseeable Projects in the Ivanpah Valley Area

ID #	Project Name; Agency ID	Location	Ownership	Status	Project Description
A	GEN 3 Solar, Inc CACA 48669	Ivanpah, south of Calif./Nevada line T17N/R14E	OptiSolar	Plan of Development letter sent 07/31/08	300 MW Photovoltaic 4,160 acres land requested
B	Ivanpah Airport (Southern Nevada Supplemental Airport)	30 miles South of the McCarran International Airport - Note outline of purple around the project depicts the airport noise compatibility area	Clark County Department of Aviation	Draft EIS in progress, Scoping Report available. Preparing Draft EIS: Draft Alternatives Working Paper is available. Construction expected to begin 2012.	International Airport to supplement the McCarran International Airport in Las Vegas • 5,934 acre site • 17,000 acre sphere of influence • Adjacent to desert tortoise relocation site
C	Victorville-Las Vegas High Speed Train	Train along the I-15 between Victorville and Las Vegas	DesertXpress Enterprises	Draft EIS was published in March 2009 and the public comment period ended on May 22, 2009.	DesertXpress would run from Victorville to Las Vegas. It hopes to operational by 2012.On August, 2006, DesertXpress submitted a ROW application to the BLM for portions of the corridor between Victorville and Las Vegas that would be located on BLM land. Two alternative alignments in the vicinity of the east approach to Mountain Pass on Interstate 15 were identified. In November, 2006 BrightSource submitted an application to the BLM for a ROW grant to construct and operate the ISEGS facility. The BLM notified DesertXpress that one of its proposed route segments – Segment 4B – travelled through two proposed solar projects, ISEGS and a proposed solar power plant by OptiSolar, Inc. In January, 2009 BLM sent a letter to DesertXpress, BrightSource, and OptiSolar alerting the parties of the conflict and urging them to consult together to determine if there is a mutually agreeable solution so that the projects could co-exist. As a result of the coordination meetings, DesertXpress developed several potential alternatives to avoid the ISEGS project area including the alternative shown on Cumulative Figure 3. DesertXpress will formally request FRA to include Segment 4C in the Final EIS as an Avoidance Alternative to Segment 4B such that no portion of the DesertXpress project would be within the boundaries of ISEGS. [See TN 51648 05-21-09 BrightSource Agreement with DesertXpress for full details of the agreement.]
D	Pipeline Restoration	Adjacent to the ISEGS property	Mojave Pipeline	Meeting in Jan or Feb to discuss what must be provided to gain ROW	Pipeline restoration, similar footprint to when laying the original pipeline.

Table 3. Future Foreseeable Projects in the Ivanpah Valley Area

ID #	Project Name; Agency ID	Location	Ownership	Status	Project Description
E	Joint Port of Entry CA-690-EA06-01	Between Yates Well Road and Nipton Road, San Bernardino County	CALTRANS, California Dept of Food and Ag (CDFA)	Caltrans is reconsidering proposal as a phased project based on funding availability (2006) Temporary Use Permit for Geotechnical Testing and Soil Sampling in Progress Caltrans submitted a Recreation and Public Purposes Act Lease application to the BLM for the JPOE facility	Joint Port of Entry would include an Agricultural Inspection Facility and a Commercial Vehicle Enforcement Facility located on the north side of Interstate 15 between Nipton Road and Yates Well Road.
F	Temporary Batch plant	Located at Yates Well Rd. intersection within Interstate 15 ROW	CALTRANS	Caltrans widening of the I-15.	Temporary asphalt batch plant.
G	Mixed-use Development	166 acres near Jean, Nevada	MGM Mirage and Jeanco Realty Development, LLC	Demolition of the Nevada Landing Casino as the first phase of the proposed new development to begin in April. Note: On hold due to International Airport plans, will not be replaced at least until building of new airport is begun if not complete.	MGM Mirage announced a joint-venture partnership with two Las Vegas-based developers to turn undeveloped land on both sides of Interstate 15 into a community that features affordable housing, commercial businesses, shops and a new hotel-casino. This would include the demolition of two casinos MGM Mirage currently owns in Jean.
H	Clark Mountain and Crescent Peak Allotment 10 Year Lease CA-690-EA06-25	Northern Clark Mountain Range	Allotment #09003	In Progress	Grazing Lease
I	Ivanpah Energy Center	Primm, Nevada	Diamond Generating Corporation	Construction was to begin in the first quarter of 2006. No construction currently taking place	• 500 Mw gas-turbine combined-cycle power plant
J	Wind energy power plant CACA 44988	Mountain Pass T15N/R14E R151/2N/R14E	PPM Energy	Application received 10/15/02 & 08/04/06 Testing & monitoring – 2nd Term	• 75 Mw wind energy project • 2,330 acres • Military: Red
L	I-15 Mountain Pass Truck Lane 4393U	San Bernardino County, near Wheaton Springs (from 2.4 km south of Bailey Rd. overcrossing to 1.2 km north of Yates Well Road Overcrossing)	CALTRANS	Bid for contractor out Sept. 2007	NB Truck Descending Lane and Pavement rehab. Construction not expected to start before August 2008. Work is expected to continue until 2010

Table 3. Future Foreseeable Projects in the Ivanpah Valley Area

ID #	Project Name; Agency ID	Location	Ownership	Status	Project Description
M	Power Partners SW Solar Application NVN 86156	West of Jean, NV.	Power Partners Southwest LLC	Application received 9/19/09, additional information requested by BLM.	Solar Power Plant to generate 250 MW, located on approximately 10,814 acres near Jean, NV.
N	Upgrade to existing 115-kV transmission line from El Dorado substation	Along northern transmission lines of Southern California Edison (SCE)	SCE	Project filed June 2009, scoping period closed August 2009. The projected online date would be 2013.	Construct a new Ivanpah Substation sized to accommodate 220 / 115 kV facilities. Remove approximately 36 miles of a portion of the Eldorado-Ivanpah leg of the existing Eldorado-Baker-Cool Water - Dunn Siding - Mountain Pass 115 kV line and construct a double circuit 220 kV line.
O	Mixed Use -Recreation	Ivanpah Dry Lake	BLM	Numbers are approximate for annual use. The use is expected to continue into the foreseeable future.	Approximately 200 Casual Use permits are issued annually (these cover between 1 individual to 6 individuals). Approximately 12 Permitted and Organized events occur on the Dry Lake annually on both east and west sides. (Approximately 50% of these permitted and organized events occur on the west side and 50% on the east side, although the largest of the events tend to occur on the east side of the Dry Lake.) Permits are also given out that include use of both sides. Annual dry-sailing and buggy events, examples from 2006 includes: • Ivanpah Playa Commercial Landsailing Tours • 2006 north American Buggy Expo Windjet Land Sailing Speed Trial
P	New fast food restaurant	Primm, NV	Unknown	In permitting process, application received by the Clark County permitting office 2/7/08	Fast food restaurant to be built adjacent to the Primm Outlet Mall (32100 S. Las Vegas Blvd.)
Q	Primm Solar Generating Plants	Just south of Primm, Nevada, on the California/ Nevada border	NextLight Renewable Power, LLC	Application in to the Las Vegas BLM Field Office	Two solar power plants are proposed by NextLight Renewable Power, LLC at the Nevada/California border. One is a 250 MW solar trough project on approximately 2,500 acres (Serial number NVN 085801). Construction expected to take 32 months.
Q	Primm Solar Generating Plant 2	Just south of Primm, Nevada, on the California/ Nevada border	NextLight Renewable Power, LLC	Application in to the Las Vegas BLM Field Office	Two solar power plants are proposed by NextLight Renewable Power, LLC at the Nevada/California border. One is a 500 MW solar trough project on approximately 4,700 acres (Serial number NVN 085077).
R	Cogentrix NVN 083083 and 083129	East, southeast of Jean, NV.	Cogentrix Solar Services LLC	Application received 1/18/07, additional information requested and received	Solar thermal energy facility for approximately 9.760 acres and 19,840 acres respectively. Mining claims identified in the same area.

CUMULATIVE ANALYSIS OF SCE TRANSMISSION UPGRADES

This analysis examines the potential cumulative impacts of future transmission line, fiber optic, and substation construction, line removal, and other upgrades that have been proposed by Southern California Edison Company (SCE) for the purpose of providing the electrical facilities necessary to integrate up to 1,400 megawatts (MW) of new solar generation in the Ivanpah Dry Lake area, including the ISEGS project.

On May 28, 2009, SCE filed an application with the California Public Utilities Commission (CPUC) to construct the Eldorado-Ivanpah Transmission Line Upgrade Project (Application 09-05-027), and on July 23, 2009, the CPUC issued a Notice of Preparation.[1]. In addition, SCE has applied to the Bureau of Land Management (BLM) for a Right-of-Way Grant and the BLM published its Notice of Intent in the Federal Register on July 27, 2009.[2] SCE's PEA serves as the basis for the project description included in this analysis.

SCE proposes to construct a new 220 kilovolt (kV) transmission line and a new 220 kV/115 kV substation in California near Primm, Nevada (see "N" in Table 3). The new double-circuit 220 kV transmission line would be approximately 35 miles long, and would be located between the existing Eldorado Substation in Nevada and the proposed new Ivanpah Substation in California. The Eldorado-Ivanpah portion of the existing Eldorado–Baker–Coolwater-Dunn Siding-Mountain Pass 115 kV transmission line would be removed and replaced with the 220 kV transmission line. The rest of the 115 kV line would remain unchanged west of the new Ivanpah Substation (SCE 2009).

Overall, the SCE project would also include the following components:

Substation Construction and Upgrades

- Construction of a new Ivanpah 220/115 kV Substation. The substation would be designed to allow up to four 220/115 kV transformer banks (three would be initially required to support 115 kV level interconnection requests) and would provide 220 kV expandability to support 220 kV voltage level generation tie-lines as well as future 220 kV network transmission lines (if and when required).

Transmission and Telecommunication Facilities

- Removal of approximately 35 miles of a portion of the Eldorado leg of the existing Eldorado-Baker-Cool Water-Dunn Siding-Mountain Pass 115 kV line (the existing 115 kV infrastructure cannot support transmission of greater capacity).
- Construction of a new approximately 35-mile double-circuit 220 kV transmission line with bundled 1590 aluminum conductor steel reinforced conductor, including optical ground wire to support a special protection system (SPS). The new double circuit 220 kV line would be constructed in mostly existing ROW with some minor rerouting for technical and environmental reasons.

[1] The CPUC Eldorado-Ivanpah project website is online at: http://www.cpuc.ca.gov/Environment/info/ene/ivanpah/Ivanpah.html

[2] Federal Register Volume 74, Number 142, page 37053-37054.

- A new approximately 1-mile portion of the existing Baker-Cool Water-Dunn Siding-Mountain Pass 115 kV line connecting to the proposed Ivanpah Substation.
- Second telecommunication route to support WECC redundant telecommunication requirements for an SPS.

This analysis examines the construction and operational impacts of the SCE transmission line, substation and telecommunications system upgrades, and the nature and scope of the probable cumulative impacts of the project. The issue areas with potentially significant impacts have been discussed in detail.

AIR QUALITY

Environmental Setting

California and Nevada

The SCE 220 kV transmission upgrades would occur in San Bernardino County, California (7 miles) and in Clark County, Nevada (28 miles). The transmission upgrades would cross BLM lands including the Ivanpah Dry Lake and some private land. These areas are largely open space, recreation, and some minimal private development within the Primm, Nevada region. The proposed route would be southwest of Las Vegas, where ozone, particulate matter, and carbon monoxide levels violate ambient standards, despite the very low population density outside of Las Vegas itself. The SCE electrical upgrades and telecommunications installations would be located within the Mojave Desert Air Basin, administered by the Mojave Desert Air Quality Management District.

Potential Environmental Impacts

The construction and structure removal activities caused by the project would generate emissions at the locations of the work along the transmission line and telecommunication right of way (ROW) and at substation sites. The impacts would principally consist of exhaust emissions from heavy-duty diesel and gasoline-powered construction equipment (*e.g.,* ozone precursors, Nitrogen Oxides (NOx) and Volatile Organic Compounds (VOC), other criteria pollutants, such as CO and PM10, and toxic diesel particulate matter emissions) and fugitive particulate matter (dust) from travel on unpaved surfaces. Beyond the boundaries of the ROW and substations, exhaust emissions would also be caused by workers commuting to and from the work sites, from trucks hauling conductor, pole segments, and other equipment and supplies to the sites, and crew trucks (*e.g.,* derrick trucks, bucket trucks, pickups).

Odors of diesel exhaust from construction equipment would be reduced by the California's requirements for mandatory use of either low-sulfur or ultra-low-sulfur fuel. No substances used or activities involved with the project would have the capability to produce offensive odors. As such, the impacts of odors would be less than significant.

Once construction and structure removal is complete, operational emissions would result from vehicle and helicopter use for periodic maintenance, repair, and inspection of the system components. These mobile source emissions would be the only direct source of emissions related to project operation, and they would be minor. System monitoring, control, and inspections would induce light and medium heavy-duty truck

traffic and periodic helicopter use. The air quality impact caused by emissions from project vehicular traffic for maintenance activities would be less than significant.

Conclusion

The construction and structure removal activities associated with SCE's upgrades would cause emissions due to heavy-duty diesel and gasoline-powered construction equipment and fugitive particulate matter (dust) emissions from activity on unpaved surfaces. With effective and comprehensive control measures such as those recommended by Energy Commission staff for the proposed ISEGS project, dust and equipment exhaust cumulative impacts could likely be reduced to a less than significant level.

BIOLOGICAL RESOURCES

Environmental Setting

California

The SCE transmission line upgrade would be located in California for approximately 7 miles. The existing SCE 115 kV transmission line is located in the southeastern portion of the Northern and Eastern Mojave Planning Area (NEMO) in the desert region of San Bernardino County. The desert regional habitat of San Bernardino County includes soils that are predominantly sandy gravel, and include major dune formations, desert pavement, and dry alkaline lake beds (SB County 2007). The Mojave Desert region is characterized by arid conditions with low precipitation. The entire NEMO planning region is crossed by expansive alluvial washes. Please see the **Biological Resources** section within this Final Staff Assessment/DEIS for a complete list of the common vegetation and wildlife species that are expected to occur within the Ivanpah Valley region.

Nevada

The SCE transmission upgrades would be located in Nevada for approximately 28 miles beginning at Eldorado Substation. The existing Eldorado Substation and SCE 115 kV transmission line are located in the southwestern portion of Clark County, Nevada. Clark County is located within the Sonoran Basin and Range Province or Mojave Desert Shrub Biotic Communities. The regional habitat of Clark County includes soils that are predominantly Entisols, located in areas where soils are actively eroding (such as on steep slopes) or receiving new soil materials (such as alluvial fans), and Aridisols, often associated with desert pavement (LVMP 1998). The Mojave Desert region is characterized by arid conditions with low precipitation. The climate of Southern Nevada has an average precipitation of four to eight inches at lower elevations and from 12 to 20 inches at higher elevations. Maximum precipitation falls between November and March.

Vegetation Communities

The SCE 115 kV to 220 kV transmission upgrade is located within the Mojave Desert Shrub Biotic communities with hot, dry summers and mild winters. Southern Nevada has a high percentage of sunny days per year (LVMP, 1998). According to generalized vegetation mapping of the Las Vegas Resource Management Plan, the SCE 115 kV

transmission upgrade would traverse Southern desert shrub and Mojave desert shrub communities. The Southern desert shrub occurs primarily at elevations below 4,000 feet, with annual rainfall averaging less than six inches and temperatures ranging from over 100 degrees Fahrenheit in the summer to 25 degrees in the winter (LVMP 1998). Creosote bush (*Larrea tridentate)* is the dominant species, and may occur with yucca (*Yucca schidigera)* depending on elevation. Additional vegetation found in the Southern desert shrub includes white bursage (*Ambrosia dumosa)*. Catclaw acacia (*Acacia greggii)* is found in dry washes at lower elevations.

Mojave desert shrub is made up of a mixture of shrubs characteristic of mid-elevation Mojave desert. The species occur on tuff or alluvial deposits at elevations between 4,000 and 5,000 feet (LVMP, 1998). Joshua tree (*Yucca brevifolia)* is one of the dominant species of the overstory. Common shrubs include horsebrush (*Tetradymia glabrata),* spiny menodora (*Menodora spinescens),* burrobrush (*Hymenoclea salsola)*, box thorn (*Lycium andersonii)*, green ephedra, green rabbitbrush (*Chrysothamnus viscidiflorus),* Mormon tea (*Ephedra nevadensis)*, and four-wing saltbush. Blackbrush (*Coleogyne ramossissima)* and sagebrush (*Artemisia* sp.) become the dominant shrubs at higher elevations. Cacti species are also part of this community including cottontop barrel cactus (*Echinocactus polycephalus),* prickly pear (*Opuntia echinocarpa*), and various cholla species (*Opuntia* sp.) (LVMP 1998).

Pinyon-Juniper Woodland is found in the McCullough range south of the SCE 115 kV transmission upgrade. The singleleaf pinyon pine (*Pinus monophylla)* and Utah juniper (*Juniperus osteosperma)* are the dominant components of this community.

The SCE upgrades would be located in between the North McCullough Mountain Wilderness Area and the South McCullough Mountain Wilderness Area in an already designated transmission line corridor.

Wildlife Species

According to the Las Vegas Management Plan, the SCE 220 kV transmission line upgrade would cross desert bighorn sheep (*Ovis canadensis nelsoni)* habitat, quail (*callipepla gambelli)* habitat, and would be north of mule deer (*Odocoileus hemionus)* winter rangeland; all of which are considered species of concern. The upgrades would be located north of the Piute-El Dorado desert tortoise Desert Wildlife Management Area (DWMA).

The following non-listed, special status animal species have moderate to high potential to occur along the 220 kV transmission line upgrade: chuckwalla (BLM sensitive) and gila monster (State of Nevada protected).

Potential Environmental Impacts

Potential impacts to biological resources caused by the project could occur as a result of construction disturbance at or near the construction work sites that would be established for the project components. These sites include the pull and tensioning sites used to pull the new conductors onto the towers and potential sites for staging or marshalling yards. Temporary construction yards would be established in both California and Nevada along the route. Generally these yards range in size from a few

acres to up to nearly 30 acres. Construction of the Ivanpah Substation would require a temporary laydown area located at or near the existing roadway at the site. Upgrades at Eldorado Substation would be within the existing substation property, and construction of the remaining 115 kV switchrack, the 220 kV switchrack and the transformer banks at Ivanpah Substation would be on already-disturbed/graded land that was analyzed as part of this Final Staff Assessment/DEIS.

For the proposed 220 kV route, new dulled galvanized 220 kV lattice steel towers (LSTs) and H-frame structures would be installed in the existing and new ROWs. Permanent loss of habitat would occur at each of these structure sites.

No main access roads are expected to be required for the proposed route, because it would largely follow an existing transmission corridor; however, spur roads to individual towers would be required. Where overland vehicle travel is not possible, upgrades to main access roads and extensions to existing spur roads would be needed to allow passage of construction vehicles. Such upgrades may require vegetation clearing and grading based on site conditions. During transmission line construction, most of the spur roads built to accommodate new construction are usually left in place to facilitate future access for operations and maintenance purposes. Thus for the purposes of this analysis, the disturbance is assumed to be permanent.

Impacts that could occur include disturbance of habitat caused by movement of the construction equipment, disturbance of nesting activities caused by construction noise and movement of machinery, and potential take of listed species caused by construction activities at the structure locations. Therefore, the project could potentially impact special status species and sensitive habitats. Recommended mitigation measures would be needed to avoid, eliminate, reduce to a less-than-significant level or compensate for those impacts.

Conclusion

Because it appears some of the construction work would occur in or near sensitive species, habitats, and/or waters of the U.S., staff concludes that the upgrades could cause an adverse cumulative impact when combined with ISEGS and other potential projects. Potential impacts include construction noise effects on nesting activities, and construction activity physical effects on habitats.

Impact avoidance measures would help reduce potentially significant cumulative biological impacts to levels less than significant. However, there would also be permanent habitat disturbances at tower locations, at the Ivanpah Substation and with the construction of new spur roads.

Activities associated with upgrading the transmission line, substations and telecommunication facilities would require compliance with applicable Federal, State and local laws, ordinances and regulations, including: Federal and State Endangered Species Acts, Federal Migratory Bird Treaty Act, and Federal and State Clean Water Acts. Specific agency permits would be required before any work could commence.

Even if the upgrades work complies with all applicable laws, ordinances, regulations and standards (LORS), absent biological survey information that proves otherwise, the SCE upgrades may create significant individual project and cumulative impacts to biological resources due to the permanent loss of habitat and the disturbance to sensitive plant and wildlife species during construction.

CULTURAL RESOURCES

Environmental Setting

California

The regional setting for archaeological resources in the Ivanpah Valley is presented in the **Cultural Resources** section of this Final Staff Assessment/DEIS. Prior to CEQA and NEPA permitting, cultural surveys would need to be conducted along the proposed 220 kV ROW within California and Nevada, as well as along the telecommunications facilities pathways and at the substation sites.

The Hoover Dam-to-San Bernardino transmission line (CA-SBR-10315H), which would be upgraded through the project, is a known historical resource and discussed in detail in the **Cultural Resources** section of this FSA/DEIS.

Nevada

All prehistoric Native Americans in southern Nevada, in the vicinity of the project, used hunting and gathering methods to acquire at least some of their foods. Hunters-gatherers moved seasonally within a series of environmental zones, and the adaptation to arid land resources is placed by archaeologists in the period called the Archaic (LVMP 1998). Heaviest use of the southern Nevada region is thought to have occurred within the last 5,000 years. Southern Nevada was used by three distinct groups (Lower Colorado, Virgin Anasazi, and Southern Paiute peoples). Lower Colorado tribes such as the Mojave conducted floodwater farming along the Colorado River south of the Las Vegas Valley and exploited resources in the surrounding ranges and valleys. The Lower Colorado people lived in open camps and rancherias, making their archaeological record similar to that of the Archaic hunter-gatherers (LVMP 1998). The Virgin Anasazi tribes are characterized by use of agriculture (maize, gourds, and possibly cotton), pit structures and aboveground masonry structures, possibly the use of kivas, and ceramics. They lived in isolated villages. The southern Paiute are considered descendants of the Archaic hunter-gatherers in southern Nevada and lived in temporary brush structures, foraging among the diverse environmental zones of the region (LVMP 1998).

Historic use of southern Nevada began with the exploration of routes such as the *Old Spanish Trail/Mormon Road* (1844 to the early 1900s). Potosí mine, the first mine in the region, dates to 1861 and ranching was underway in the late 1800s. Historic foundations such as mining sites, ranches, and quarries are found within southern Nevada.

Potential Environmental Impacts

The project would have a significant impact to a portion of one historical resource, the Hoover Dam-to-San Bernardino transmission line (CA-SBR-10315H). Proposed Conditions of Certification **CUL-8** and **CUL-9** would reduce the contribution of the proposed project to the cumulative impact to this resource to less than cumulatively considerable..

Ground disturbance, the presence of vehicles driving over the top of sites and the installation of new towers could damage archaeological resources. After the work area is defined and after archaeological and historic surveys are complete in any areas that have not been protocol-level surveyed previously by SCE, archaeological sites or historic resources within the built environment may be identified. Depending on when they were built, if the existing SCE 115 kV line or the Eldorado Substation are determined eligible for the National Register of Historic Places (NRHP), the upgrades and removal effort would result in an impact to historical resources. Whether the impact is significant would need to be determined after the line or substations are evaluated.

Some new underground and overhead lines would be installed in places where there previously were none, and some existing overhead lines would have poles replaced or new poles installed along the existing line. The trench for undergrounding would normally be excavated within or adjacent to a roadway, and trenching would not come within 12 inches from any existing fence, wall, or outbuilding associated with an adjacent property. Therefore, there would be no potential to adversely impact the physical condition of existing above-ground cultural resources. The only potential to adversely impact existing above-ground cultural resources would arise from a change in the visual setting of the property due to the addition of taller poles or new poles, new overhead lines, and new substation equipment depending on the location in the project area.

It is possible that buried cultural deposits could be encountered during ground disturbing project activities including trenching for the installation of underground fiber optic cables, during ground disturbance associated with the replacement or installation of new poles, or ground disturbance associated with the construction at the substations.

Conclusion

SCE would directly impact one known cultural site but mitigation would reduce this impact. Additionally, it is possible that the corridors have sensitive cultural resources that could be affected. It is possible that all cumulative impacts to cultural resources could be mitigated to less than a significant level through the Section 106 process and implementation of recommended measures that apply to cultural resources. Known sensitive areas would be avoided, construction activities would be monitored and other appropriate mitigation similar to the conditions of certification identified in the **Cultural Resources** section of the Final Staff Assessment/DEIS would be implemented.

GEOLOGY AND PALEONTOLOGY

Geotechnical and paleontological investigations for geologic or paleontologic resources have not yet been performed in the project area; however, fossilized vertebrae bones and invertebrate fossils have been uncovered in the southern Nevada region. There are

no known active faults crossing the proposed route and the area is considered to have a low potential for seismic hazard. Therefore, there would not likely be any contribution to cumulative impacts related to fault rupture, liquefaction, strong groundshaking, or earthquake-induced landslides. The structures would be constructed to comply with all applicable LORS. With implementation of measures and best management practices that would ensure proper re-vegetation, erosion control, and drainage, among other geologic and paleontologic requirements, SCE's project upgrades would create a less than significant cumulative impact to geology and paleontology.

HAZARDOUS MATERIALS MANAGEMENT

Spills and leaks of hazardous materials during construction activities could potentially result in soil or groundwater contamination. Improper handling of hazardous materials could expose project workers or the nearby public to hazards and/or known or previously undocumented soil and or groundwater contamination could be encountered during ground disturbing activities. Evaluation of the primary potential cumulative effect would require consideration of the possibility that any one chemical release from the sites or linear facilities would create an additive risk to the public when combined with other releases from surrounding chemical-use facilities. Implementing mitigation measures similar to the Conditions of Certification that are proposed in the Final Staff Assessment/DEIS for construction of the ISEGS, as well as implementation of SWPPP and SPCC plans, would avoid potentially significant cumulative hazard impacts from work associated with the proposed SCE upgrades.

LAND USE

The SCE 220 kV transmission upgrades project would parallel an established and major utility corridor across BLM land. Generally all of the upgrades would parallel existing utility or transportation corridors and so they would not disrupt or divide the physical arrangement of an established community. Also for these reasons, the SCE upgrades would not restrict existing or future land uses along the route. To reduce cumulative recreation impacts, mitigation measures would be recommended that would require SCE to coordinate construction activities and the project construction schedule with the authorized BLM officer for the Ivanpah Dry Lake area, and require SCE to identify alternative recreation facilities that may be used by the public during construction.

NOISE

The entire area within the ROW is undeveloped, with the exception of a few roads that pass underneath the transmission line. There are a few residences within 500 feet of the transmission line ROW in the area of Primm, NV at the California/Nevada state line. Short-term noise impacts to these residences may occur during the construction from operation of heavy equipment throughout the project area. SCE would largely use existing ROW access roads to complete work, but they would also need improvement and construction of new spur roads (new access roads would not be required with the proposed route). Implementing mitigation measures similar to the conditions of certification that are proposed in the Staff Assessment/DEIS for construction of the ISEGS would avoid potential significant individual and cumulative noise impacts from work associated with the proposed project. After the construction work is complete and the line operational, there may be a change in corona noise levels in portions along the new corridor.

SOCIOECONOMICS

Because few, if any, workers are expected to relocate to the area, no new housing would be needed for the project, no housing would be displaced, and no new competition for existing housing would likely occur in conjunction with the ISEGS project. Construction employees would likely already live within commuting distance to the project area in Primm, Nevada, the Las Vegas area, which is less than 40 miles to the north, or San Bernardino County in California. Since any non-local construction workers would not likely relocate family members for the relatively short duration of construction and very few, if any, new permanent employees would be hired by SCE for operation of the project, cumulative impacts to schools, public services, and recreational facilities would be less than significant.

SOIL AND WATER RESOURCES

Construction activities would not occur within the watercourses; therefore, impacts to water quality for construction and operation of the transmission lines would be less than significant. Implementation of SWPPP and recommended mitigation, such as temporary erosion control measures, and best management practices or similar mitigation would ensure less than significant cumulative impacts to soils and water resources. The SCE project would cross three grazing allotments located along the transmission line corridor in California and Nevada, however, with the implementation of mitigation, neither construction nor operation of the transmission line would cause a significant impact to agricultural resources and associated cumulative impacts would be less than significant.

TRAFFIC AND TRANSPORTATION

Since the majority of construction activities would take place in largely rural areas, it is projected that the activities of the proposed SCE upgrades in conjunction with the ISEGS project would have minimal impact on the traffic level of service for the roadways in the vicinity of the activities. In addition, the movement of heavy machinery on local roads would occur intermittently, but infrequently throughout the project area over the construction period. However, on Fridays from approximately 12 p.m. to 10 p.m., northbound I-15 experiences an hourly average of approximately 2,000 trips per lane and operates at LOS F. Regardless, the number of vehicles added to northbound I-15 on Friday afternoons as a result of the project would be minor compared to the number of vehicles traveling on northbound I-15 during the same time. Based on the temporary nature of the construction activities and the generally undeveloped nature of the area, coupled with implementation of traffic mitigation measures similar to conditions of certification in the ISEGS Staff Assessment/DEIS, such as scheduling during non-peak hours, would ensure that any potential cumulative traffic and transportation impacts would be less than significant.

TRANSMISSION LINE SAFETY AND NUISANCE

Since the upgraded 220 kV line would be operated at a higher voltage than the existing 115 kV line, the magnitude of the electric field along the line route would increase. The magnetic field may also change, because its intensity depends directly on current levels, however, phasing with other existing lines can actually reduce magnetic fields in some instances. SCE would prepare an EMF Field Management Plan as part of its project application to the CPUC that would include changes in EMF levels associated

with the upgrades. The upgraded 220 kV transmission line would be designed, built and operated (largely within the existing ROW) according to SCE's requirements, reflecting compliance with the health and safety (non-EMF) LORS. Therefore, it is not expected that this project's operation would pose a significant cumulative health and safety hazard to individuals in the area, in conjunction with the ISEGS project.

TRANSMISSION SYSTEM ENGINEERING

To mitigate potential safety and reliability impacts, the LORS, CPUC and NESC regulations and SCE scheduling protocols would be used. SCE would need to assure conformance with the safety and reliability requirements. All of SCE's electrical and telecommunication upgrades would result in local system benefits, in that they would provide considerably greater flexibility in routing power in the regional transmission, subtransmission and telecommunication networks, even if the ISEGS is not built. The project would ensure that the ISEGS could generate at its rated capacity as it would mitigate overloads on the existing Eldorado–Baker–Coolwater-Dunn Siding-Mountain Pass 115 kV transmission line between Eldorado and Ivanpah Substations.

VISUAL RESOURCES

Environmental Setting

California and Nevada

As stated in the **Visual Resources** analysis in the ISEGS Staff Assessment/DEIS, the regional landscape is part of the Great Basin section of Fenneman's Basin and Range physiographic province, a vast desert area of the western U.S. extending from eastern Oregon to western Texas, characterized by periodic mountain ranges separated by desert plain (Fenneman, 1931). It is also located within the Mojave Desert, immediately north and east of the northernmost portions of the Mojave National Preserve. Locally, the site is situated within the Ivanpah Valley, notable for the level playa or dry lakebed of Ivanpah Lake. Steeply rising, barren slopes and ridges of the Clark, Spring, and Ivanpah Mountains to the south, west, and north, and the Lucy Gray, McCullough, and New York Mountains to the east, define the Ivanpah Valley in the project vicinity.

The transmission line would be located approximately 30 miles south of the City of Las Vegas, and would cross within several hundred feet of Primm, Nevada, and along I-15 becoming increasingly urbanized and less scenically intact as one progresses northward. However, upon leaving Primm, Nevada, the transmission line upgrades would be located on undeveloped BLM land. The transmission line upgrades would be located approximately one mile south of the Red Rock Canyon National Conservation Area that is managed primarily for its visual resources. However, the transmission line upgrades would occur within an existing transmission line corridor adjacent as many as five additional transmission lines. Thus, in a regional context, the site is located at the outer edge of urban influence of the City of Las Vegas metropolitan area. I-15 adjacent to the project site is the principal travel route for visitors to Las Vegas from southern California. There are no California Officially-Designated or Eligible State Scenic Highways in the project vicinity (Caltrans 2008).

Potential Environmental Impacts

For the proposed 220 kV route, new dulled galvanized 220 kV LSTs and H-frame structures would be installed in the existing and new ROW. Double-circuit LSTs generally range in height between 100 feet and 200 feet. Single-circuit H-frame structures generally would be less than 100 feet tall. Most of the structure sites would likely require minor to substantial grading and new or re-developed access and spur roads.

The project would require temporary staging areas for equipment and materials storage along the transmission line route in both California and Nevada. Generally these yards range in size from a few acres to up to approximately 30 acres. Construction of the Ivanpah Substation would likely require a temporary laydown area located at or near the existing roadway at the site.

Conductor pulling and tensioning equipment would be located at various sites along the transmission line ROW. Depending on the terrain and the number of angles and dead-end sites, numerous pull sites would likely be needed.

Construction equipment and activities would be visible to motorists on I-15 and other local roadways, as well as to residents living near the construction activities in Primm, Nevada. Due to temporary duration of the project construction, the adverse visual impacts that would occur during construction would not be significant. This conclusion assumes that construction areas and the ROW would be restored to their pre-project conditions, as discussed below.

However, the upgrades would include the construction of new permanent spur and access roads to the individual structure sites and Ivanpah Substation, which could create permanent visual scars across the undeveloped landscape.

Construction of the 220 kV line would be largely within an existing ROW, where feasible, across undeveloped BLM lands, and would parallel a major existing utility corridor with up to five existing transmission lines for its length. Because the existing transmission lines and towers are an established part of the setting and the project would include removal of the existing 115 kV line and poles, the adverse visual impacts that would occur due to installation of the new line, and any incremental changes in tower height or design, would likely not be significant. This conclusion assumes that the new wires and towers would incorporate typical measures to mitigate potentially significant adverse visual impacts, such as those listed below.

Conclusion

Construction of the SCE upgrades project would require temporary disturbance during construction (i.e., heavy equipment, tensioning, and pull sites). After rehabilitation of temporary construction yards and pulling sites, as required by the suggested mitigation, the transmission line would appear largely as it does now, except for the construction of new and permanent spur and access roads, which would permanently scar the fragile desert landscape.

The SCE upgrades project would have the potential to cause adverse long-term visual impacts, such as through the use of reflective conductors and/or insulators that would make existing or new structures more dominant in the existing viewshed, and through the construction of new and larger structures. However, project design features and feasible mitigation measures would be available that would ensure that visual impacts, including cumulative impacts, of the project would be reduced. With use of non-specular conductors and non-reflective and non-refractive insulators, potential long-term impacts associated with this activity would be reduced as well. Because the upgrades would be in a largely undeveloped area on BLM land, would parallel an existing utility corridor or be on/within existing facilities, and would include removal of the existing line, it is expected that incremental cumulative visual impacts would be reduced to less than significant.

WASTE MANAGEMENT

Construction would generate waste largely in the form of soil from structure excavation, concrete from existing foundations, utility line cable, and scrap metal/wood from the removal/replacement of existing structures, which would be disposed of at an offsite location. Due to the number and capacity of landfills serving the project area, capacity for materials generated from construction of the upgrades in conjunction with the proposed ISEGS project would be available. Recycling activities would greatly reduce the quantity of construction-related materials transported to local landfills. To help ensure and facilitate ongoing project compliance with LORS, mitigation similar to the conditions of certification included in the **Waste Management** section of this Final Staff Assessment/DEIS would be recommended. It is also recommended that SCE should be required to recycle construction waste where feasible.

WORKER SAFETY AND FIRE PROTECTION

Workers at the project would be exposed to loud noises, moving equipment, trenches, and confined space entry and egress. Workers may sustain falls, trips, burns, lacerations, and other injuries. During construction and operation of the upgrades there is also the potential for both small fires and major structural fires. Mitigation similar to the Conditions of Certification in the **Worker Safety and Fire Protection** section of this Final Staff Assessment/DEIS would require SCE to provide a project construction safety and health program and a project operations and maintenance safety and health program. These measures would ensure adequate levels of industrial safety and would comply with applicable LORS. The project would not have significant cumulative impacts on local fire protection services.

Conclusion

This analysis determined that impacts in the following areas would likely be less than significant for this upgrades project (some with implementation of standard mitigation measures): Facility Design, Power Plant Efficiency, and Power Plant Reliability.

Although implementation of mitigation may reduce potential impacts to less than significant levels, the disciplines where potential impacts are of most concern are Air Quality, Biological Resources, Cultural Resources, and Visual Resources.

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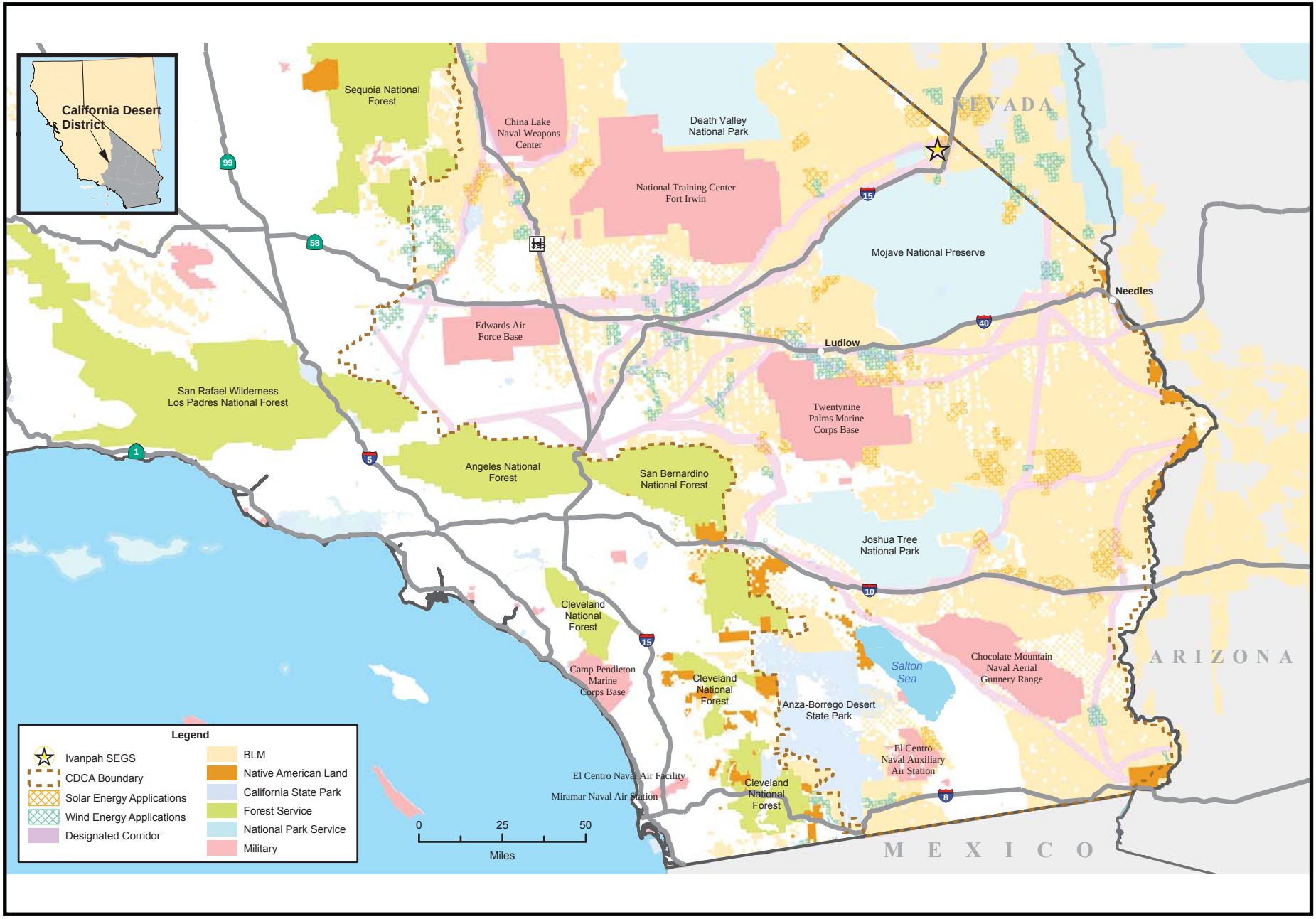
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CUMULATIVE IMPACTS - FIGURE 1

Ivanpah Solar Electric Generating System - Regional Renewable Applications



CUMULATIVE IMPACTS

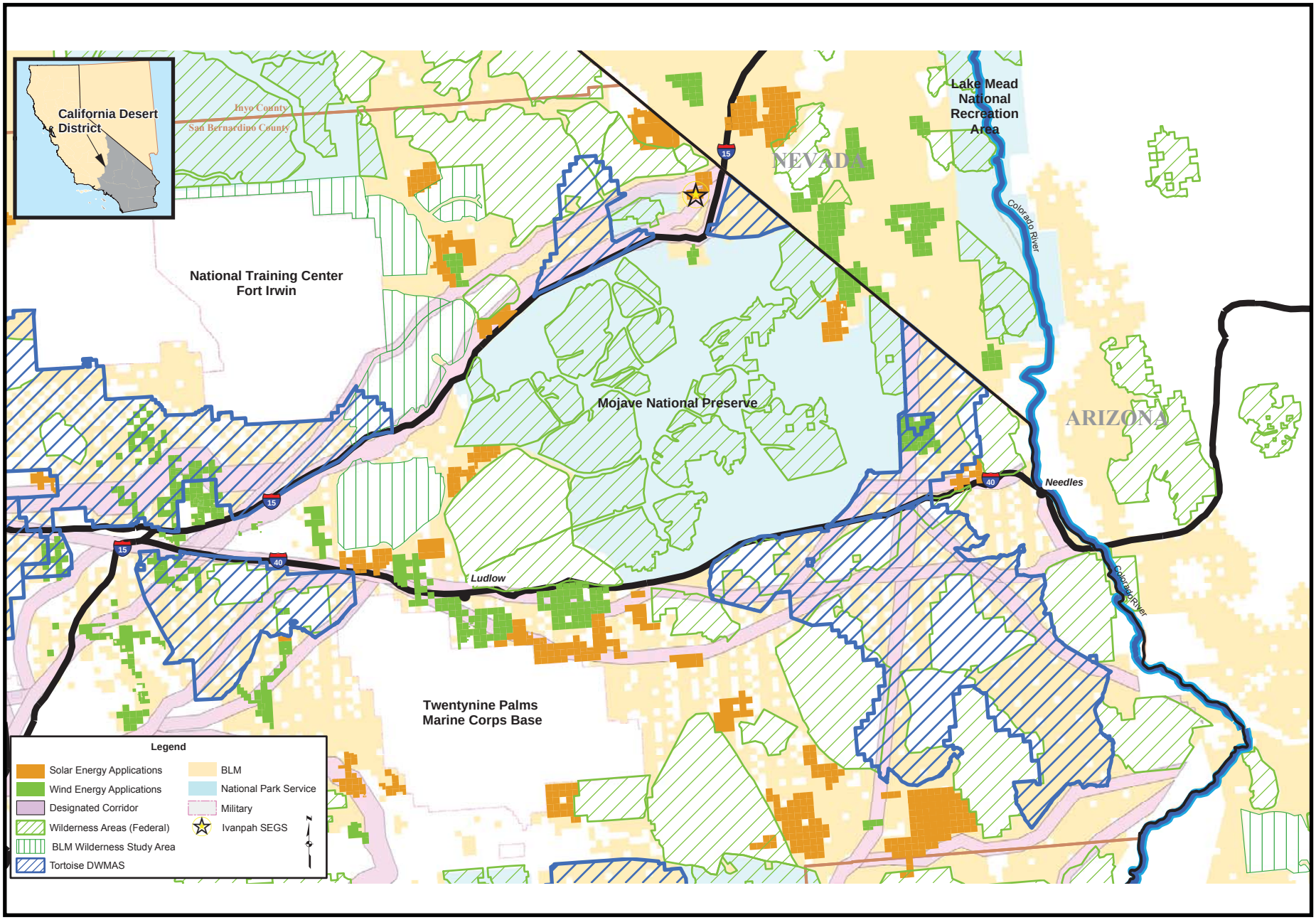
U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009

SOURCE: Data Response - Cumulative Impacts - Figure 1

OCTOBER 2009

CUMULATIVE IMPACTS - FIGURE 2

Ivanpah Solar Electric Generating System - Regional Renewable Applications - Detail



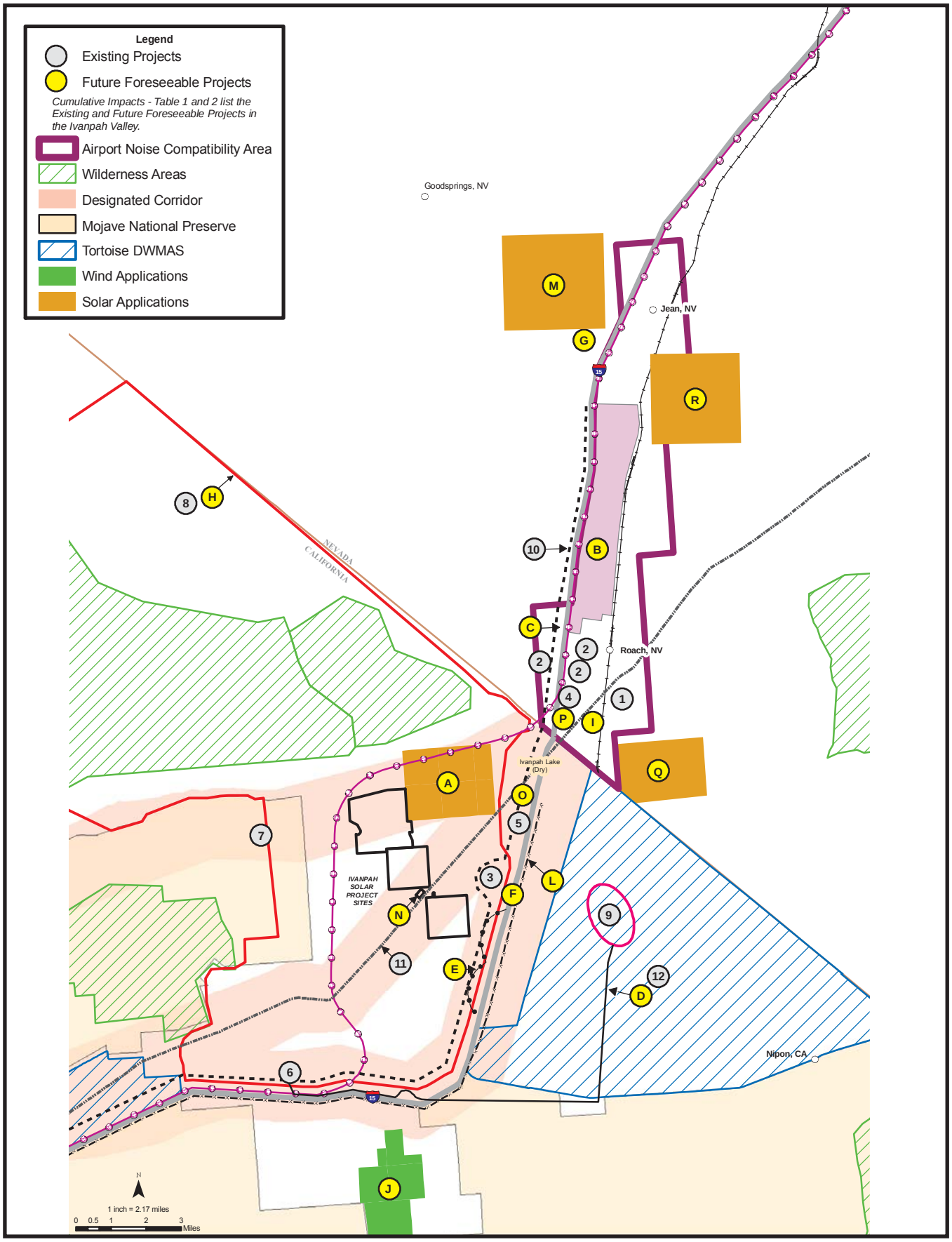
CUMULATIVE IMPACTS

U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009

SOURCE: Data Response - Cumulative Impacts - Figure 2

CUMULATIVE IMPACTS - FIGURE 3

Ivanpah Solar Electric Generating System - Ivanpah Valley Existing and Future/Foreseeable Projects



U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009

SOURCE: Data Response - Cumulative Impacts - Figure 3

ENVIRONMENTAL ASSESSMENT

AIR QUALITY

Prepared by William Walters, P.E.

SUMMARY OF CONCLUSIONS

U.S. Bureau of Land Management (BLM) and Energy Commission staff (hereinafter jointly referred to as "staff") find that with the adoption of the attached conditions of certification the proposed Ivanpah Solar Electric Generating System (ISEGS) project would comply with all applicable laws, ordinances, regulations, and standards (LORS) and would not result in any significant air quality-related CEQA impacts. Conditions of Certification referred to herein serve the purpose of both the Energy Commission's Conditions of Certification for purposes of the California Environmental Quality Act (CEQA) and BLM's Mitigation Measures for purposes of the National Environmental Policy Act (NEPA).

Staff have concluded that the project would not have the potential to exceed PSD emission levels during direct source operation and the facility is not considered a major stationary source with potential to cause significant NEPA air quality impacts. However, without adequate fugitive dust mitigation, the project would have the potential to exceed the General Conformity PM10 applicability threshold during construction and operation, and could cause potential localized exceedances of the PM10 NAAQS during construction and operation. This potential exceedance of federal air quality standards would be considered a direct, adverse significant impact under NEPA. This impact would be less than significant with the proposed construction and operation mitigation measures controlling fugitive dust.

The ISEGS project would emit substantially reduced greenhouse gas (GHG)[1] emissions per megawatt-hour produced than fossil fueled generation resources in California. The project is not subject to the requirements of SB 1368 (Perata, Chapter 598, Statutes of 2006) and the Emission Performance Standard, but would nevertheless meet the Emission Performance Standard.

INTRODUCTION

On August 28, 2007, BrightSource Energy (applicant) submitted an Application for Certification (AFC) to construct and operate ISEGS in the Mojave Desert region near the border of California and Nevada in San Bernardino County. The applicant proposes to develop this project in three phases, which together would produce approximately 400-megawatt (MW) of electrical power. The project would include heliostat mirror fields, spread over approximately 4,065 acres, focusing solar energy on power tower receivers producing steam for turbine generators.

[1] Greenhouse gas emissions are not criteria pollutants, but they affect global climate change. In that context, staff evaluates the GHG emissions from the proposed project (Appendix Air-1), presents information on GHG emissions related to electricity generation, and describes the applicable GHG standards and requirements.

This analysis evaluates the expected air quality impacts from the emissions of criteria air pollutants from both the construction and operation of the ISEGS project. Criteria air pollutants are defined as air contaminants for which the state and/or federal governments have established an ambient air quality standard to protect public health.

The criteria pollutants analyzed are nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), ozone (O_3), and particulate matter (PM). Lead is not analyzed as a criteria pollutant, but lead and other toxic air pollutant emissions impacts are analyzed in the Public Health Section of this FSA. Two subsets of particulate matter are inhalable particulate matter (less than 10 microns in diameter, or PM10) and fine particulate matter (less than 2.5 microns in diameter, or PM2.5). Nitrogen oxides (NOx, consisting primarily of nitric oxide [NO] and NO_2) and volatile organic compounds (VOC) emissions readily react in the atmosphere as precursors to ozone and, to a lesser extent, particulate matter. Sulfur oxides (SOx) readily react in the atmosphere to form particulate matter and are major contributors to acid rain. Global climate change and greenhouse gas (GHG) emissions from the project are discussed in an Appendix Air-1 and analyzed in the context of cumulative impacts.

In carrying out this analysis, the California Energy Commission (Energy Commission) staff evaluated the following four major points:

- whether the ISEGS project is likely to conform with applicable federal, state, and Mojave Desert Air Quality Management District (District) air quality laws, ordinances, regulations and standards (Title 20, California Code of Regulations, section 1744 (b));
- whether the ISEGS project is likely to cause new violations of ambient air quality standards or contribute substantially to existing violations of those standards (Title 20, California Code of Regulations, section 1743);
- whether mitigation measures proposed for the project are adequate to lessen potential impacts to a level of insignificance (Title 20, California Code of Regulations, section 1742 (b)).
- whether the ISEGS project would exceed NEPA air quality analysis thresholds, before or after implementation of recommended mitigation measures.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

The federal, state, and local laws and policies applicable to the control of criteria pollutant emissions and mitigation of air quality impacts for the ISEGS are summarized in **Air Quality Table 1**. Staff's analysis examines the project's compliance with these requirements summarizes the applicable LORS.

Air Quality Table 1
Laws, Ordinances, Regulations, and Standards

Applicable LORS	Description
Federal	
40 Code of Federal Regulations (CFR) Part 52	Nonattainment New Source Review (NSR) requires a permit and requires Best Available Control Technology (BACT) and Offsets. Permitting and enforcement is delegated to MDAQMD. Prevention of Significant Deterioration (PSD) requires major sources or major modifications to major sources to obtain permits for attainment pollutants. The ISEGS project is a new source that has a rule listed emission source thus the PSD trigger levels are 100 tons per year for NOx, VOC, SO_2, PM2.5 and CO. This project's proposed emissions are below NSR and PSD applicability thresholds.
40 CFR Part 60	New Source Performance Standards (NSPS), Subpart Da Standards of Performance for Electricity Steam Generation Units. Establishes emission standards and monitoring/recordkeeping requirements for units with greater than 250 MMBtu/hr heat input. Subpart Db Standards of Performance for Electricity Steam Generation Units. Establishes emission standards and monitoring/recordkeeping requirements for units with greater than 100 MMBtu/hr heat input. Subpart IIII Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. Establishes emission standards for compressions ignition internal combustion engines, including emergency fire water pump engines.
40 CFR Part 93 General Conformity	Requires determination of conformity with State Implementation Plan for Projects requiring federal approvals it project annual emissions are above specified levels.
State	
Health and Safety Code (HSC) Section 40910-40930	Permitting of source needs to be consistent with Air Resource Board (ARB) approved Clean Air Plans.
HSC Section 41700	Restricts emissions that would cause nuisance or injury.
California Code of Regulations (CCR) Section 93115	Airborne Toxics Control Measure for Stationary Compression Ignition Engines. Limits the types of fuels allowed, established maximum emission rates, establishes recordkeeping requirements on stationary compression ignition engines, including emergency fire water pump engines.
Local (Mojave Desert Air Quality Management District, MDAQMD)	
Rule 201 and 203 Permits Required	Required a Permit to Construct before construction of an emission source occurs. Prohibits operation of any equipment that emits or controls air pollutant without first obtaining a permit to operate.
Rules 401, 402, 403, and 403.2 Nuisance, Visible Emissions, Fugitive Dust	Limits the visible, nuisance, and fugitive dust emissions and would be applicable to the construction period of the project.
Rule 404 Particulate Matter - Concentration	Limits the particulate matter concentration from stationary source exhausts.
Rule 900 Standard of Performance for New Stationary Source	Incorporates the Federal NSPS (40 CFR 60) rules by reference.
Regulation XII – Federal Operating Permits	Requires new or modified major facilities, or facilities that trigger NSPS, Acid Rain or other federal air quality programs obtain a Title V federal operating permit.
Rule 1210 – Acid Rain	Requires facilities subject to the federal Acid Rain program obtain permits and comply with emissions and monitoring provisions.

Applicable LORS	Description
Rule 1303 New Source Review	Specifies BACT/Offsets technology and requirements for a new emissions unit that has potential to emit any affected pollutants.
Rule 1306 Electric Energy Generating Facilities	Describes actions to be taken for permitting of power plants that are within the jurisdiction of the Energy Commission.

SETTING

CLIMATE AND METEOROLOGY

The project is located in the southern California Mojave Desert, about three and one-half miles west of the California-Nevada border at approximately 2,800 to 3,400 feet above sea level. Relatively high daytime temperatures, large variations in relative humidity, large and rapid diurnal temperature changes, occasional high winds, and sand, dust, and thunderstorms characterize the climate of the Mojave Desert area. The aridity of the region is influenced by a sub-tropical high-pressure system typically off the coast of California and topographical barriers that effectively block the flow of moisture to the region. Seasonally, the precipitation totals in the area range from lows of 0.5 inch in the spring to as high as 8 inches in the winter.

The most recent meteorological (weather) data, collected at the Jean, Nevada monitoring station 16 miles northeast of the project site, was for 2001 through 2002. The measured wind data are graphically represented by quarterly wind roses, provided in the AFC Figures 5.1-1 and 5.1-2 (BSE2007a). These wind roses show that for most of the year, the winds are from the west-southwest, although between November through March, winds are predominately from the northeast. Mixing heights in the area, which represent the altitudes where different air masses mix together, are estimated to be on average 230 feet (70 meters) in the morning to as high as 5,250 feet (1,600 meters) above ground level in the afternoon.

EXISTING AMBIENT AIR QUALITY

The Federal Clean Air Act and the California Clean Air Act both require the establishment of standards for ambient concentrations of air pollutants, called ambient air quality standards (AAQS). The state AAQS, established by the California Air Resources Board, are typically lower (more protective) than the federal AAQS, which are established by the United States Environmental Protection Agency (U.S. EPA). The state and federal air quality standards are listed in **Air Quality Table 2**. As indicated in **Air Quality Table 2**, the averaging times for the various air quality standards, the times over which they are measured, range from one-hour to annual averages. The standards are read as a concentration, in parts per million (ppm), or as a weighted mass of material per a volume of air, in milligrams or micrograms of pollutant in a cubic meter of air (mg/m^3 or $\mu g/m^3$, respectively).

In general, an area is designated attainment if the concentration of a particular air contaminant does not exceed the standard. Likewise, an area is designated non-attainment for an air contaminant if that contaminant standard is violated. Where not enough ambient data are available to support designation as either attainment or non-attainment, the area can be designated as unclassified. An unclassified area is normally treated the same as an attainment area for regulatory purposes. An area could be

attainment for one air contaminant while non-attainment for another, or attainment for the federal standard and non-attainment for the state standard for the same air contaminant.

ISEGS is located in the Mojave Desert Air Basin (MDAB) and is under the jurisdiction of the Mojave Desert Air Quality Management District (MDAQMD). This area is designated as moderate nonattainment for the state ozone standard, nonattainment for both the state and the federal PM10 standards, attainment for federal ozone standard, and attainment or unclassified for the state and federal CO, NO_2, SO_2, and PM2.5 standards. **Air Quality Table 3** summarizes the area's attainment status for various applicable state and federal standards.

Air Quality Table 2
Federal and State Ambient Air Quality Standards

Pollutant	Averaging Time	Federal Standard	California Standard
Ozone (O_3)	8 Hour	0.075 ppm [a] (147 µg/m^3)	0.070 ppm (137 µg/m^3)
	1 Hour	—	0.09 ppm (180 µg/m^3)
Carbon Monoxide (CO)	8 Hour	9 ppm (10 mg/m^3)	9.0 ppm (10 mg/m^3)
	1 Hour	35 ppm (40 mg/m^3)	20 ppm (23 mg/m^3)
Nitrogen Dioxide (NO_2)	Annual	0.053 ppm (100 µg/m^3)	0.03 ppm (57 µg/m^3)
	1 Hour	—	0.18 ppm (339 µg/m^3)
Sulfur Dioxide (SO_2)	Annual	0.030 ppm (80 µg/m^3)	—
	24 Hour	0.14 ppm (365 µg/m^3)	0.04 ppm (105 µg/m^3)
	3 Hour	0.5 ppm (1300 µg/m^3)	—
	1 Hour	—	0.25 ppm (655 µg/m^3)
Particulate Matter (PM10)	Annual	—	20 µg/m^3
	24 Hour	150 µg/m^3	50 µg/m^3
Fine Particulate Matter (PM2.5)	Annual	15 µg/m^3	12 µg/m^3
	24 Hour	35 µg/m^3	—
Sulfates (SO_4)	24 Hour	—	25 µg/m^3
Lead	30 Day Average	—	1.5 µg/m^3
	Calendar Quarter	1.5 µg/m^3	—
Hydrogen Sulfide (H_2S)	1 Hour	—	0.03 ppm (42 µg/m^3)
Vinyl Chloride (chloroethene)	24 Hour	—	0.01 ppm (26 µg/m^3)
Visibility Reducing Particulates	8 Hour	—	In sufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70%.

Source: ARB 2009a.

Air Quality Table 3
Federal and State Attainment Status
Mojave Desert Air Basin [a]

Pollutant	Attainment Status [b]	
	Federal	State
Ozone	Attainment	Moderate Nonattainment
CO	Attainment	Attainment
NO_2	Attainment	Attainment
SO_2	Attainment	Attainment
PM10	Nonattainment	Nonattainment
PM2.5	Attainment	Attainment

Source: ARB 2009b, U.S. EPA 2009a.
a Attainment status for the site area only, not the entire MDAB.
b Attainment = Attainment or Unclassified.

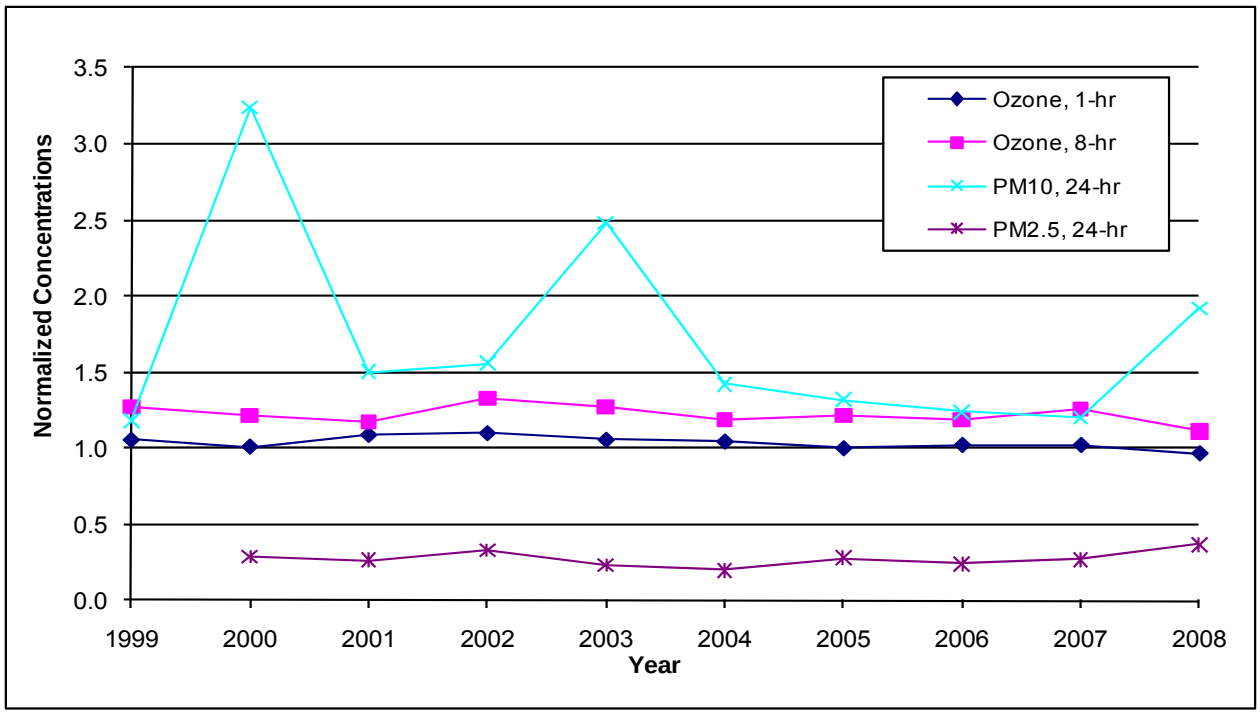
Ambient air quality monitoring data for ozone, PM10, PM2.5, CO, NO_2, and SO_2, compared to most restrictive applicable standards for the years between 2004 through 2008 (the last year that the complete annual data is currently available) at the most representative monitoring stations for each pollutant are shown in **Air Quality Table 4** and the 1-hour and 8-hour ozone, and 24-hour PM10 data for the years 2004 through 2008 are shown in **Air Quality Figure 1**. All ozone, PM10, PM2.5, and NOx (up through 2006) data shown are from the Jean, Nevada, monitoring station that is located approximately 17 miles northwest of the project site. All CO data are from the Barstow monitoring station that is located approximately 100 miles west southwest of the project site. All SOx data are from the Trona Athol and Telegraph monitoring station that is located approximately 110 miles west northwest of the project site. Besides the Jean monitoring station, which provides reasonably close ozone, NOx, and particulate monitoring data, available monitoring stations for CO or SOx are either located a hundred miles or more away from the site, or in the case of Las Vegas are otherwise not representative as an urban location. Therefore, staff has chosen other more remote Mojave Desert Air Basin monitoring locations, Barstow and Trona, to represent the site conditions. However, while staff expects that the background ambient concentrations for both of these pollutants to be relatively low at the project site, there is a reduced overall confidence in the representativeness of these monitoring stations.

Air Quality Table 4
Criteria Pollutant Summary
Maximum Ambient Concentrations (ppm or µg/m^3)

Pollutant	Averaging Period	Units	2004	2005	2006	2007	2008	Limiting AAQS
Ozone	1 hour	ppm	0.094	0.090	0.092	0.092	0.087	0.09
Ozone	8 hours	ppm	0.083	0.085	0.083	0.088	0.078	0.07
PM10 [a]	24 hours	µg/m^3	71	66	62	60	96	50
PM10 [a,b]	Annual	µg/m^3	15.9	17.3	12.1	12.7	12.7	20
PM2.5 [a,c]	24 hours	µg/m^3	7.3	10.2	9.0	11.1	12.9	35
PM2.5 [a,b]	Annual	µg/m^3	3.49	3.78	3.52	4.08	4.52	12
CO	1 hour	ppm	1.6	3.3	3.5	1.4	1.4	20
CO	8 hours	ppm	1.18	1.34	1.19	0.70	1.23	9.0
NO_2	1 hour	ppm	0.032	0.039	0.036	ND	ND	0.18
NO_2	Annual	ppm	0.0035	0.0039	0.0035	ND	ND	0.03
SO_2	1 hour	ppm	0.019	0.0188	0.033	0.014	0.036	0.25
SO_2	24 hours	ppm	0.005	0.004	0.005	0.004	0.005	0.04
SO_2	Annual	ppm	0.001	0.001	0.001	0.001	0.001	0.03

Source: ARB 2008, ARB 2009c, U.S. EPA 2009b
ND – no data
Notes:
[a] Exceptional PM concentration events, such as those caused by windstorms are excluded in the data presented.
[b] Annual average data is federal data and may not exactly represent California annual average.
c The U.S. EPA database used for retrieval of the PM2.5 data did not allow direct determination of the calculated 98th percentile, which is the basis of the standard, so the closest proxy (third highest values) are presented.

Air Quality Figure 1
1999-2008 Historical Ozone and PM Air Quality Data - Jean, Nevada



Source: US.EPA 2009b
Note: The highest measured ambient concentrations of various criteria air contaminants were divided by their applicable standard and provided as a graphical point. Any point on the chart that is greater than one means that the measured concentrations of such air contaminant exceed the standard, and any point that is less than one means that the respective standard is not exceeded for that year. For example the 1-hour ozone concentration in 2005 is 0.090 ppm/0.09 ppm standard = 1.0.

Ozone

The area is classified attainment of the federal 8-hour ozone standard and is classified as nonattainment of the state ozone standards. The ambient data shown in **Air Quality Table 3** indicates that 8-hour concentrations near the site (Jean, Nevada) exceed the recently revised federal 8-hour ozone standard (0.075 ppm). However, the values shown are peak values that correspond to the state standard. The federal standard is based on the fourth highest 8-hour concentration in a year averaged over three years.

The current federal 8-hour ozone attainment status was determined in 2004, was based on the former 8-hour ozone standard of 0.08 ppm, and would have considered state lines and monitoring station locations, where the data shown is from Nevada, not California. The State of California has recommended to U.S. EPA that the northeast portion of San Bernardino County be designated as nonattainment of the new federal ozone standard (ARB 2009d) with an 8-hour ozone design value of 0.080 ppm for the northeast portion of San Bernardino County. U.S. EPA has not yet commented on this recommendation. The revised federal 8-hour ozone standard attainment/nonattainment designations are scheduled to be completed by March 12, 2010.

Ozone is not directly emitted from stationary or mobile sources, but is formed as the result of chemical reactions in the atmosphere between directly emitted nitrogen oxides (NOx) and hydrocarbons (volatile organic compounds [VOC]) in the presence of sunlight to form ozone. **Air Quality Figure 1** shows that the maximum 1-hour ozone

concentrations monitored near the site in Jean, Nevada, have been relatively stable over the past ten years and are just over the state's 1-hour standard for most years from 1999 to 2008. The maximum 8-hour ozone concentrations also have been relatively stable over the past ten years but are somewhat higher in relation to the AAQS than the 1-hour ozone levels, hovering between 1.2 to 1.4 times the California 8-hour ozone standard since 1999.

The Air Resources Board (ARB) report: *Second Triennial Review of the Assessment of the Impacts of Transported Pollutants on Ozone Concentrations in California* (ARB 1996) provided the following observations regarding ozone violations in the Mojave Desert area:

- The ozone and ozone precursors from the South Coast Air Basin contribute overwhelmingly to ozone violations in the Mojave Desert Air Basin.
- There are days when a combination of local emissions and transported ozone or precursors contribute to the violations of 1-hour ozone standards,
- There is a possibility that on at least one day of the year the violations of the 1-hour ozone standards are the direct result of local source emissions.

However, staff notes that in the area of the project site at the far eastern end of the MDAB there is also the potential for ozone transport from the much closer Las Vegas area. However, regardless of the source, it is clear that the main source of the ozone concentrations encountered in the project site area are primarily the result of pollutant transport from urban areas.

Nitrogen Dioxide

The entire air basin is classified attainment of the state 1-hour and federal annual nitrogen dioxide (NO_2) standards. The NO_2 levels monitored in Jean, Nevada, are no more than 25 percent of the most stringent NO_2 ambient air quality standard. Approximately 90 percent of the NOx emitted from combustion sources is nitric oxide (NO), while the balance is NO_2. NO is oxidized in the atmosphere to NO_2, but some level of photochemical activity is needed for this conversion. The highest concentrations of NO_2 typically occur during the fall. The winter atmospheric conditions can trap NO emissions near the ground but lacking substantial photochemical activity (sun light), oxidation of NO to NO_2 and NO_2 levels remain relatively low. In the summer the conversion rates of NO to NO_2 are high, but the relatively high temperatures and windy conditions disperse pollutants, preventing the accumulation of NO_2 at levels that might approach the 1-hour ambient air quality standard.

Carbon Monoxide

The area is classified attainment of the state and federal 1-hour and 8-hour carbon monoxide (CO) standards. The highest concentrations of CO occur when low wind speeds and a stable atmosphere trap the pollution emitted at or near ground level. These conditions occur frequently in the wintertime late in the afternoon, persist during the night and may extend one or two hours after sunrise.

Particulate Matter (PM10)

The area is nonattainment for both the state and the federal PM10 standards. PM10 can be emitted directly as fugitive dust or combustion particulates, or it can be formed many miles downwind from emission sources when various precursor pollutants interact in the atmosphere. Gaseous emissions of pollutants like NOx, SOx and VOC from combustion sources, and ammonia (NH_3) from human and animal wastes or combustion NOx control equipment can, given the right meteorological conditions, form particulate matter known as nitrates (NO_3), sulfates (SO_4), and organic compounds. These pollutants are known as secondary particulates, because they are not directly emitted but are formed through complex chemical reactions between directly emitted pollutants in the atmosphere.

Air Quality Figure 1 indicates that the state 24-hour ambient air quality standard for PM10 was exceeded every year from 1999 to 2008, with highs close to three and a half times the state 24-hour PM10 standard.

Fine Particulate Matter (PM2.5)

Fine particulate matter, or PM2.5 (particulate matter less than 2.5 microns in diameter), is derived either mainly from the combustion of materials, or from precursor gases (SOx, NOx, and VOC) through complex reactions in the atmosphere. PM2.5 consists mostly of sulfates, nitrates, ammonium, elemental carbon, and a small portion of organic and inorganic compounds. Some PM2.5 emissions come from fugitive dust sources such as unpaved roads and construction sites.

The Mojave Desert Air Basin in the area of the project site is classified as attainment or unclassified for both the state and the federal PM2.5 air quality standards, but as noted previously the area is not in attainment of the state and federal PM10 standards. This divergence indicates that the ambient particulate matter levels are most likely due to localized fugitive dust sources, such as vehicles travel on unpaved roads, agricultural operations, or wind-blown dust.

Sulfur Dioxide

The entire air basin is classified as attainment for the state and federal SO_2 standards. Sulfur dioxide is typically emitted as a result of the combustion of a fuel containing sulfur. Sources of SO_2 emissions within the MDAB come from a wide variety of fuels: gaseous, liquid and solid; however, the total SO_2 emissions within the eastern MDAB are limited due to the limited number of major stationary sources and California's and U.S. EPA's substantial reduction in motor vehicle fuel sulfur content. The project area's SO_2 concentrations are well below the state and federal ambient air quality standards.

Nitrates and Sulfates

PM nitrate (mainly ammonium nitrate) is formed in the atmosphere from the reaction of NOx and ammonia. NOx, as emitted from combustion sources, is mainly in the form of nitric oxide (NO). NO converts to NO_2 primarily by reacting with ozone in the ambient air and sunlight. The formed NO_2 can convert back to NO, which sustains the ozone formation reactions. NO_2 can also form organic nitrates, or be reduced to nitric acid by available hydroxyl radicals in the ambient air. Nitric acid reacts with ammonia in ambient

air to form ammonium nitrate. Ammonium nitrate, in its particulate form, can remain suspended in the ambient air and/or be transported long distance downwind as PM2.5. Ammonium nitrate, under certain conditions of heat and humidity, breaks down to NOx and starts a new ozone cycle again.

PM sulfate (mainly ammonium sulfate) is formed in the atmosphere from the oxidation of SO_2 and subsequent neutralization by ammonia in the atmosphere. The oxidation of SO_2 depends on many factors, which include the availability of sulfur, hydroxyl, hydroperoxy and methylperoxy radicals, and atmospheric humidity.

Summary

In summary, staff recommends the background ambient air concentrations in **Air Quality Table 5** for use in the modeling and impacts analysis. The recommended background concentrations are based on the maximum criteria pollutant concentrations from the past three years of available data collected at the monitoring stations within the Mojave Desert.

Air Quality Table 5
Staff Recommended Background Concentrations (µg/m^3)

Pollutant	Averaging Time	Recommended Background	Limiting Standard	Percent of Standard
NO_2	1 hour	73.3	339	22%
	Annual	7.3	57	13%
PM10	24 hour	96	50	192%
	Annual	12.7	20	64%
PM2.5	24 hour	12.9	35	39%
	Annual	4.5	12	38%
CO	1 hour	4,025	23,000	18%
	8 hour	1,367	10,000	14%
SO_2	1 hour	94.3	655	14%
	24 hour	13.1	105	12%
	Annual	2.7	80	3%

Source: ARB 2008, ARB 2009c, U.S. EPA 2009b and Energy Commission Staff Analysis
Note: PM2.5 24-hour data shown in **Air Quality Table 4** are 99th percentile values; however, the standard is based on the three year average of the 98th percentile, so the background concentration used is somewhat conservative.

Where possible, staff prefers that the recommended background concentrations come from nearby monitoring stations with similar characteristics. For this project the Jean monitoring station (ozone, PM10, PM2.5, and NO_2 [up to 2006]) is located reasonably close to the project site and should be fairly representative of the project site. The Barstow (CO) monitoring station is located in a more populated area and may provide conservatively high background concentrations for the project site. The Trona (SO_2) monitoring station, while located in a more remote area has two very large nearby emission sources of SOx (Searles Valley Minerals and Ace Cogeneration Company) so this monitoring station location should also provide representative or conservative SOx background concentrations for the project site.

The background 24-hour concentrations for PM10 are above the most restrictive existing ambient air quality standards, while the background concentrations for the other pollutants and averaging times are all below the most restrictive existing ambient air quality standards.

The pollutant modeling analysis was limited to the pollutants listed above in **Air Quality Table 5**; therefore, recommended background concentrations were not determined for the other criteria pollutants (ozone, lead, etc.) or background values determined for other ambient standards (visibility reducing particulates).

PROJECT DESCRIPTION

The proposed 400-MW project includes three solar concentrating thermal power plants, based on distributed power tower and heliostat mirror technology, in which heliostat (mirror) fields focus solar energy on power tower receivers near the center of each heliostat array. ISEGS 1 and 2, are designed to provide 100 MW of electricity and would occupy approximately 914 acres and 921 acres respectively; the 200-MW phase, ISEGS 3, would require occupy approximately 1,843 acres. All three phases would share an administration building, an operation and maintenance building, and a substation. Another 316 acres is needed for construction staging activities. Established dirt roads account for an additional five acres. ISEGS total project footprint amounts to approximately 4,065 acres (approximately 6.4 square miles).

Each plant includes a natural gas-fired steam boiler equipped with a low-NOx burner/air recirculation system to maintain NOx emissions below 9 ppm. These boilers provide thermal input to the turbine during the morning start-up cycle and during transient cloudy conditions. The operation of these boilers would not exceed four hours each day and 5 percent of the facility annual's heat input from the sun. To provide fuel to these new boilers, natural gas would be supplied to the site through a new, proposed six-mile long distribution pipeline ranging from 4 to 6 inches in diameter. From the Kern River Gas Transmission pipeline, the pipeline would extend 0.5 miles south to the northern edge of Ivanpah 3. From ISEGS 3, a supply line would extend northwest into the Ivanpah 3 power block. The main pipeline would continue along the eastern edge of Ivanpah 2 to another metering station at its southeastern corner. Again, a branch supply line would extend northwestwards into the center of the Ivanpah 2 power block. From that station, the pipeline would follow the paved access road from Colosseum Road past the administration/warehouse building to the Ivanpah 1 power block.
Project steam cycle cooling needs would be provided by air cooled condensers (ACCs) at each of the three plants, which will minimize water use substantially. The applicant is currently proposing the use of groundwater from wells just east of Ivanpah 2, which will be stored in tanks with underground pipelines constructed to connect to the three plants. Process wastewater will treated onsite and recycled for use at each of the three plants, and domestic wastewater will be disposed in a septic tank and an onsite leach field. Therefore, no industrial wastewater or sewer pipeline is proposed to be constructed.

The project would include other operating emission sources for operation and maintenance of the facility. Each plant also includes a diesel-fired 240-horsepower (hp)

fire pump engine (3 total at the site) and a 3,750-hp emergency generator engine, with ISEGS 3 having two emergency generator engines (4 total at the site). Additionally, it is proposed that the facility have tractor pulled mirror washing trailers and dedicated pickup trucks for personnel transport within the plants, which will create both tailpipe and fugitive dust emissions during operation.

PROJECT CONSTRUCTION

Construction of each of the three phases of the facility would last about 24 months, with a 12 month overlap between each phase. Thus, the construction of the entire facility would last up to four years. The construction is scheduled in the order of the plant number, and the construction of the gas pipeline is scheduled to occur during months 7 and 8 of ISEGS 1 construction.

Air Quality Table 6 presents the applicant's estimate of direct onsite and offsite (delivery and employee vehicle) construction emissions for NOx, VOC, SOx, CO, PM10 and PM2.5.

Air Quality Table 6
ISEGS Construction Emissions

Solar Facility Construction	Daily Emissions (lbs/day) [a]					
	NOx	SOx	CO	VOC	PM10	PM2.5
Maximum Daily Onsite Emissions	363	1	117	23	199	46
Maximum Daily Offsite Emissions	137	1	392	40	86	16
Maximum Daily Emissions	500	2	509	63	285	63
	Annual Emissions (tons/year) [a]					
Maximum Annual Onsite Emissions	29.9	0.1	9.9	2.0	18.5	4.3
Maximum Annual Offsite Emissions	11.4	0.1	34.3	3.5	6.0	1.5
Maximum Annual Emissions	41.3	0.2	44.2	5.4	24.5	5.8

Source: AFC (BSE2007a), and Data Responses (CH2ML 2008h).
Notes:
a. Emissions include fugitive dust.

The emission estimate appears reasonable in terms of the onsite equipment and offsite vehicle use and the offsite vehicle fugitive dust emissions. However, the onsite fugitive dust emissions estimate may be underestimated given the amount of activity on the site and appropriate level of control for the applicant's proposed mitigation measures (specifically watering unpaved roads). Staff has recommended additional mitigation measures, specifically the use of soil binders on unpaved roads and other inactive disturbed surfaces during construction, so that the applicant's fugitive dust emissions estimate and associated impact analysis will be reasonable for this project.

The emission values in **Air Quality Table 6** include incorporation of the fugitive dust mitigation measures. The unmitigated PM10 annual emission potential during construction would potentially be greater than 100 tons per year, so without mitigation the annual PM10 emissions would have the potential to exceed General Conformity applicability thresholds and the project would require a formal conformity determination as per the federal Clean Air Act (CAA) General Conformity Rule.

PROJECT OPERATION

The ISEGS facility would be a nominal 400 Megawatt (MW) heliostat mirror and power tower thermal solar electrical generating facility comprised of three plants, ISEGS 1 (100 MW), ISEGS 2 (100 MW) and ISEGS 3 (200 MW) (BSE 2007a). The direct air pollutant emissions from solar power generation are minimal; however, the facility will start-up each day with the assist of one large boiler associated with each plant and there are other auxiliary equipment and maintenance activities necessary to operate and maintain the facility.

The ISEGS onsite stationary and mobile emission sources are as follows:

- Three natural gas fueled boilers, two 231.1 MMBtu/hr boilers (ISEGS 1 and ISEGS 2), and one 462.2 MMBtu/hr boiler (ISEGS 3) used for daily startup, each limited to no more than 4 hours of use per day and no more than 1,460 hours of use per year;
- Three 240-bhp diesel-fired emergency fire water pump engines, one for each plant, that will operate in non-emergency mode no more than 50 hours per year or no more than required by National Fire Protection Association, whichever is greater;
- Four 3,750-bhp diesel-fired emergency generator engines fire water pump engines, one each for ISEGS 1 and 2, and two for ISEGS 3 that will operate in non-emergency mode no more than 50 hours per year;
- Onsite diesel and gasoline fueled maintenance vehicles used for mirror washing and other maintenance/operation support activities.

The following assumptions were used to develop the hourly, daily, and annual emissions estimate for ISEGS operation:

A. Maximum Hourly Emissions

- All boilers are operating.
- One emergency generator engine operates one-half hour for testing purposes.
- The maximum hourly use of the maintenance vehicles is 1/2000th the annual use, which is 60 miles for the heavy-duty mirror washing vehicles and 15 miles for the pickup trucks.
- 25 employees are traveling 50 mile one-way trip to/from the site and one heavy-duty delivery vehicle is traveling 50 mile one-way to/from the site during the hour.

B. Maximum Daily Emissions

- All boilers operate for 4 hours per day.
- All four emergency generator engines operate one hour each for testing purposes.
- All three emergency fire pump engines operate one hour each for testing purposes.
- The maximum daily use of the maintenance vehicles is 1/250th the annual use, which is 480 miles for the heavy duty mirror washing vehicles and 120 miles for the pickup trucks.

- 66 employees traveling 100 mile round trips to/from the site during the day and three heavy-duty delivery vehicle travel 100 mile round trips to/from the site during the day.

C. Maximum Annual Emissions

- All boilers operate for 1,460 hours per year.
- All four emergency generator engines operate 50 hours per year for testing purposes.
- All three emergency fire pump engines operate 50 hours per year for testing purposes.
- The heavy duty mirror washing vehicles travel 120,000 miles per year and the on-site pickup trucks travel 30,000 miles per year.
- There is a total of 2.34 million employee vehicle miles traveled and a total of 12,000 heavy-duty delivery vehicle miles traveled annually.

The ISEGS onsite stationary source, onsite mobile equipment, and offsite vehicle emissions, including fugitive PM10 emissions, are estimated and summarized in **Air Quality Table 7**.

Air Quality Table 7
ISEGS Operation - Maximum Hourly, Maximum Daily, and Annual Emissions

	Maximum Hourly Emissions (lbs/hr)					
Emission Source	NOx	SOx	CO	VOC	PM10	PM2.5
Boilers	10.00	2.50	16.90	4.90	6.80	6.80
Emergency Generator Engines	19.43	0.02	10.75	0.41	0.62	0.57
Emergency Fire Pump Engines	0.00	0.00	0.00	0.00	0.00	0.00
Maintenance Vehicles (all types)	2.32	0.02	1.48	0.18	14.60	3.13
Employee and Delivery Vehicles (offsite)	3.62	0.03	19.15	1.88	1.40	0.37
Total Maximum Hourly Emissions	35.38	2.57	48.28	7.38	23.41	10.87
Emission Source	Maximum Daily Emissions (lbs/day)					
Boilers	40.0	10.0	67.6	19.6	27.2	27.2
Emergency Generator Engines	77.7	0.1	43.0	1.7	2.5	2.3
Emergency Fire Pump Engines	4.6	0.0	4.1	0.2	0.2	0.2
Maintenance Vehicles (all types)	18.6	0.2	11.9	1.4	116.8	25.0
Employee and Delivery Vehicles (offsite)	20.5	0.2	101.9	10.0	7.4	2.0
Total Maximum Daily Emissions	161.4	10.4	228.4	32.9	154.1	56.7
Emission Source	Annual Emissions (tons/year) [a]					
Boilers	7.3	1.8	12.3	3.6	5.0	5.0
Emergency Generator Engines	3.9	0.0	2.1	0.1	0.1	0.1
Emergency Fire Pump Engines	0.1	0.0	0.1	0.0	0.0	0.0
Maintenance Vehicles (all types)	2.3	0.0	1.5	0.2	14.6	3.1
Employee and Delivery Vehicles (offsite)	1.8	0.0	17.1	1.7	1.2	0.3
Total Annual Emissions	15.4	1.9	33.1	5.5	20.9	8.5

Source: BSE 2007a, CH2ML 2008a, Tier II and Tier III maximum emissions for the engines and staff estimates of paved road dust emissions for the employee and delivery vehicles.

Note:

a – The annual emissions are based on permit limits, but the actual annual boiler use and annual emissions are expected to be less than a third of the permit limits.

Similar to the construction emissions estimate staff believes that the onsite fugitive dust emissions estimate may be underestimated given the amount of activity on the site and appropriate level of control for the applicant's proposed mitigation measures (specifically watering unpaved roads). Staff has recommended additional mitigation measures, specifically the use of soil binders on unpaved roads and other inactive disturbed surfaces during site operation, so that the applicant's fugitive dust emissions estimate and associated impact analysis will be reasonable for this project.

The emission values in **Air Quality Table 7** include incorporation of the fugitive dust mitigation measures. The unmitigated PM10 annual emission potential during operation would potentially be greater than 100 tons per year, so without mitigation the annual PM10 emissions would have the potential to exceed General Conformity applicability thresholds and the project would require a formal conformity determination as per the CAA General Conformity Rule.

The direct stationary source emissions from this project are well below the PSD and/or nonattainment NSR permitting applicability thresholds; therefore, the facility is considered a minor stationary source and likely would not create significant NEPA impacts.

Project Construction and Operation Overlap

For a period of time, the construction and operation of the facilities will overlap due to the staged construction and operation of the three plants. The applicant estimated the maximum overlapping emissions when ISEGS 1 is operating and ISEGS 2 is in construction and when ISEGS 1 and 2 are operating and ISEGS 3 is in construction. **Air Quality Table 8** presents the determined worst-case overlapping construction and operation emissions, which occur when operating ISEGS 1 and 2 and constructing ISEGS 3.

Air Quality Table 8
ISEGS Maximum Construction and Operations Overlap Emissions

	Hourly Emissions (lbs/hour) [a]					
Solar Facility Construction	NOx	SOx	CO	VOC	PM10	PM2.5
Construction Onsite Emissions	36.3	0.1	11.7	2.3	19.9	4.6
Construction Offsite Emissions	13.7	0.1	39.2	4.0	8.6	1.6
Solar Facility Operation						
Operation Onsite Emissions	26.0	1.3	20.2	3.0	13.8	6.1
Operation Offsite Emissions	2.4	0.0	12.8	1.3	0.9	0.2
Maximum Hourly Overlap Emissions	78.4	1.5	83.9	10.6	43.2	12.5
Solar Facility Construction	Daily Emissions (lbs/day) [a]					
Construction Onsite Emissions	363.4	1.0	116.7	23.0	199.2	46.3
Construction Offsite Emissions	136.9	1.3	392.3	39.7	85.9	16.5
Solar Facility Operation						
Operation Onsite Emissions	74.3	5.2	66.0	11.7	92.9	31.6
Operation Offsite Emissions	13.7	0.1	67.9	6.7	4.9	1.3
Maximum Daily Overlap Emissions	588.3	7.6	642.9	81.1	382.9	95.7
Solar Facility Construction	Annual Emissions (tons/year) [a]					
Construction Onsite Emissions	29.9	0.1	9.9	2.0	18.5	4.3
Construction Offsite Emissions	11.4	0.1	34.3	3.5	6.0	1.5
Solar Facility Operation						
Operation Onsite Emissions	7.2	0.9	8.3	2.0	12.3	4.6
Operation Offsite Emissions	1.2	0.0	11.4	1.1	0.8	0.2
Maximum Annual Emissions	49.7	1.1	63.9	8.6	37.6	10.6

Source: Data Responses (CH2ML 2008h) and staff's assessment of offsite emissions.
Note:
a. Emissions include fugitive dust and construction emissions are based on a 10-hour construction day.

The applicant modeled the onsite emissions shown above for the operation of ISEGS 1 and 2 and the construction of ISEGS 3, as well as the worst-case onsite emissions associated with operation of ISEGS 1 and construction of ISEGS 2 to determine the estimated worst-case impacts during project construction and partial operation overlap.

INITIAL COMMISSIONING

Initial commissioning refers to a period of approximately 60 days prior to beginning commercial operation when the equipment undergoes initial tuning and performance tests. Staff does not expect substantial change of emissions from the facility commissioning to that of full production.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Staff assessed three kinds of primary and secondary[2] impacts: construction, operational, and cumulative. Construction impacts result from the emissions occurring during site preparation and construction of the project. Operational impacts result from the emissions of the proposed project during normal operation, which includes all of the onsite auxiliary equipment (boilers, cooling tower, fire pump engine, etc.) and the maintenance vehicle emissions. Cumulative impacts result from the proposed project's

[2] Primary impacts potentially result from facility emissions of NOx, SOx, CO and PM10/2.5. Secondary impacts result from air contaminants that are not directly emitted by the facility but formed through reactions in the atmosphere that result in ozone, and sulfate and nitrate PM10/PM2.5.

incremental effect, together with other closely related past, present and reasonably foreseeable future projects whose impacts may compound or increase the incremental effect of the proposed project. (Pub. Resources Code § 21083; Cal. Code Regs., tit. 14, §§ 15064(h), 15065(c), 15130, and15355.)

METHOD AND THRESHOLD FOR DETERMINING CEQA SIGNIFICANCE

Energy Commission staff used two main CEQA significance criteria in evaluating this project. First, all project emissions of nonattainment criteria pollutants and their precursors (NOx, VOC, PM10 and SO_2) are considered CEQA significant cumulative impacts that must be mitigated. Second, any AAQS violation or any contribution to any AAQS violation caused by any project emissions is considered CEQA significant and must be mitigated. Potentially significant CEQA impacts are mitigated to less than significant with the application of maximum feasible mitigation.

For construction emissions, the mitigation that is considered is limited to controlling both construction equipment tailpipe emissions and fugitive dust emissions to the maximum extent feasible.

For operating emissions, when analyzing renewable projects with very low direct criteria pollutant emissions from stationary sources associated with electric generation that: 1) are located in areas with generally good air quality; and 2) are non-attainment of ambient air quality standards primarily or solely due to pollutant transport, the mitigation that is considered is limited to feasible emission controls. These feasible emission controls are applied to both the stationary sources (such as BACT) and the on-site non-stationary emission sources (such as maintenance vehicles) including associated fugitive dust emission sources.

The ambient air quality standards that staff uses as a basis for determining project CEQA significance are health-based standards established by the ARB and U.S. EPA. They are set at levels to adequately protect the health of all members of the public, including those most sensitive to adverse air quality impacts such as the aged, people with existing illnesses, children, and infants, including a margin of safety.

NEPA AIR QUALITY ANALYSIS METHODOLOGY

The NEPA air quality analysis considers the following three regulatory thresholds:

- General Conformity applicability thresholds, which for this project is limited to 100 tons per year of PM10 and PM10 precursors (NOx and SOx). This regulatory threshold applies to both project construction and operation emissions.
- PSD permit applicability thresholds, which for this project as a listed major source category is 100 tons per year for the criteria pollutants. This regulatory threshold only applies to project operation and only applies to direct project emissions, and does not apply to secondary emissions, such as fugitive dust emissions.
- Project would cause air quality impacts in exceedance of the NAAQS.

If the project were to exceed any of first two of these regulatory thresholds then the impacts would be considered potentially significant and would require a further refined

impact and mitigation analysis in order to demonstrate that the Project would not result in a significant impact based on the potential to cause exceedances of the NAAQS. However, regardless of the NEPA requirements for this project, a refined impact and mitigation analysis has been conducted per CEQA requirements, and that analysis and the resulting NEPA findings are described in detail in this document.

Impacts from Closure and Decommissioning

Impacts from closure and decommissioning, as a one-time limited duration event, are evaluated with the same methods and thresholds as construction emissions as discussed above.

DIRECT/CUMULATIVE IMPACTS AND MITIGATION

While the emissions are the actual mass of pollutants emitted from the project, the impacts are the concentration of pollutants from the project that reach the ground level. When emissions are expelled at a high temperature and velocity through the relatively tall stack, the pollutants would be substantially diluted by the time they reach ground level. The emissions from the proposed project, both stationary source and onsite mobile source emissions, are analyzed through the use of air dispersion models to determine the probable impacts at ground level.

Air dispersion models provide a means of predicting the location and ground level magnitude of the impacts of a new emissions source. These models consist of several complex series of mathematical equations, which are repeatedly calculated by a computer for many ambient conditions to provide theoretical maximum offsite pollutant concentrations short-term (1-hour, 3-hour, 8-hour, and 24-hour) and annual periods. The model results are generally described as maximum concentrations, often described as a unit of mass per volume of air, such as micrograms per cubic meter ($\mu g/m^3$).

The applicant has used the U.S. EPA-approved ARMS/EPA Regulatory Model (AERMOD version 07026) air dispersion model to estimate the direct impacts of the project's NOx, PM10, CO, and SOx emissions resulting from project construction and operation. Additionally, boiler emission fumigation impacts during inversion breakup conditions were determined using the U.S. EPA approved SCREEN3 model.

Staff revised the background concentrations provided by the applicants, replacing them with the available highest ambient background concentrations for the last three year from representative monitoring sites as show in **Air Quality Table 5**. Staff added the modeled impacts to these background concentrations, then compared the results with the ambient air quality standards for each respective air contaminant to determine whether the project's emission impacts would cause a new violation of the ambient air quality standards or would contribute to an existing violation.

The inputs for the air dispersion models include stack information (exhaust flow rate, temperature, and stack dimensions), specific boiler emission data and meteorological data, such as wind speed, atmospheric conditions, and site elevation. For this project, the meteorological data used as inputs to the model included hourly wind speeds and directions measured at the Jean, Nevada, meteorological site during 2001 and 2002, which is the closest complete meteorological data source to the project site, and

supplemented to fill missing data using the Nellis Air Force Base meteorological site. Concurrent upper air data from the Mercury Desert Rock Airport in Mercury, Nevada was also used.

Additionally, the applicant obtained hourly ozone and NO_2 ambient data from the Barstow monitoring station for 2001 and 2002 that was used in a more refined NO_2 impact modeling analysis using the Plume Volume Molar Ratio Method (PVMRM), available with AERMOD that integrates the Ozone Limiting Method (OLM) with the downwind plume stoichiometry.

Proposed Project

Construction Impacts Analysis

The ISEGS project consists of three phases, each of which would require approximately 24 months of partially overlapping construction that would last a total of 48 months (BSE2007a). Construction generally consists of two major activities: site preparation, and construction and installation of major equipment and structures. In addition to fugitive dust emissions resulting from the site preparation, emissions from construction equipment exhausts, such as vehicles and internal combustion engines, would also occur during the project construction phase. In addition, a small amount of hydrocarbon emissions may occur because of the temporary storage of petroleum fuel at the site.

Using estimated peak hourly, daily, and annual construction equipment exhaust and fugitive dust emissions, the applicant performed a modeling analysis. **Air Quality Table 9** presents the results of the applicant's modeling analysis.

Air Quality Table 9
Maximum Project Construction Impacts

Pollutants	Avg. Period	Impacts ($\mu g/m^3$)	Background [a] ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	Standard ($\mu g/m^3$)	Percent of Standard
NO_2	1-hr	200.4	73.3	273.7	339	81%
	Annual	0.2	7.3	7.5	57	13%
PM10	24-hr	6.7	96	102.7	50	205%
	Annual	0.2	12.7	12.9	20	65%
PM2.5	24-hr	1.6	12.9	14.5	35	41%
	Annual	0.0	4.5	4.5	12	38%
CO	1-hr	109	4,025	4,134	23,000	18%
	8-hr	24	1,367	1,391	10,000	14%
SO_2	1-hr	0.9	94.3	95.2	665	14%
	24-hr	0.0	13.1	13.1	105	12%
	Annual	0.0	2.7	2.7	80	3%

Source: CH2ML 2008h.
Note:
a - Background values have been adjusted per staff recommended background concentrations shown in **Air Quality Table 5**.

This modeling analysis indicates, with the exception of 24-hour PM10 impacts, that the project would not create new exceedances or contribute to existing exceedances for any of the modeled air pollutants. Staff notes that the maximum local background 24-hour measurements of PM10 may be substantially impacted by wind-blown dust. However, in light of the existing PM10 and ozone non-attainment status for the project

site area, staff considers the construction NOx, VOC, and PM emissions to be potentially CEQA significant and, therefore, staff is recommending that the off-road equipment and fugitive dust emissions be mitigated to the extent feasible.

The modeling analysis shows that, after implementation of the recommended fugitive dust mitigation measures, the project's construction is not predicted to cause violations of the NAAQS. Therefore, no significant NEPA impacts would occur after implementation of the fugitive dust mitigation measures.

Construction Impacts Mitigation

To mitigate the impacts due to construction of the facility, the applicant has proposed to use the following mitigation measures from the South Coast Air Quality Management District CEQA Guidelines (CH2ML 2008i):

A. All unpaved roads and disturbed areas in the project and linear construction sites will be watered until sufficiently wet to ensure that no visible dust plumes leave the project site.

B. Vehicle speeds will be limited to 10 miles per hour within the construction site.

C. All construction equipment vehicle tires will be washed or cleaned free of dirt prior to entering paved roadways.

D. Gravel ramps will be provided at the tire washing/cleaning station.

E. All entrances to the construction site will be graveled or treated with water or dust soil stabilization compounds.

F. Construction areas adjacent to any paved roadway will be provided with sandbags to prevent run-off to the roadway.

G. All paved roads within the construction site will be swept twice daily when construction activity occurs.

H. At least the first 500 feet of any paved public roadway, accessed from the construction site or from unpaved roads en route to the construction site and construction staging areas will be swept regularly on days when construction activity occurs.

I. All soil storage piles and disturbed areas that remain inactive for longer than 10 days will be covered or treated with appropriate dust suppressant compounds.

J. All vehicles that are used to transport solid bulk material on public roadways and that have potential to cause visible emissions will be provided with a cover, or the materials will be sufficiently wetted and loaded onto the trucks in a manner to provide at least two feet of freeboard.

K. Wind erosion control techniques such as windbreaks, water, chemical dust suppressants, and vegetation will be used on all construction areas that may be

disturbed. Any windbreaks used will remain in place until the soil is stabilized or permanently covered with vegetation.

L. Construction equipment will be shut down to avoid excessive idling emissions.

M. Construction equipment will use low sulfur, low aromatic diesel fuel.

N. Construction equipment will be maintained in top service shape.

O. Construction equipment used will meet state and federal emission standards for Tier II and Tier III.

Staff recommends the implementation of mitigation measures contained in Conditions of Certification **AQ-SC1 to AQ-SC5**, which incorporate the applicant's proposed measures with revisions and additions recommended by staff to reduce the impacts from the construction of the proposed project. Specific recommendations from staff include a more aggressive dust control requirement to use polymer based, or equivalent, soil stabilizers[3] on the site's unpaved roads and inactive disturbed surfaces during construction.

The construction of the project would cause particulate matter emissions that would add to the existing violations of the ambient PM10 air quality standards. Therefore, if unmitigated, the project's construction PM10 emission impacts would be CEQA significant. Additionally, unmitigated PM10 emissions could exceed General Conformity applicability thresholds, and could potentially cause NEPA significant impacts. However, staff believes that the implementation of proposed specific mitigation measures during construction of the facility as identified in the conditions of certification would eliminate the potential to cause the short-term CEQA impacts of PM10 to a level of less than significant, and would mitigate the potential for NEPA significant impacts.

Operational Impacts

The following section discusses the project's direct operating and overlapping construction/operating ambient air quality impacts, as estimated by the applicant, and evaluated by staff. Additionally, this section discusses the recommended mitigation measures.

[3] The soil stabilizer product used will require prior approval by BLM and the Energy Commission.

Operational Modeling Analysis

The applicant has provided a modeling analysis using the EPA-approved AERMOD model to estimate the impacts of the project's NOx, PM10, CO, and SOx emissions[4] resulting from project operation (CH2ML 2008h). Similar to the assessment of construction impacts, staff added the modeled impacts to the available highest ambient background concentrations recorded during the previous three years from nearby monitoring stations to assess the project operational impacts. **Air Quality Table 10** presents the results of the applicant's modeling analysis.

Air Quality Table 10
Project Operation Emissions Impacts

Pollutants	Avg. Period	Impacts ($\mu g/m^3$)	Background [a] ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	Standard ($\mu g/m^3$)	Percent of Standard
NO_2	1-hr	150.4	73.3	223.4	339	66%
	Annual	0.1	7.3	7.4	57	13%
PM10	24-hr	3.3	96	99.3	50	199%
	Annual	0.5	12.7	13.2	20	66%
PM2.5 [c]	24-hr [b]	0.2	12.9	13.1	35	37%
	Annual	0.0	4.5	4.5	12	38%
CO	1-hr	321	4,025	4,346	23,000	19%
	8-hr	55	1,367	1,422	10,000	14%
SO_2	1-hr	3.9	94.3	98.2	665	15%
	24-hr [b]	0.1	13.1	13.2	105	13%
	Annual	0.0	2.7	2.7	80	3%

Source: CH2ML 2008h.
Notes:
[a] Background values have been adjusted per staff recommended background concentrations shown in **Air Quality Table 5**.
[b] Maximum 24-hour hour PM2.5 and SO_2 concentrations occur under fumigation conditions.
[c] PM2.5 impacts were not remodeled to include maintenance emissions like the other pollutants, the results presented are stationary source emission only from the original AFC modeling analysis. With the maintenance PM2.5 emission the PM2.5 results would be higher than shown but lower than the PM10 results as the PM2.5 emissions are less than the PM10 emissions. Therefore, the PM2.5 impacts with maintenance emissions would not create new exceedances of the ambient air quality standards.

This modeling analysis indicates, with the exception of 24-hour PM10 impacts, that the project would not create new exceedances or contribute to existing exceedances for any of the modeled air pollutants. Staff notes that the maximum local background 24-hour measurements of PM10 may be substantially impacted by wind-blown dust. However, in light of the existing PM10 and ozone non-attainment status for the project site area, staff considers the operating NOx, VOC, and PM emissions to be potentially

[4] The applicant's modeling analysis uses assumptions that are somewhat different than those presented in the emissions table (**Air Quality Table 7**). Specifically, for the annual emissions modeling the applicant assumed 520 hours of boiler operation rather than the permitted maximum 1,460 hours, and for all averaging periods used manufacturer specified engine emission factors rather than the worst-case emission standard based values used by staff in **Air Quality Table 7;** and assumed one-hour of emergency engine testing rather than the permitted maximum one-half hour of testing. These differences would not change staff's overall modeling analysis impact findings, but staff will be adding a condition of certification limiting boiler operation, in terms of heat input, to that which was modeled. This heat input level restriction also formalizes the applicant's stipulation that "Heat input from natural gas will not exceed 5 percent of the heat input from the sun, on an annual basis". (BSE 2007a, p. 5.1-1).

CEQA significant and, therefore, staff is recommending that the stationary equipment, the off-road maintenance equipment, and fugitive dust emissions be mitigated to the extent feasible.

The modeling analysis shows that, after implementation of the recommended fugitive dust mitigation measures, the project's operation is not predicted to cause violations of the NAAQS. Therefore, no significant NEPA impacts would occur after implementation of the fugitive dust mitigation measures.

Construction/Operation Overlapping Impacts

The applicant has provided a modeling analysis using the EPA-approved AERMOD model to estimate the impacts of the project's NOx, PM10, CO, and SOx emissions[5] resulting from worst-case overlap when the project is in partial operation and still being constructed (CH2ML 2008h). Similar to the assessment of the construction and operating impacts, staff added the modeled impacts to the available highest ambient background concentrations recorded during the previous three years from nearby monitoring stations to assess the project overlapping construction/operation impacts. **Air Quality Table 11** presents the results of the applicant's modeling analysis.

Air Quality Table 11
Project Overlapping Construction/Operation Emission Impacts

Pollutants	Avg. Period	Impacts ($\mu g/m^3$)	Background [a] ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	Standard ($\mu g/m^3$)	Percent of Standard
NO_2	1-hr	202.4	73.3	275.7	339	81%
	Annual	0.3	7.3	7.6	57	13%
PM10	24-hr	10.4	96	106.4	50	213%
	Annual	0.3	12.7	13.0	20	65%
PM2.5	24-hr	3.2	12.9	16.1	35	46%
	Annual	0.3	4.5	4.8	12	40%
CO	1-hr	261	4,025	4,286	23,000	19%
	8-hr	52	1,367	1,419	10,000	14%
SO_2	1-hr	3.6	94.3	97.9	665	15%
	24-hr	0.0	13.1	13.1	105	12%
	Annual	0.0	2.7	2.7	80	3%

Source: CH2ML 2008h.
Notes:
[a] Background values have been adjusted per staff recommended background concentrations shown in **Air Quality Table 5**.

This modeling analysis again indicates, with the exception of 24-hour PM10 impacts, that the project would not create new exceedances or contribute to existing exceedances for any of the modeled air pollutants. Considering the existing PM10 and ozone non-attainment status for the project site area, staff considers the construction and operating NOx, VOC, and PM emissions to be potentially CEQA significant and, therefore, as noted previously staff is recommending that the construction and operations emission sources be mitigated to the extent feasible.

[5] The applicant's modeling analysis uses assumptions that are somewhat different than those presented in the emissions table (**Air Quality Table 8**). Specifically, for the operating emissions used are revised as previously noted for the operating emission impact modeling.

The modeling analysis shows that, after implementation of the recommended fugitive dust mitigation measures, the project's worst-case construction/operation overlap period is not predicted to cause violations of the NAAQS. Therefore, no significant NEPA impacts would occur after implementation of the fugitive dust mitigation measures.

Chemically Reactive Pollutant Impacts

The project will have direct emissions of chemically reactive pollutants (NOx, SOx, and VOC), but will also have indirect emission reductions associated with the reduction of fossil-fuel fired power plant emissions due to the project displacing the need for their operation. The exact nature and location of such reductions is not known and the overall magnitude and downwind impact of those upwind emission reductions is speculative and staff's impact analysis has not considered these potential reductions as an offset source for the project's emissions, so the discussion below focuses on the direct emissions from the project.

Ozone Impacts

There are air dispersion models that can be used to quantify ozone impacts, but they are used for regional planning efforts where hundreds or even thousands of sources are input into the modeling to determine ozone impacts. There are no regulatory agency models approved for assessing single source ozone impacts. However, because of the known relationship of NOx and VOC emissions to ozone formation, it can be said that the emissions of NOx and VOC from the ISEGS project do have the potential (if left unmitigated) to contribute to higher ozone levels in the region, which are already designated nonattainment for the state ozone standard.

PM2.5 Impacts

Secondary particulate formation, which is assumed to be 100% PM2.5, is the process of conversion from gaseous reactants to particulate products. The process of gas-to-particulate conversion, which occurs downwind from the point of emission, is complex and depends on many factors, including local humidity and the presence of air pollutants. The basic process assumes that the SOx and NOx emissions are converted into sulfuric acid and nitric acid first and then the acids react with ambient ammonia to form sulfate and nitrate. The sulfuric acid reacts with ammonia much faster than nitric acid and converts completely and irreversibly to particulate form. Nitric acid reacts with ammonia to form both a particulate and a gas phase of ammonium nitrate. The particulate phase will tend to fall out; however, the gas phase can revert back to ammonia and nitric acid. Thus, under the right conditions, ammonium nitrate and nitric acid establish a balance of concentrations in the ambient air. There are two conditions that are of interest, described as *ammonia rich* and *ammonia poor*. The term ammonia rich indicates that there is more than enough ammonia to react with all the sulfuric acid and to establish a balance of nitric acid-ammonium nitrate. Further ammonia emissions in this case would not necessarily lead to increases in ambient PM2.5 concentrations. In the case of an ammonia poor environment, there is insufficient ammonia to establish a balance and thus additional ammonia would tend to increase PM2.5 concentrations.

The northeastern San Bernardino County portion of the Mojave Desert Air Basin has not undergone the rigorous secondary particulate studies that have been performed in other areas of California, such as the San Joaquin Valley, that have more serious fine

particulate pollution problems. However, due to the limited agricultural activity in the area the project site area would likely be characterized as ammonia poor, and the ISEGS project is not a notable source of ammonia emissions so the small amount of operating NOx and SOx emissions that would be generated by this project would have a reduced potential to create secondary particulate.

Impact Summary

The applicant is proposing to mitigate the project's stationary source NOx, VOC, SO_2, and PM10/PM2.5 emissions through the use of boiler emission controls (Low NOx burner and flue gas recirculation) and natural gas fuel for the boilers, and use emergency engines that meet the highest available EPA/ARB Tier emission standards fueled with California 15 ppm sulfur diesel fuel. Additionally, staff recommends additional mitigation, specified in conditions of certification **AQ-SC6** and **AQ-SC7,** to reduce maintenance vehicle emissions, both tailpipe emission and fugitive dust emissions that could contribute to further ozone and PM10 violations. With the applicant proposed and staff recommended emission mitigation, it is staff's belief that the project would not cause CEQA significant secondary pollutant impacts.

Operations Mitigation

Applicant's Proposed Mitigation

Emission Controls

As discussed in the air quality section of the AFC (BSE 2007a), the applicant proposes the following emission controls on the stationary equipment associated with the ISEGS operation:

Boilers

The applicant's proposed mitigation for the three boilers includes Low-NOx burners and 20 percent flue gas recirculation (for NOx), good combustion practices (for CO), and operate exclusively on pipeline quality natural gas (for VOC, PM and SOx) to limit boiler emission levels. The AFC (BSE 2007a), and FDOC conditions (MDAQMD 2009b) provides the following emission limits, each for the two smaller (231.1 MMBtu/hour) boilers:

- NOx: 9.0 ppmvd at 3% O_2 (one-hour average), 2.5 lb/hour
- CO: 25 ppmvd at 3% O_2 (one-hour average), 4.2 lb/hour
- VOC: 12.6 ppmvd, 1.2 lb/hour
- PM10: 1.7 lb/hour
- SO_2: 1.7 ppmvd, 0.6 lb/hour

And provide the following emission limit for the larger (462.2 MMBtu/hour) boiler:

- NOx: 9.0 ppmvd at 3% O_2 (one-hour average), 5.0 lb/hour
- CO: 25 ppmvd at 3% O_2 (one-hour average), 8.5 lb/hour
- VOC: 12.6 ppmvd, 2.5 lb/hour

- PM10: 3.47 lb/hour
- SO_2: 1.7 ppmvd, 1.3 lb/hour

Emergency Generator Engines

The applicant's proposed controls for the emergency generator engine is to purchase a new engine meeting current emission standard requirements (Tier 2) for 3,470 bhp engines. Additionally only ARB low sulfur (15 ppm) diesel fuel will be used. The specific emission levels for the selected engine are currently unknown but they will be no higher than following Tier 2 emission standards:

- NOx: 4.8 grams per break horsepower (including non-methane hydrocarbons - NMHC)
- CO: 2.6 grams per break horsepower
- VOC: (see NOx above)
- PM10: 0.15 grams per break horsepower
- SO_2: 15 ppm sulfur content fuel

Fire Water Pump Engines

The applicant's proposed the use of a Tier 2 Engine. However, based on currently regulatory requirements (NSPS Subpart IIII - Table 4) staff will be requiring the use of a Tier 3 engine for the 240 horsepower fire pump engines that will have emission not higher than the following Tier 3 emission standards:

- NOx: 3.0 grams per break horsepower (including NMHC)
- CO: 2.6 grams per break horsepower
- VOC: (see NOx above)
- PM10: 0.15 grams per break horsepower
- SO_2: 15 ppm sulfur content fuel

Maintenance Vehicles

The applicant has not proposed any specific emission controls for this emission source.

Delivery and Employee Vehicles

The applicant has not proposed any specific emission controls for this emission source.

Emission Offsets

The applicant has not proposed any emission offsets and the stationary source emissions for ISEGS as currently proposed by the applicant would be well below District offset thresholds.

Adequacy of Proposed Mitigation

Staff concurs with the District's determination that the project's stationary source proposed emission controls/emission levels for criteria pollutants meets regulatory requirements and that the proposed stationary source emission levels are reduced adequately.

Staff Proposed Mitigation

As mentioned earlier in the discussions of the ozone and PM10 impacts, staff believes that the project's ozone precursors and PM10 emissions, if unmitigated, could cause CEQA significant. Additionally, staff believes a solar renewable project, which would have a 30 to 40-year life, located in an ozone and PM10 nonattainment area and just upwind of other ozone and PM10 nonattainment areas, should address its contribution to the potentially ongoing nonattainment of the PM10 and ozone standards. Therefore, staff recommends the following additional mitigation measures:

- Require the use new model year vehicles at the time of purchase for onsite maintenance, or equivalently low emitting vehicles as long as those vehicles can be demonstrated to have a similar or lower emission profile than new model year vehicles.
- Limit vehicle speeds within the facility to no more than ten miles per hour on unpaved areas that have not undergone soil stabilization, and up to 25 miles per hour on stabilized unpaved roads as long as no visible dust plumes are observed, to address fugitive PM emissions from the site;
- Apply and maintain a non-toxic soil binder[6] to the onsite unpaved roads to create a durable stabilized surface;
- Additional ongoing operations fugitive dust emissions control techniques such as windbreaks, trackout controls, etc. should be identified in a fugitive dust control plan and used on areas that could be disturbed by vehicles or wind. Any windbreaks used would remain in place until the soil or road is stabilized: and

Staff recommendations for onsite maintenance vehicles and ongoing fugitive dust emissions control are in conditions of certification **AQ-SC6** and **AQ-SC7**, respectively.

Staff is proposing Condition of Certification **AQ-SC8** to ensure that the license is amended as necessary to incorporate changes to the air quality permits.

Staff recommendation to require the engines meet model year EPA/ARB Tier emission standards for the year purchased is in condition of certification **AQ-SC9**.

Staff recommends Condition of Certification **AQ-SC10** to ensure that the boiler operation does not exceed the amount that was modeled in the applicant's air quality modeling analysis and to formalize the applicant's stipulation that "Heat input from natural gas will not exceed 5 percent of the heat input from the sun, on an annual basis". (BSE 2007a, p. 5.1-1).

[6] The soil stabilizer product used will require prior approval by BLM and the Energy Commission.

Staff believes that the implementation of its recommended mitigation measures would reduce the potential CEQA emission impacts from the facility on ozone and PM10 to a level of less than significant. Additionally, staff believes that the implementation of its recommended operations fugitive dust mitigation measure would mitigate the potential for NEPA adverse impacts.

Staff has considered the minority population surrounding the site (see **Socioeconomics Figure 1**). Since the project's direct CEQA air quality impacts have been reduced to less than significant, there is no environmental justice issue for air quality.

Closure and Decommissioning Impacts and Mitigation

Eventually the facility will close, either at the end of its useful life or due to some unexpected situation such as a natural disaster or catastrophic facility breakdown. When the facility closes, all sources of air emissions would cease to operate and thus impacts associated with those emissions would no longer occur. The only other expected emissions would be equipment exhaust and fugitive particulate emissions from the dismantling activities. These activities would be of much a shorter duration than construction of the project, equipment are assumed to have much lower comparative emissions due to technology advancement, and fugitive dust emissions would be required to be controlled in a manner at least equivalent to that required during construction. Therefore, while there will be adverse CEQA air quality impacts during decommissioning they are expected to be less than significant.

Alternative 1 – No Action Alternative

In the No Project / No Action Alternative, the proposed action would not be undertaken. The Bureau of Land Management (BLM) land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan.

The results of the No Project / No Action Alternative would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project.
- The benefits of the proposed project in displacing fossil fuel fired generation and reducing associated pollutant emissions would not occur.

If this project were not approved, renewable projects would likely be developed on other sites in the Mojave Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are two large solar projects proposed on BLM land in California and Nevada within a few miles of the Ivanpah site. In addition, as of August 2009 there were 66 applications for solar projects covering 611,692 acres pending with BLM in the California Desert District (CDD).

CUMULATIVE IMPACTS

Cumulative impacts are defined as "two or more individual effects which, when considered together, are considerable or . . . compound or increase other environmental impacts." (CEQA Guidelines, § 15355) A cumulative impact consists of an impact that is created as a result of a combination of the project evaluated in the EIR together with other projects causing related impacts." (CEQA Guidelines, § 15130(a)(1).) Such impacts may be relatively minor and incremental, yet still be significant because of the existing environmental background, particularly when one considers other closely related past, present, and reasonably foreseeable future projects.

This analysis is concerned with *criteria* air pollutants. Such pollutants have impacts that are usually (though not always) cumulative by nature. Rarely would a project cause a violation of a federal or state criteria pollutant standard. However, a new source of pollution may contribute to violations of criteria pollutant standards because of the existing background sources or foreseeable future projects. Air districts attempt to attain the criteria pollutant standards by adopting attainment plans, which comprise a multi-faceted programmatic approach to such attainment. Depending on the air district, these plans typically include requirements for air offsets and the use of Best Available Control Technology (BACT) for new sources of emissions, and restrictions of emissions from existing sources of air pollution.

Much of the preceding discussion is concerned with cumulative impacts. The "Existing Ambient Air Quality" subsection describes the air quality background in northeastern San Bernardino County portion of the Mojave Desert Air Basin, including a discussion of historical ambient levels for each of the assessed criteria pollutants. The "Construction Impacts and Mitigation" subsection discusses the project's contribution to the local existing background caused by project construction. The "Operation Impacts and Mitigation" subsection discusses the project's contribution to the local existing background caused by project operation. The following subsection includes two additional analyses:

- a summary of projections for criteria pollutants by the air district and the air district's programmatic efforts to abate such pollution;
- an analysis of the project's *localized cumulative impacts*, the project's direct operating emissions combined with other local major emission sources;

Summary of Projections

The northeastern San Bernardino County portion of the MDAB is designated as non-attainment for both the federal and State PM10 standards, and for the State ozone standard. PM2.5, CO, NO_2, and SO_2 are all considered to be attainment or unclassified for the federal and State standards.

Ozone

Since a portion of San Bernardino County in the Mojave Desert is currently classified as non-attainment, south and west of the project site, for the federal 8-hour ozone standard, the District is required to prepare and adopt an ozone attainment plan for

submittal to the U.S. EPA describing how it will achieve attainment with the federal 8-hour standard. The project is not specifically subject to the provisions in the federal attainment plan and the site is outside of the non-attainment area.

Particulate Matter

The District is currently classified as nonattainment for the state and the federal 24-hour PM10 air quality standard. The District first adopted a Federal Particulate Matter (PM10) Attainment Plan (PMAP) in July 31, 1995. However, some experts are critical of the federal standards as not being sufficiently health protective. California has adopted standards that are far more stringent for PM10. Currently, virtually all air districts in the state (the lone exception being Lake County) are designated nonattainment of the state PM10 standard. There is no legal requirement for air districts to provide plans to attain the state PM10 standard, so air districts have not developed such plans.

In 1997, the federal government adopted PM2.5 standards, as did the state in 2003. The EPA has determined that the area is unclassified, or attainment for both the annual and the 24-hour federal PM2.5 standard. However, the ARB classified the area as nonattainment of the annual state PM2.5 air quality standard.

The PMAP states that "(t)he air quality of the MDAQMD is impacted by both fugitive dust from local sources and occasionally by region-wide wind blown dust during moderate to high wind episodes. This region-wide or “regional” event includes contributions from both local and distant dust sources which frequently result in violations of the NAAQS that are multi-district and interstate in scope." It also states that "(i)t is not feasible to implement control measures to reduce dust from regional wind events." Therefore, the District would have put considerable effort to reduce the emissions from "…unpaved road travel, construction, and local disturbed areas in the populated areas, and certain stationary sources operating in the rural Lucerne Valley."

As a solar power generation facility, the direct air pollutant emissions from power generation are negligible and the emission sources are limited to auxiliary equipment and maintenance activities. With the mitigation required by the recommended staff conditions and District conditions, it is unlikely that the project would have a CEQA significant impact on particulate matter emissions.

Summary of Conformance with Applicable Air Quality Plans

The applicable air quality plans do not outline any new control measures applicable to the proposed project’s operating emission sources. Therefore, compliance with existing District rules and regulations would ensure compliance with those air quality plans.

Localized Cumulative Impacts

Since ISEGS air quality impacts can be reasonably estimated through air dispersion modeling (see the “Operational Modeling Analysis” subsection) the project contributions to localized cumulative impacts can be estimated. To represent *past* and, to an extent, *present projects* that contribute to ambient air quality conditions, the Energy Commission staff recommends the use of ambient air quality monitoring data (see the

"Environmental Setting" subsection), referred to as the *background*. The staff takes the following steps to estimate what are additional appropriate "present projects" that are not represented in the background and "reasonably foreseeable projects":

- First, the Energy Commission staff (or the applicant) works with the air district to identify all projects that have submitted, within the last year of monitoring data, new applications for an authority to construct (ATC) or permit to operate (PTO) and applications to modify an existing PTO within six miles of the project site. Based on staff's modeling experience, beyond six miles there is no statistically considerable concentration overlap for non-reactive pollutant concentrations between two stationary emission sources.
- Second, the Energy Commission staff (or the applicant) works with the air district and local counties to identify any new area sources within six miles of the project site. As opposed to point sources, area sources include sources like agricultural fields, residential developments or other such sources that do not have a distinct point of emission. New area sources are typically identified through draft or final Environmental Impact Reports (EIRs) that are prepared for those sources. The initiation of the EIR process is a reasonable basis on which to determine what is "reasonably foreseeable" for new area sources.
- The data submitted, or generated from the applications with the air district for point sources or initiating the EIR process for area sources, provides enough information to include these new emission sources in air dispersion modeling. Thus, the next step is to review the available EIR(s) and permit application(s), determine what sources must be modeled and how they must be modeled.
- Sources that are not new, but may not be represented in ambient air quality monitoring are also identified and included in the analysis. These sources include existing sources that are co-located with or adjacent to the proposed source (such as an existing power plant). In most cases, the ambient air quality measurements are not recorded close to the proposed project, thus a local major source might not be well represented by the background air monitoring. When these sources are included, it is typically a result of there being an existing source on the project site and the ambient air quality monitoring station being more than two miles away.
- The modeling results must be carefully interpreted so that they are not skewed towards a single source, in high impact areas near that source's fence line. It is not truly a cumulative impact of the ISEGS if the high impact area is the result of high fence line concentrations from another stationary source and BSEP is not providing a substantial contribution to the determined high impact area.

Once the modeling results are interpreted, they are added to the background ambient air quality monitoring data and thus the modeling portion of the cumulative assessment is complete. Due to the use of air dispersion modeling programs in staff's cumulative impacts analysis, the applicant must submit a modeling protocol, based on information requirements for an application, prior to beginning the investigation of the sources to be modeled in the cumulative analysis. The modeling protocol is typically reviewed, commented on, and eventually approved in the Data Adequacy phase of the licensing procedure. Staff typically assists the applicant in finding sources (as described above), characterizing those sources, and interpreting the results of the modeling. However, the

actual modeling runs are usually left to the applicant to complete. There are several reasons for this: modeling analyses take time to perform and require substantial expertise, the applicant has already performed a modeling analysis of the project alone (see the "Operational Modeling Analysis" subsection), and the applicant can act on its own to reduce stipulated emission rates and/or increase emission control requirements as the results warrant. Once the cumulative project emission impacts are determined, the necessity to mitigate the project emissions can be evaluated, and the mitigation itself can be proposed by staff and/or the applicant (see the "Mitigation" subsection).

The applicant, in consultation with the District, has conducted a survey of stationary sources that are either under construction, or have received permits to be built or operate in the near future and that have the potential for emissions of criteria air contaminants within six miles of the project site. The survey results indicate that no such sources exist within the 6-miles radius[7] of the proposed project site (CH2ML 2008a).

There are several proposed projects near the project site including several other renewable energy facilities (solar and wind), an airport, a high speed train, a new commercial/residential development in Jean, and other long-term projects with minimal air quality impacts, and temporary projects with no long term air quality impacts. In general, most of these projects would create minimal long-term emissions, but construction emissions of the other renewable energy facilities, the airport, and the large development in Jean will likely have high temporary emissions from construction vehicles and fugitive dust. In the long-term, several of the developments should cause beneficial impacts such as the high-speed train reducing traffic emissions on I-15, and the renewable energy projects reducing emissions within the area of the Western Electricity Coordinating Council (WECC).

No additional cumulative air quality impact modeling analysis was performed, and while adverse cumulative impacts would likely occur, no CEQA significant cumulative air quality impacts are expected after implementation of staff's recommended project mitigation measures. However, staff is aware of a tremendous potential development of wind and solar in the desert southwest of the United States, and in the California Desert Conservation Area where ISEGS would be located. While the number of renewable project filings is much larger than what will eventually be built and operated in the desert southwest, staff believes it is appropriate to construct and operate the desert renewable projects with best practices to reduce any potential cumulative effects, including criteria pollutants and their contributions to region ozone and particulate matter and haze. Staff recommends Conditions of Certification **AQ-SC1** and **AQ-SC-7** as best practices for the construction and operation of the ISEGS desert solar project, which may be one of many in the area and greater southwest region.

Staff has considered the minority population surrounding the site (see **Socioeconomics Figure 1**). Since the project's cumulative CEQA air quality impacts have been mitigated to less than significant, there is no environmental justice issue for air quality.

[7] Staff assumes that impacts from projects beyond six miles would not affect the modeling analysis on a cumulative basis.

COMPLIANCE WITH LORS

The Mojave Desert Air Quality Management District issued the Preliminary Determination of Compliance (PDOC) for the ISEGS on December 23, 2008 (MDAQMD 2009), and the Final Determination of Compliance (FDOC), second revision version Rev. B, on July 15, 2009 (MDAQMD 2009b). Compliance with all District rules and regulations was demonstrated to the District's satisfaction in the DOC. The District's FDOC conditions are presented in the Conditions of Certification.

FEDERAL

The District is responsible for issuing the federal New Source Review (NSR) permit, the federal Title V permit, and has been delegated enforcement of the applicable New Source Performance Standard (Subparts, Da, Db, and IIII). The applicant will be required to submit a Title V permit application to the District within 12 months of commencing operation. Additionally, this project would not require a PSD permit from U.S. EPA.

The project is located in a federal nonattainment area and requires the approval of a federal agency (BLM). Therefore, the project is subject to the general conformity regulations (40 CFR Part 93). The project area is moderate nonattainment of the federal PM10 ambient air quality standards, and the general conformity emissions applicability thresholds for this nonattainment classification is 100 tons/year of direct and indirect PM10 emissions and 100 tons/year of direct and indirect PM10 precursor (NOx and SOx) emissions. The project's maximum annual unmitigated direct and indirect emissions of PM10 during construction and operation would have the potential to exceed the 100 tons threshold, while the unmitigated NOx and SOx emissions from construction and operation would not have the potential to exceed the 100 tons/year threshold. However, the mitigated direct and indirect construction and operation emissions, as shown in **Air Quality Tables 6** through **8** have been determined to be well below the applicable General Conformity applicability thresholds of 100 tons per year for PM10, SOx, and NOx. Therefore, the project is not required to complete a conformity analysis and conformance with the State Implementation Plan is assumed.

STATE

The applicant would demonstrate that the project would comply with Section 41700 of the California State Health and Safety Code, which restricts emissions that would cause nuisance or injury, with the issuance of the District's Final Determination of Compliance and the Energy Commission's affirmative finding for the project. In the FDOC, the District concluded that the project should comply with this requirement as the screening health risk assessment they performed found risks to be below a Prioritization Score of 1.0, or below the need for any additional analysis or action.

The fire pump and emergency generator engines are also subject to the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines. This measure limits the types of fuels allowed, established maximum emission rates, establishes recordkeeping requirements. The proposed Tier II engine meets the emission limit requirements of this rule. This measure would also limit the engine's testing and maintenance operation to 50 hours per year.

LOCAL

The District rules and regulations specify the emissions control and offset requirements for new sources such as the ISEGS. Best Available Control Technology would be implemented, and emission reduction credits (ERCs) are not required to offset the project's emissions by District rules and regulations based on the permitted stationary source emission levels for this project. Compliance with the District's new source requirements would ensure that the project would be consistent with the strategies and future emissions anticipated under the District's air quality attainment and maintenance plans.

The applicant provided an air quality permit application to the MDAQMD in September 2007; and the District issued the PDOC on February 14, 2008 (MDAQMD 2008a), issued the FDOC on December 3, 2008 (MDAQMD 2008b), and issued two applicant requested revisions to the FDOC, Rev. A on April 9, 2009 (MDAQMD 2009a) and Rev. B on July 15, 2009 (MDAQMD 2009b). The FDOC states that the proposed project is expected to comply with all applicable District rules and regulations. The DOC evaluates whether and under what conditions the proposed project would comply with the District's applicable rules and regulations, as described below.

Regulation II – Permits

Rule 201 and 203 – Permit to Construct and Permit to Operate

Rule 201 establishes the emission source requirements that must be met to obtain a Permit to Construct. Rule 203 prohibits use of any equipment or the use of which may emits air contaminants without obtaining Permit to Operate. The applicant has submitted all required applications, therefore, the applicant is in compliance with these rules.

Rule 221 – Federal Operating Permit Requirement

Rule 221 requires certain facilities to obtain Federal Operating Permits. Title V permitting will be required as a result of Acid Rain rule applicability for the proposed project. The applicant will be required to submit an application for a Title V permit to comply with this rule.

Regulation IV – Prohibitions

Rule 401 - Visible Emissions

This rule limits visible emissions from emissions sources, including stationary source exhausts and fugitive dust emission sources. Compliance with this rule is expected.

Rule 402 - Nuisance

This rule restricts discharge of emissions that would cause injury, detriment, annoyance, or public nuisance. The facility is expected to comply with this rule (identical to California Health and Safety Code 41700).

Rule 403 - Fugitive Dust

This rule limits fugitive emissions from certain bulk storage, earthmoving, construction and demolition, and manmade conditions resulting in wind erosion. With the

implementation of recommended staff condition **AQ-SC3** and **AQ-SC7,** the facility is expected to comply with this rule.

Rule 404 - Particulate Matter Concentration

Rule 404 limits particulate matter (PM) emissions to less than 0.1 grains per standard cubic foot of gas at standard conditions. In the FDOC, the District has determined that the estimated PM emission concentrations of the proposed boilers and engines are less than 0.006 gr/dscf and 0.05 gr/dscf, respectively. These proposed emission rates are well below the limits established by this rule, therefore compliance is expected.

Rule 405 – Solid Particulate Matter Weight

Rule 405 prohibits discharge of solid particulate matter, such as lead and lead compounds, into the atmosphere. The ISEGS is expected to operate in compliance with this rule.

Rule 406 – Specific Contaminants

Rule 406 prohibits discharge of sulfur compounds, calculated as SO_2, in excess of 0.05 percent by volume (500 ppmv), and acid gas emissions above specified levels. SO_2 emissions from the propose project would be below 0.5 ppmv, based on the fuel sulfur content limit of 0.75 gr/100 scf. Compliance is expected.

Rule 407 – Liquid and Gaseous Air Contaminants

Rule 407 prohibits discharge of carbon monoxide (CO) in excess of 2,000 ppmv. The CO emissions from the boilers, firewater pumps, and emergency generator engines would be well below 2,000 ppmv in compliance with this rule.

Rule 431 – Sulfur Content of Fuels

Rule 431 prohibits the burning of gaseous fuel with sulfur content in excess of 800 ppm and liquid fuel with a sulfur content of more than 0.5 percent sulfur by weight. With the requirement of utility grade natural gas for the boilers and the requirement of ARB ultra-low sulfur diesel fuel, ISEGS would operate in compliance with this rule.

Rule 463 – Storage of Organic Liquids

This rule is to limit the emissions of volatile organic compounds (VOC) and toxic compounds during the storage of organic liquid. This rule sets standards for storage of organic liquids with a true vapor pressure of 1.5 pounds per square inch or greater. The project is proposing a diesel storage tank but no gasoline storage tank or other organic liquid with a true vapor pressure of 1.5 pounds per square inch or greater; therefore, the requirements of this rule do not apply.

Rule 475 – Electric Power Generating Equipment

Rule 475 limits emissions of NOx and PM from electric generating equipment, and this rule is applicable to the emergency engine of the proposed project. This rule limits NOx and PM emission no more than 160 ppmv, and 0.01 gr/dscf at 3 percent O_2. Compliance is expected with the proposed Tier II emergency diesel engines.

Regulation IX – Standards of Performance for New Stationary Sources

Rule 900 – Standard of Performance For New Stationary Source (NSPS)

This rule incorporates the Federal NSPS (40 CFR 60) rules by reference. The District evaluated compliance with Subpart Da that applies to the ISEGS 3 boiler and Subpart Db that applies to the ISEGS 1 and 2 boilers and has provided conditions they believe ensure compliance with these regulations. However, staff believes that two specific exhaust monitoring requirements required by Subparts Da and Db, NO_2 monitoring for the ISEGS 1 and 2 boilers and oxygen monitoring for the ISEGS 3 boiler, may need to be clarified, or revised conditions added to the boiler permits, prior to construction of the boilers. Staff has added verification language that will require the project owner make a clear determination regarding these monitoring requirements.

The proposed Tier II engines meet the emission limit requirements of the NSPS ((Subpart IIII) that applies to the proposed ISEGS emergency generators engines; however, the NSPS (Table 4) requires that the fire pump engines meet regulatory stationary IC equivalent engine emission requirements (Tier III) by 2009 model years. Therefore, staff has added a condition insuring that engines meet the latest ARB/U.S. EPA emission standards when they are purchased.

Regulation XIII – New Source Review

Rule 1303 – New Source Review

This rule requires implementation of BACT for any emission source unit that emits or has the potential to emit 25 lbs/day or more, and emission offsets if total facility emissions exceed annual thresholds. The District permits limit the emissions from each source to less than 25 lbs/day, so BACT is not applicable; and the permits limit the total site annual emission below offset thresholds, so offsets are not applicable.

Rule 1306 – Electric Energy Generating Facilities

Describes actions to be taken for permitting of power plants. The District has issued a PDOC and an FDOC in compliance with the requirements of this rule.

NOTEWORTHY PUBLIC BENEFITS

Renewable energy facilities, such as the ISGES, are needed to meet California's mandated renewable energy goals.

PUBLIC AND AGENCY COMMENTS ON THE PSA

No public or agency comments were received on the Preliminary Staff Assessment (PSA) Air Quality analysis. However, the applicant and an intervenor, Basin Range and Watch (BRW), did provide comments. The applicant's comments have been addressed as appropriate within this Final Staff Assessment (FSA). The BRW comment is summarized and addressed below.

BRW Comment 2
For dust control during operation and construction, where will water come from? How much will be used? This should be explained and estimated numbers of gallons should be listed.

Staff Response
The source of water for dust control during plant construction and operation is assumed to be the same on-site ground water wells used for other plant water needs (see Soil and Water Resources section). The applicant estimated 128 acre-feet of use during the 15 months of initial grading for the three project phases (BSE 2007a, p. 5.15-14), which is also presented in the Soil and Water Resources section (**Soil & Water Table 3**) based on a 5 day per week construction schedule and 5 months of initial grading per construction phase. However, the applicant did not provide estimates of water use for dust control during the rest of the construction period or for ongoing operations. Staff has modified the recommended conditions of certification (**AQ-SC3** and **AQ-SC7**) to both increase dust control efficiency and minimize water use through the required use of polymeric dust suppressants on the site's unpaved roads and other disturbed surfaces to create and maintain stabilized surfaces during project construction and operation.

CONCLUSIONS

Staff has made the following conclusions about the ISEGS:

- The project would not have the potential to exceed PSD emission levels during direct source operation and the facility is not considered a major stationary source with potential to cause significant NEPA air quality impacts. However, without adequate fugitive dust mitigation, the project would have the potential to exceed the General Conformity PM10 applicability threshold during construction and operation, and could cause potential localized exceedances of the PM10 NAAQS during construction and operation. Recommended Conditions of Certification **AQ-SC1** through **AQ-SC4**, for construction, and **AQ-SC7**, for operation, will mitigate these potentially significant NEPA impacts.
- The project would comply with applicable District Rules and Regulations, including New Source Review requirements, and staff recommends the inclusion of the Districts FDOC conditions as Conditions of Certification **AQ-1** through **AQ-39** and the addition of staff recommended Condition of Certification **AQ-SC9** to ensure that the emergency engines meet applicable model year emission standards.
- The project's construction activities would likely contribution to significant CEQA adverse PM10 and ozone impacts. Staff recommends **AQ-SC1** to **AQ-SC5** to mitigate the potential impacts.
- The project's operation would not cause new violations of any NO_2, SO_2, PM2.5 or CO ambient air quality standards, and therefore, the project direct operational NOx, SOx, PM2.5 and CO emission impacts are not CEQA significant.
- The project's direct and indirect, or secondary emissions contribution to existing violations of the ozone and PM10 ambient air quality standards are likely CEQA significant if unmitigated. Therefore, staff recommends **AQ-SC6** to mitigate the onsite maintenance vehicle emissions and **AQ-SC7** to mitigate the operating fugitive

dust emissions to ensure that the potential ozone and PM10 CEQA impacts are mitigated to less than significant over the life of the project.

- Staff recommends **AQ-SC10** to formalize the applicant's stipulation that "Heat input from natural gas will not exceed 5 percent of the heat input from the sun, on an annual basis", which also generally corresponds the amount of operation included in the applicant's air dispersion modeling impact analysis.
- The project would be consistent with the requirements of SB 1368 and the Emission Performance Standard for greenhouse gases (see **Appendix Air-1**).

MITIGATION MEASURES/ PROPOSED CONDITIONS OF CERTIFICATION

STAFF CONDITIONS OF CERTIFICATION

Staff conditions **AQ-SC1** through **AQ-SC4** and **AQ-SC7** are both CEQA and NEPA mitigation conditions. Staff conditions **AQ-SC5**, **AQ-SC6**, and **AQ-SC8** through **AQ-SC10** are CEQA-only conditions.

AQ-SC1 Air Quality Construction Mitigation Manager (AQCMM): The project owner shall designate and retain an on-site AQCMM who shall be responsible for directing and documenting compliance with Conditions of Certification **AQ-SC3**, **AQ-SC4** and **AQ-SC5** for the entire project site and linear facility construction. The on-site AQCMM may delegate responsibilities to one or more AQCMM Delegates. The AQCMM and AQCMM Delegates shall have full access to all areas of construction on the project site and linear facilities, and shall have the authority to stop any or all construction activities as warranted by applicable construction mitigation conditions. The AQCMM and AQCMM Delegates may have other responsibilities in addition to those described in this condition. The AQCMM shall not be terminated without written consent of the Compliance Project Manager (CPM).

Verification: At least 60 days prior to the start of ground disturbance, the project owner shall submit to the BLM's Authorized Officer and CPM for approval, the name, resume, qualifications, and contact information for the on-site AQCMM and all AQCMM Delegates.

AQ-SC2 Air Quality Construction Mitigation Plan (AQCMP): The project owner shall provide an AQCMP, for approval, which details the steps that will be taken and the reporting requirements necessary to ensure compliance with Conditions of Certification **AQ-SC3**, **AQ-SC4,** and **AQ-SC5**.

Verification: At least 60 days prior to the start of any ground disturbance, the project owner shall submit the AQCMP to the BLM's Authorized Officer and CPM for approval. The AQCMP shall include effectiveness and environmental data for the proposed soil stabilizer. The BLM's Authorized Officer or CPM will notify the project owner of any necessary modifications to the plan within 30 days from the date of receipt.

AQ-SC3 Construction Fugitive Dust Control: The AQCMM shall submit documentation to the BLM's Authorized Officer and CPM in each Monthly Compliance Report that demonstrates compliance with the following mitigation measures for the purposes of preventing all fugitive dust plumes from leaving the project. Any deviation from the following mitigation measures shall require prior BLM Authorized Officer and CPM notification and approval.

A. The main access roads through the facility to the power block areas will be paved prior to initiating construction in the main power block area, and delivery areas for operations materials (chemicals, replacement parts, etc.) will be paved prior to taking initial deliveries.

B. All unpaved construction roads and unpaved operational site roads, as they are being constructed, shall be stabilized with a non-toxic soil stabilizer or soil weighting agent that can be determined to be both as efficient or more efficient for fugitive dust control as ARB approved soil stabilizers, and shall not increase any other environmental impacts including loss of vegetation. All other disturbed areas in the project and linear construction sites shall be watered as frequently as necessary during grading and stabilized with a non-toxic soil stabilizer or soil weighting agent to comply with the dust mitigation objectives of Condition of Certification **AQ-SC4**. The frequency of watering can be reduced or eliminated during periods of precipitation.

C. No vehicle shall exceed 10 miles per hour on unpaved areas within the construction site, with the exception that vehicles may travel up to 25 miles per hour on stabilized unpaved roads as long as such speeds do not create visible dust emissions.

D. Visible speed limit signs shall be posted at the construction site entrances.

E. All construction equipment vehicle tires shall be inspected and washed as necessary to be cleaned free of dirt prior to entering paved roadways.

F. Gravel ramps of at least 20 feet in length must be provided at the tire washing/cleaning station.

G. All unpaved exits from the construction site shall be graveled or treated to prevent track-out to public roadways.

H. All construction vehicles shall enter the construction site through the treated entrance roadways, unless an alternative route has been submitted to and approved by the CPM and BLM Authorized Officer..

I. Construction areas adjacent to any paved roadway shall be provided with sandbags or other equivalently effective measures to prevent run-off to roadways, or other similar run-off control measures as specified in the Storm Water Pollution Prevention Plan (SWPPP), only when such SWPPP measures are necessary so that this condition does not conflict with the requirements of the SWPPP.

J. All paved roads within the construction site shall be swept at least twice daily (or less during periods of precipitation) on days when construction activity occurs to prevent the accumulation of dirt and debris.

K. At least the first 500 feet of any paved public roadway exiting the construction site or exiting other unpaved roads en route from the construction site or construction staging areas shall be swept at least twice daily (or less during periods of precipitation) on days when construction activity occurs or on any other day when dirt or runoff resulting from the construction site activities is visible on the public paved roadways.

L. All soil storage piles and disturbed areas that remain inactive for longer than 10 days shall be covered, or shall be treated with appropriate dust suppressant compounds.

M. All vehicles that are used to transport solid bulk material on public roadways and that have potential to cause visible emissions shall be provided with a cover, or the materials shall be sufficiently wetted and loaded onto the trucks in a manner to provide at least one foot of freeboard.

N. Wind erosion control techniques (such as windbreaks, water, chemical dust suppressants, and/or vegetation) shall be used on all construction areas that may be disturbed. Any windbreaks installed to comply with this condition shall remain in place until the soil is stabilized or permanently covered with vegetation.

Verification: The AQCMM shall provide the BLM's Authorized Officer and the CPM a Monthly Compliance Report (**COMPLIANCE-6**) to include:

A. a summary of all actions taken to maintain compliance with this condition;

B. copies of any complaints filed with the District in relation to project construction; and

C. any other documentation deemed necessary by the BLM Authorized Officer, CPM, and AQCMM to verify compliance with this condition. Such information may be provided via electronic format or disk at the project owner's discretion.

AQ-SC4 Dust Plume Response Requirement: The AQCMM or an AQCMM Delegate shall monitor all construction activities for visible dust plumes. Observations of visible dust plumes that have the potential to be transported (A) off the project site and within 400 feet upwind of any regularly occupied structures not owned by the project owner or (B) 200 feet beyond the centerline of the construction of linear facilities indicate that existing mitigation measures are not resulting in effective mitigation. The AQCMP shall include a section detailing how the additional mitigation measures will be accomplished within the time limits specified. The AQCMM or Delegate shall implement the following procedures for additional mitigation measures in the event that such visible dust plumes are observed:

Step 1: The AQCMM or Delegate shall direct more intensive application of the existing mitigation methods within 15 minutes of making such a determination.

Step 2: The AQCMM or Delegate shall direct implementation of additional methods of dust suppression if Step 1, specified above, fails to result in adequate mitigation within 30 minutes of the original determination.

Step 3: The AQCMM or Delegate shall direct a temporary shutdown of the activity causing the emissions if Step 2, specified above, fails to result in effective mitigation within one hour of the original determination. The activity shall not restart until the AQCMM or Delegate is satisfied that appropriate additional mitigation or other site conditions have changed so that visual dust plumes will not result upon restarting the shutdown source. The owner/operator may appeal to the CPM or BLM Authorized Officer any directive from the AQCMM or Delegate to shut down an activity, if the shutdown shall go into effect within one hour of the original determination, unless overruled by the CPM or BLM Authorized Officer before that time.

Verification: The AQCMM shall provide the BLM's Authorized Officer and the CPM a Monthly Compliance Report (**COMPLIANCE-6**) to include:

A. a summary of all actions taken to maintain compliance with this condition;

B. copies of any complaints filed with the District in relation to project construction; and

C. any other documentation deemed necessary by the CPM and AQCMM to verify compliance with this condition. Such information may be provided via electronic format or disk at the project owner's discretion.

AQ-SC5 Diesel-Fueled Engine Control: The AQCMM shall submit to the CPM, in the MCR, a construction mitigation report that demonstrates compliance with the following mitigation measures for purposes of controlling diesel construction-related emissions. Any deviation from the following mitigation measures shall require prior and CPM notification and approval.

a. All diesel-fueled engines used in the construction of the facility shall have clearly visible tags issued by the on-site AQCMM showing that the engine meets the conditions set forth herein.

b. All construction diesel engines with a rating of 50 hp or higher shall meet, at a minimum, the Tier 3 California Emission Standards for Off-Road Compression-Ignition Engines, as specified in California Code of Regulations, Title 13, section 2423(b)(1), unless a good faith effort that is certified by the on-site AQCMM demonstrates that such engine is not available for a particular item of equipment. This good faith effort shall be documented with signed written correspondence by the appropriate construction contractors along with documented correspondence with at least two construction equipment rental firms. In the event that a Tier 3 engine is not available for any off-road equipment larger than 100 hp, that

equipment shall be equipped with a Tier 2 engine, or an engine that is equipped with retrofit controls to reduce exhaust emissions of nitrogen oxides (NOx) and diesel particulate matter (DPM) to no more than Tier 2 levels unless certified by engine manufacturers or the on-site AQCMM that the use of such devices is not practical for specific engine types. For purposes of this condition, the use of such devices is "not practical" for the following, as well as other, reasons.

1. There is no available retrofit control device that has been verified by either the California Air Resources Board or U.S. Environmental Protection Agency to control the engine in question to Tier 2 equivalent emission levels and the highest level of available control using retrofit or Tier 1 engines is being used for the engine in question; or

2. The construction equipment is intended to be on site for 5 days or less.

3. The CPM may grant relief from this requirement if the AQCMM can demonstrate a good faith effort to comply with this requirement and that compliance is not possible.

c. The use of a retrofit control device may be terminated immediately, provided that the CPM is informed within 10 working days of the termination and that a replacement for the equipment item in question meeting the controls required in item "b" occurs within 10 days of termination of the use, if the equipment would be needed to continue working at this site for more than 15 days after the use of the retrofit control device is terminated, if one of the following conditions exists :

   1. The use of the retrofit control device is excessively reducing the normal availability of the construction equipment due to increased down time for maintenance, and/or reduced power output due to an excessive increase in back pressure.

   2. The retrofit control device is causing or is reasonably expected to cause engine damage.

   3. The retrofit control device is causing or is reasonably expected to cause a substantial risk to workers or the public.

   4. Any other seriously detrimental cause which has the approval of the CPM prior to implementation of the termination.

d. All heavy earth-moving equipment and heavy duty construction-related trucks with engines meeting the requirements of (b) above shall be properly maintained and the engines tuned to the engine manufacturer's specifications.

e. All diesel heavy construction equipment shall not idle for more than five minutes. Vehicles that need to idle as part of their normal operation (such as concrete trucks) are exempted from this requirement.

f. Construction equipment will employ electric motors when feasible.

Verification: The AQCMM shall include in the Monthly Compliance Report (**COMPLIANCE-6**):

A. A summary of all actions taken to maintain compliance with this condition;

B. A list of all heavy equipment used on site during that month, including the owner of that equipment and a letter from each owner indicating that equipment has been properly maintained; and

C. Any other documentation deemed necessary by the CPM, and the AQCMM to verify compliance with this condition. Such information may be provided via electronic format or disk at the project owner's discretion.

AQ-SC6 The project owner, when obtaining dedicated vehicles for mirror washing activities and other facility maintenance activities, shall only obtain new model year vehicles that meet California on-road vehicle emission standards for the model year when obtained.

Other vehicle/fuel types may be allowed assuming that the emission profile for those vehicles, including fugitive dust generation emissions, is comparable to the vehicles types identified in this condition.

Verification: At least 60 days prior to the start commercial production, the project owner shall submit to the CPM a copy of the plan that identifies the size and type of the on-site vehicle and equipment fleet and the vehicle and equipment purchase orders and contracts and/or purchase schedule. The plan shall be updated every other year and submitted in the Annual Compliance Report (**COMPLIANCE-7**).

AQ-SC7 The project owner shall provide a site operations dust control plan, including all applicable fugitive dust control measures identified in **AQ-SC3** that would be applicable to reducing fugitive dust from ongoing operations; that:

A. describes the active operations and wind erosion control techniques such as windbreaks and chemical dust suppressants, including their ongoing maintenance procedures, that shall be used on areas that could be disturbed by vehicles or wind anywhere within the project boundaries; and

B. identifies the location of signs throughout the facility that will limit traveling on unpaved portion of roadways to solar equipment maintenance vehicles only. In addition, vehicle speed shall be limited to no more than 10 miles per hour on these unpaved roadways, with the exception that vehicles may travel up to 25 miles per hour on stabilized unpaved roads as long as such speeds do not create visible dust emissions.

The site operations fugitive dust control plan shall include the use of durable non-toxic soil stabilizers on all regularly used unpaved roads and disturbed off-road areas within the project boundaries, and shall include the inspection and maintenance procedures that will be undertaken to ensure that the unpaved roads remain stabilized. The soil stabilizer used shall be a non-toxic soil stabilizer or soil weighting agent that can be determined to be both as

efficient or more efficient for fugitive dust control as ARB approved soil stabilizers, and shall not increase any other environmental impacts including loss of vegetation.

The performance and application of the fugitive dust controls shall also be measured against and meet the performance requirements of condition **AQ-SC4**. The performance requirements of **AQ-SC4** shall also be included in the operations dust control plan.

Verification: At least 60 days prior to start of commercial operation, the project owner shall submit to the BLM's Authorized Officer and the CPM for review and approval a copy of the plan that identifies the dust and erosion control procedures, including effectiveness and environmental data for the proposed soil stabilizer, that will be used during operation of the project and that identifies all locations of the speed limit signs. At least 60 days after commercial operation, the project owner shall provide to the BLM's Authorized Officer and the CPM a report identifying the locations of all speed limit signs, and a copy of the project employee and contractor training manual that clearly identifies that project employees and contractors are required to comply with the dust and erosion control procedures and on-site speed limits.

AQ-SC8 The project owner shall provide the CPM copies of all District issued Authority-to-Construct (ATC) and Permit-to-Operate (PTO) for the facility.

The project owner shall submit to the CPM for review and approval any modification proposed by the project owner to any project air permit. The project owner shall submit to the CPM any modification to any permit proposed by the District or U.S. Environmental Protection Agency (U.S. EPA), and any revised permit issued by the District or U.S. EPA, for the project.

Verification: The project owner shall submit any ATC, PTO, and proposed air permit modification to the CPM within 5 working days of its submittal either by 1) the project owner to an agency, or 2) receipt of proposed modifications from an agency. The project owner shall submit all modified air permits to the CPM within 15 days of receipt.

AQ-SC9 The emergency generator and fire pump engines procured for this project will meet or exceed the NSPS Subpart IIII emission standards for the model year that corresponds to their date of purchase.

Verification: The project owner shall submit the emergency engine specifications to the CPM at least 30 days prior to purchasing the engines for review and approval.

AQ-SC10 The ISEGS 1, ISEGS 2, and ISEGS 3 boilers shall not exceed a total annual natural gas fuel heat input that is more than 5 percent of the total annual heat input from the sun for ISEGS1, ISEGS2, and ISEGS 3, respectively.

Verification: Annual natural gas fuel heat input data and annual solar heat input data for the ISEGS 1, ISEGS 2, and ISEGS 3 units showing compliance with this condition shall be provided in the Annual Compliance Report (**COMPLIANCE-7**).

DISTRICT CONDITIONS OF CERTIFICATION

District conditions **AQ-1** through **AQ-39** are CEQA-only required conditions.

Conditions Applicable to Ivanpah 1 & 2 Boilers, MDAQMD Application Numbers/Permit Numbers; 00009311 (B010375) & 00009314 (B010376)

Equipment Description:

Nebraska boilers, Model NSX-G-120, each equipped with Natcom Low-NOx Burners rated at a maximum heat input of 231.1 MMBTU/hr, and flue gas recirculation (FGR or EGR) operating at 13.9 percent excess air, fueled exclusively on utility grade natural gas. Equipment boiler is equipped with stacks that are 130 feet high and 60 inches in diameter.

These conditions apply separately to both boilers unless otherwise specified.

AQ-1 Operation of this equipment must be conducted in compliance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted below.

Verification: Any non-compliant operations shall be listed in the Annual Compliance Report (**COMPLIANCE-7**).

AQ-2 The owner/operator shall operate this equipment in strict accord with the recommendations of the manufacturer or supplier and/or sound engineering principles and consistent with all information submitted with the application for this permit, which produce the minimum emission of air contaminants.

Verification: As part of the Annual Compliance Report (**COMPLIANCE-7**), the project owner shall include information on the date, time, and duration of any violation of this permit condition.

AQ-3 This boiler shall use only natural gas as fuel and shall be equipped with a meter measuring fuel consumption in standard cubic feet.

Verification: As part of the Annual Compliance Report (**COMPLIANCE-7**), the project owner shall include proofs that only pipeline quality, or Public Utility Commission regulated natural gas are used for the boilers.

AQ-4 The owner owner/operator shall maintain a current, on-site (at a central location if necessary) log for this equipment for five (5) years, which shall be provided to District, state or federal personnel upon request. This log shall include calendar year fuel use for this equipment in standard cubic feet, or BTU's, and daily hours of operation.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or Energy Commission staff.

AQ-5 Not later than 180 days after initial startup, the operator shall perform an initial compliance test on this boiler in accordance with the District Compliance Test Procedural Manual. This test shall demonstrate that this equipment does not exceed the following emission maximums:

Pollutant	ppmvd	Lb/MMBtu	Lb/hr	
*NOx	9.0	0.011	2.5	(per USEPA Methods 19 and 20)
SOx	1.7	0.003	0.6	
*CO	25.0	0.018	4.2	(per USEPA Methods 10)
VOC	12.6	0.0054	1.2	(per USEPA Methods 25A and 18)
PM10	n/a	0.007	1.7	(per USEPA Methods 5 and 202 or CARB Method 5)

*corrected to 3% oxygen, on a dry basis, averaged over one hour

Verification: The project owner shall notify the District and the CPM within fifteen (15) working days before the execution of the compliance test required in this condition. The test results shall be submitted to the District and to the CPM within 60 days of the date of the tests.

AQ-6 This boiler shall be operated in compliance with all applicable requirements of 40 CFR 60 Subpart Db - Standards of Performance for Industrial Steam Generating Units (NSPS Db).

Verification: The project owner shall complete and submit to the CPM a compliance plan that provides a list of the 40 CFR 60 Subpart Db plans, tests, and recordkeeping requirements and their compliance schedule dates as applicable for the ISEGS Boilers 1 and 2 at least 30 days prior to first fire of the boilers or earlier as necessary for compliance with Subpart Db.

AQ-7 Records of fuel supplier certifications of fuel sulfur content shall be maintained to demonstrate compliance with the sulfur dioxide and particulate matter emission limits.

Verification: Complying with Condition of Certification **AQ-3** shall be used to demonstrate compliance with this condition.

AQ-8 The owner/operator shall continuously monitor fuel flow rate and flue gas oxygen level.

Verification: At least 120 days prior to construction of the boiler stacks, the project owner shall provide the District for approval, and the CPM for review, a detailed drawing and a plan on how the measurements and recordings, required by this condition, will be performed by the chosen monitoring system.

AQ-9 The owner/operator shall conduct an initial compliance test for NOx emissions within 180 days of startup. This initial compliance test shall be used to develop a relationship between fuel firing rate, flue gas oxygen, and flue gas NOx concentration. This relationship shall be used to determine compliance with NOx emission limits contained in these conditions.

Verification: The project owner shall notify the District and the CPM within fifteen (15) working days before the execution of the compliance test required in this condition. The test results shall be submitted to the District and to the CPM within 60 days of the date of the tests.

AQ-10 The owner/operator shall comply with all applicable recordkeeping and reporting requirements of NSPS Db.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

AQ-11 This boiler shall not operate more than 4 hours in any single day, and no more than 1460 hours in any calendar year.

a. These limits shall not apply during the facility commissioning period. The commissioning period shall begin the first time fuel is fired in the boiler. The commissioning period shall end when the facility achieves commercial operation, but no later than 180 days after first fire.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

Conditions Applicable to Ivanpah 3 Boiler, MDAQMD Application Number; 00009320

Equipment Description:

Babcock-Wilcox boiler, Model unknown, equipped with an unknown Low-NOx Burner rated at a maximum heat input of 462.2 MMBTU/hr, and flue gas recirculation (FGR or EGR) operating at 13.9 percent excess air, fueled exclusively on utility grade natural gas. Equipment shall use 450,000 cu-ft/hr of fuel and provide 440,000 lb/hr of steam. This boiler is equipped with a stack that is 130 feet high and 60 inches in diameter.

AQ-12 Operation of this equipment must be conducted in compliance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted below.

Verification: Any non-compliant operations shall be listed in the Annual Compliance Report (**COMPLIANCE-7**).

AQ-13 The owner/operator shall operate this equipment in strict accord with the recommendations of the manufacturer or supplier and/or sound engineering principles and consistent with all information submitted with the application for this permit, which produce the minimum emission of air contaminants.

Verification: As part of the Annual Compliance Report, (**COMPLIANCE-7**) the project owner shall include information on the date, time, and duration of any violation of this permit condition.

AQ-14 This boiler shall use only natural gas as fuel and shall be equipped with a meter measuring fuel consumption in standard cubic feet.

Verification: As part of the Annual Compliance Report (**COMPLIANCE-7**), the project owner shall include proofs that only pipeline quality, or Public Utility Commission regulated natural gas are used for the boilers.

AQ-15 The owner owner/operator shall maintain a current, on-site (at a central location if necessary) log for this equipment for five (5) years, which shall be provided to District, state or federal personnel upon request. This log shall include calendar year fuel use for this equipment in standard cubic feet, or BTU's, and daily hours of operation.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or Energy Commission staff.

AQ-16 Not later than 180 days after initial startup, the operator shall perform an initial compliance test on this boiler in accordance with the District Compliance Test Procedural Manual. This test shall demonstrate that this equipment does not exceed the following emission maximums:

Pollutant	ppmvd	Lb/MMBTU	Lb/hr	
*NOx	9.0	0.011	5	(per USEPA Methods 19 and 20)
SOx	1.7	0.003	1.3	
*CO	25.0	0.018	8.5	(per USEPA Methods 10)
VOC	12.6	0.0054	2.5	(per USEPA Methods 25A and 18)
PM10	n/a	0.007	3.4	(per USEPA Methods 5 and 202 or CARB Method 5)

*corrected to 3% oxygen, on a dry basis, averaged over one hour

Verification: The project owner shall notify the District and the CPM within fifteen (15) working days before the execution of the compliance test required in this condition. The test results shall be submitted to the District and to the CPM within 60 days of the date of the tests.

AQ-17 This boiler shall be operated in compliance with all applicable requirements of 40 CFR 60 Subpart Da - Standards of Performance for Industrial Steam Generating Units (NSPS Da).

Verification: The project owner shall complete and submit to the CPM a compliance plan that provides a list of the 40 CFR 60 Subpart Da plans, tests, and recordkeeping requirements and their compliance schedule dates as applicable for the ISEGS Boiler 3 at least 30 days prior to first fire of the boiler or earlier as necessary for compliance with Subpart Da.

AQ-18 Records of fuel supplier certifications of fuel sulfur content shall be maintained to demonstrate compliance with the sulfur dioxide and particulate matter emission limits.

Verification: Complying with Condition of Certification **AQ-14** shall be used to demonstrate compliance with this condition.

AQ-19 The owner/operator shall install, calibrate, maintain and operate a continuous emissions monitoring system (CEMS) to measure and record NOx emissions and oxygen concentration according to 40 CFR Part 60 specifications.

Verification: At least 120 days prior to construction of the boiler stacks, the project owner shall provide the District for approval and the CPM for review, a detailed drawing

and a plan on how the measurements and recordings, required by this condition, will be performed by the chosen monitoring system.

AQ-20 The owner/operator shall conduct an initial compliance test for NOx emissions by conducting the CEMS RATA test within 180 days of startup; and shall collect data from the CEMS at all times that fuel is combusted in the boiler.

Verification: The project owner shall notify the District and the CPM within fifteen (15) working days before the execution of the compliance test required in this condition. The test results shall be submitted to the District and to the CPM within 60 days of the date of the tests.

AQ-21 The owner/operator shall comply with all applicable recordkeeping and reporting requirements of NSPS Da.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

AQ-22 This boiler shall not operate more than 4 hours in any single day, and no more than 1460 hours in any calendar year.

a. These limits shall not apply during the facility commissioning period. The commissioning period shall begin the first time fuel is fired in the boiler. The commissioning period shall end when the facility achieves commercial operation, but no later than 180 days after first fire.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

Conditions Applicable to Ivanpah I, II, and III Emergency Fire Pumps, MDAQMD Application Numbers/Permit Numbers; 00009312 (E010380), 00009315 (E010378), and 00009319 (E010384)

Equipment Description:

Year of Manufacture 2008, Tier II, One Clarke, Diesel fired internal combustion engine, Model No. JU6H-UF62, and Serial number tbd, After Cooled, Direct Injected, Turbo Charged, producing 240 bhp with 6 cylinders at 2,600 rpm while consuming a maximum of 10 gal/hr. This equipment powers a pump.

These conditions apply separately to all three emergency fire pump engines unless otherwise specified.

AQ-23 This system shall be installed, operated and maintained in strict accord with those recommendations of the manufacturer/supplier and/or sound engineering principles which produce the minimum emissions of contaminants. Unless otherwise noted, this equipment shall also be operated in accordance with all data and specifications submitted with the application for this permit.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

AQ-24 These engines may operate in response to notification of impending rotating outage if the area utility has ordered rotating outages in the area where the engines are located or expects to order such outages at a particular time, the engines are located in the area subject to the rotating outage, the engines are operated no more than 30 minutes prior to the forecasted outage, and the engines are shut down immediately after the utility advises that the outage is no longer imminent or in effect.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

AQ-25 These engines may operate in response to fire suppression requirements and needs.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

AQ-26 These units shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15ppm) on a weight per weight basis per CARB Diesel or equivalent requirements.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

AQ-27 A non-resettable four-digit (9,999) hour timer shall be installed and maintained on these units to indicate elapsed engine operating time.

Verification: At least thirty (30) days prior to the installation of the engine, the project owner shall provide the District and the CPM the specification of the hour timer.

AQ-28 These units shall be limited to use for emergency power, defined as in response to a fire or when commercially available power has been interrupted. In addition, this unit shall be operated no more than 50 hours per year for testing and maintenance, excluding compliance source testing. Time required for source testing will not be counted toward the 50 hour per year limit.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

AQ-29 The hour limit of **AQ-28** can be exceeded when the emergency fire pump assemblies are driven directly by a stationary diesel fueled CI engine when operated per and in accord with the National Fire Protection Association (NFPA) 25 - "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems," 2006 edition or the most current edition approved by the CARB Executive Officer. {Title 17 CCR 93115(c)16}

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

AQ-30 The owner/operator shall maintain a operations log for these units current and on-site, either at the engine location or at a on-site location, for a minimum of two (2) years, and for another year where it can be made available to the

District staff within 5 working days from the District's request, and this log shall be provided to District, State and Federal personnel upon request. The log shall include, at a minimum, the information specified below:

a. Date of each use and duration of each use (in hours);

b. Reason for use (testing & maintenance, emergency, required emission testing);

c. Calendar year operation in terms of fuel consumption (in gallons) and total hours; and,

d. Fuel sulfur concentration (the owner/operator may use the supplier's certification of sulfur content if it is maintained as part of this log).

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

AQ-31 These fire protection units are subject to the requirements of the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines (Title 17 CCR 93115). In the event of conflict between these conditions and the ATCM, the more stringent requirements shall govern.

Verification: Not necessary.

Conditions Applicable to Ivanpah I, II, and III Emergency Generators, MDAQMD Application Numbers/Permit Numbers; 00009313 (E010381), 00009316 (E010379), 00009317 (E010382) and 00009318 (E010383)

Equipment Description:

Year of Manufacture 2008, Tier II, One Caterpillar, Diesel fired internal combustion engine, Model No. 3516C-HD, and Serial No. tbd, After Cooled, Direct Injected, Turbo Charged, producing 3,750 bhp with 16 cylinders at 1,800 rpm while consuming a maximum of 173 gal/hr. This equipment powers a Generator.

These conditions apply separately to all four emergency generator engines unless otherwise specified.

AQ-32 Engine may operate in response to notification of impending rotating outage if the area utility has ordered rotating outages in the area where the engine is located or expects to order such outages at a particular time, the engine is located in the area subject to the rotating outage, the engine is operated no more than 30 minutes prior to the forecasted outage, and the engine is shut down immediately after the utility advises that the outage is no longer imminent or in effect.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

AQ-33 This unit shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15ppm) on a weight per weight basis per CARB Diesel or equivalent requirements.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

AQ-34 This equipment shall be installed, operated and maintained in strict accord with those recommendations of the manufacturer/supplier and/or sound engineering principles which produce the minimum emissions of contaminants. Unless otherwise noted, this equipment shall also be operated in accordance with all data and specifications submitted with the application for this permit.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

AQ-35 A non-resettable four-digit (9,999) hour timer shall be installed and maintained on this unit to indicate elapsed engine operating time.

Verification: At least thirty (30) days prior to the installation of the engine, the project owner shall provide the District and the CPM the specification of the hour timer.

AQ-36 This unit shall be limited to use for emergency power, defined as in response to a fire or when commercially available power has been interrupted. In addition, this unit shall be operated no more than 50 hours per year, and no more than 0.5 hours per day for testing and maintenance, excluding compliance source testing. Time required for source testing will not be counted toward the 50 hour per year limit.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

AQ-37 The owner/operator shall maintain an operations log for this unit current and on-site (or at a central location) for a minimum of five (5) years, and this log shall be provided to District, State and Federal personnel upon request. The log shall include, at a minimum, the information specified below:

a. Date of each use and duration of each use (in hours);

b. Reason for use (testing & maintenance, emergency, required emission testing);

c. Calendar year operation in terms of fuel consumption (in gallons) and total hours; and,

d. Fuel sulfur concentration (the owner/operator may use the supplier's certification of sulfur content if it is maintained as part of this log).

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

AQ-38 This genset is subject to the requirements of the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines (Title 17 CCR 93115). In the event of conflict between these conditions and the ATCM, the more stringent requirements shall govern.

Verification: Not necessary.

AQ-39 This unit shall not be used to provide power during a voluntary agreed to power outage and/or power reduction initiated under an Interruptible Service Contract (ISC); Demand Response Program (DRP); Load Reduction Program (LRP) and/or similar arrangement(s) with the electrical power supplier.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

ACRONYMS

AAQS	Ambient Air Quality Standard
ACC	Air Cooled Condenser
AERMOD	ARMS/EPA Regulatory Model
AFC	Application for Certification
AQCMM	Air Quality Construction Mitigation Manager
AQCMP	Air Quality Construction Mitigation Plan
AQMD	Air Quality Management District
ARB	California Air Resources Board
ATC	Authority to Construct
ATCM	Airborne Toxic Control Measure
BACT	Best Available Control Technology
bhp	brake horsepower
BLM	Bureau of Land Management
BRW	Basin Range and Watch
Btu	British thermal unit
CAA	Clean Air Act (Federal)
CAAQS	California Ambient Air Quality Standard
CCR	California Code of Regulations
CDD	California Desert District
CEC	California Energy Commission (or Energy Commission)
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CPM	(CEC) Compliance Project Manager
dscf	dry standard cubic feet
EIR	Environmental Impact Report
ERC	Emission Reduction Credit
FDOC	Final Determination Of Compliance
FSA	Final Staff Assessment
GHG	Greenhouse Gas
gr	Grains (1 gr $\cong$ 0.0648 grams, 7000 gr = 1 pound)
hp	horsepower
H_2S	Hydrogen Sulfide
HSC	Health and Safety Code
ISEGS	Ivanpah Solar Electric Generating System (proposed project)

lbs	Pounds
LORS	Laws, Ordinances, Regulations and Standards
MCR	Monthly Compliance Report
MDAB	Mojave Desert Air Basin
MDAQMD	Mojave Desert Air Quality Management District
mg/m^3	milligrams per cubic meter
MMBtu	Million British thermal units
MW	Megawatts (1,000,000 Watts)
NAAQS	National Ambient Air Quality Standard
NH_3	Ammonia
NMHC	Non-Methane Hydrocarbons
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
NO_3	Nitrates
NOx	Oxides of Nitrogen *or* Nitrogen Oxides
NSPS	New Source Performance Standard
NSR	New Source Review
O_2	Oxygen
O_3	Ozone
OLM	Ozone Limiting Method
PDOC	Preliminary Determination Of Compliance
PM	Particulate Matter
PM10	Particulate Matter less than 10 microns in diameter
PM2.5	Particulate Matter less than 2.5 microns in diameter
ppm	Parts Per Million
ppmv	Parts Per Million by Volume
ppmvd	Parts Per Million by Volume, Dry
PSA	Preliminary Staff Assessment (this document)
PSD	Prevention of Significant Deterioration
PTO	Permit to Operate
PVMRM	Plume Volume Molar Ratio Method
scf	Standard Cubic Feet
SO_2	Sulfur Dioxide
SO_3	Sulfate
SOx	Oxides of Sulfur

U.S. EPA	United States Environmental Protection Agency
$\mu g/m^3$	Microgram per cubic meter
VOC	Volatile Organic Compounds

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APPENDIX AIR-1 - GREENHOUSE GAS EMISSIONS

Testimony of William Walters, P.E. and Matthew Layton, P.E.

SUMMARY OF CONCLUSIONS

The Ivanpah Solar Electric Generating System (ISEGS) project is a proposed addition to the state's electricity system. ISEGS is a solar concentrating thermal power plant, which is comprised of fields of heliostat mirrors focusing solar energy on boilers located on centralized power towers. As a solar project it would emit considerably less greenhouse gases (GHG) than existing power plants and most other generation technologies, and thus would contribute to continued improvement of the overall western United States, and specifically California, electricity system GHG emission rate average.

ISEGS, as a solar energy generation project, is exempt from the mandatory GHG emission reporting requirements for electricity generating facilities as currently required by the California Air Resources Board (ARB) for compliance with the California Global Warming Solutions Act of 2006 (AB 32 Núñez, Statutes of 2006, Chapter 488, Health and Safety Code sections 38500 et seq.) (ARB 2008a). However, the project may be subject to future reporting requirements and GHG reductions or trading requirements as these regulations become more fully developed and implemented.

On October 8, 2008, the Energy Commission adopted an order initiating an informational (OII) proceeding (08-GHG OII-1) to solicit comments on how to assess the greenhouse gas impacts of proposed new power plants in accordance with the California Environmental Quality Act (CEQA). This analysis provides the staff's conclusions concerning greenhouse gas emissions for this siting case. Future power plant siting and amendment cases are likely to be reviewed with the benefit of new information and policy direction from the Energy Commission in response to the OII. (CEC 2009a).

While ISEGS would emit some GHG emissions, ISEGS's contribution to the system build-out of renewable resources in California would result in a net cumulative reduction of energy and GHG emission from new and existing fossil resources. Electricity is produced by operation of inter-connected generation resources. Operation of one power plant, like ISEGS, affects all other power plants in the interconnected system. The operation of the ISEGS would affect the overall electricity system operation and GHG emissions in several ways:

- ISEGS would provide low-GHG, renewable generation.
- ISEGS would facilitate to some degree the replacement out-of-state high-GHG-emitting (e.g., coal) electricity generation that must be phased out in conformance with the State's new Emissions Performance Standard.
- ISEGS could facilitate to some extent the replacement of generation provided by aging fossil-fired power plants that use once-through cooling.

These system impacts would result in a net reduction in GHG emissions across the electricity system providing energy and capacity to California. Thus, staff believes that

the project would result in a cumulative overall reduction in GHG emissions from power plants, does not worsen current conditions, and would not result in impacts that are cumulatively CEQA significant.

Staff concludes that the short-term minor emission of greenhouse gases during construction that are necessary to create this new low GHG-emitting power generating facility would be sufficiently reduced by "best practices" and would, therefore, not be CEQA significant.

The Ivanpah Solar Electric Generating System project, as a solar project with a nightly shutdown would operate less than 60% of capacity and is therefore not subject to the requirements of SB 1368 (Chapter 11, Greenhouse Gases Emission Performance Standard, Article 1, Section 2900 et. seq.). However, the ISEGS would easily comply with the requirements of SB 1368 and the Greenhouse Gas Emission Performance Standard.

INTRODUCTION

Greenhouse gas (GHG) emissions are not criteria pollutants, but they are discussed in the context of cumulative impacts. The state has demonstrated a clear willingness to address global climate change through research, adaptation[8] and inventory reductions. In that context, staff evaluates the GHG emissions from the proposed project, presents information on GHG emissions related to electricity generation, and describes the applicable GHG standards and requirements.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The following federal, state, and local laws and policies in **Greenhouse Gas Table** 1 pertain to the control and mitigation of greenhouse gas emissions. Staff's analysis examines the project's compliance with these requirements.

GLOBAL CLIMATE CHANGE AND ELECTRICITY PRODUCTION

There is general scientific consensus that climate change is occurring and that human activity contributes in some measure (perhaps substantially) to that change. Man-made emissions of greenhouse gases, if not sufficiently curtailed, are likely to contribute further to continued increases in global temperatures. Indeed, the California Legislature finds that "[g]lobal warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California" (Cal. Health & Safety Code, sec. 38500, division 25.5, part 1).

[8] While working to understand and reverse global climate change, it is prudent to also adapt to potential changes in the state's climate (for example, changing rainfall patterns).

Greenhouse Gas Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
State	
California Global Warming Solutions Act of 2006, AB 32 (Stats. 2006; Chapter 488; Health and Safety Code sections 38500 et seq.)	This act requires the California Air Resource Board (ARB) to enact standards that will reduce GHG emission to 1990 levels. Electricity production facilities will be regulated by the ARB.
California Code of Regulations, tit. 17, Subchapter 10, Article 2, sections 95100 et. seq.	These ARB regulations implement mandatory GHG emissions reporting as part of the California Global Warming Solutions Act of 2006 (Stats. 2006; Chapter 488; Health and Safety Code sections 38500 et seq.)
Title 20, California Code of Regulations, section 2900 et seq.; CPUC Decision D0701039 in proceeding R0604009	The regulations prohibit utilities from entering into long-term contracts with any base load facility that does not meet a greenhouse gas emission standard of 0.5 metric tonnes carbon dioxide per megawatt-hour (0.5 $MTCO_2$/MWh) or 1,100 pounds carbon dioxide per megawatt-hour (1,100 lbs CO_2/MWh).

In 1998, the Energy Commission identified a range of strategies to prepare for an uncertain climate future, including a need to account for the environmental impacts associated with energy production, planning, and procurement (CEC 1998, p.5). In 2003, the Energy Commission recommended that the state require reporting of greenhouse gases (GHG) or global climate change[9] emissions as a condition of state licensing of new electric generating facilities (CEC 2003, IEPR p. 42). In 2006, California enacted the California Global Warming Solutions Act of 2006 (AB 32). It requires the California Air Resources Board (ARB) to adopt standards that will reduce statewide GHG emissions to statewide GHG emissions levels in 1990, with such reductions to be achieved by 2020.[10] To achieve this, ARB has a mandate to define the 1990 emissions level and achieve the maximum technologically feasible and cost-effective GHG emission reductions.

The ARB adopted early action GHG reduction measures in October 2007, adopted mandatory reporting requirements and the 2020 statewide target in December 2007, and adopted a statewide scoping plan in December 2008 to identify how emission reductions will be achieved from major sources of GHG via regulations, market mechanisms, and other actions. ARB staff is developing regulatory language to implement its plan and holds ongoing public workshops on key elements of the recommended GHG reduction measures, including market mechanisms (ARB 2006). The regulations must be effective by January 1, 2011 and mandatory compliance commences on January 1, 2012. The mandatory reporting requirements are effective for electric generating facilities with a nameplate capacity equal or greater than 1 megawatt (MW) capacity, and the due date for initial reports by existing facilities this first year was June 1, 2009.

[9] Global climate change is the result of greenhouse gases, or air emissions with global warming potentials, affecting the global energy balance, and thereby, climate of the planet. The term greenhouse gases (GHG) and global climate change (GCC) gases are used interchangeably.

[10] Governor Schwarzenegger has also issued Executive Order S-3-05 establishing a goal of 80% below 1990 levels by 2050.

Examples of strategies that the state might pursue for managing GHG emissions in California, in addition to those recommended by the Energy Commission and the Public Utilities Commission, were identified in the California Climate Action Team's Report to the Governor (CalEPA 2006). The scoping plan approved by ARB in December 2008 builds upon the overall climate policies of the Climate Action Team report and show the recommended strategies to achieve the goals for 2020 and beyond. Some strategies focus on reducing consumption of petroleum across all areas of the California economy. Improvements in transportation energy efficiency (fuel economy), land use planning, and alternatives to petroleum-based fuels are slated to provide substantial reductions by 2020 (CalEPA 2006). The scoping plan includes a 33 percent Renewables Portfolio Standard (RPS), aggressive energy efficiency targets, and a cap-and-trade system that includes the electricity sector (ARB 2008b).

It is possible that GHG reductions mandated by ARB will be non-uniform or disproportional across emitting sectors, in that most reductions will be based on cost-effectiveness (i.e., the greatest effect for the least cost). For example, the ARB proposes a 40 percent reduction in GHG from the electricity sector, even though that sector currently only produces about 25 percent of the state GHG emissions. In response, in September 2008 the Energy Commission and the Public Utilities Commission provided recommendations (CPUC 2008) to ARB on how to achieve such reductions through both programmatic and regulatory approaches, and identified regulation points should ARB decide that a multi-sector cap and trade system is warranted.

The Energy Commission's *2007 Integrated Energy Policy Report* (IEPR) also addresses climate change within the electricity, natural gas, and transportation sectors (CEC 2007). For the electricity sector, it recommends such approaches as pursuing all cost-effective energy efficiency measures and meeting the Governor's stated goal of a 33 percent renewable portfolio standard.

SB 1368[11], enacted in 2006, and regulations adopted by the Energy Commission and the Public Utilities Commission pursuant to the bill, prohibits California utilities from entering into long-term commitments with any base load facilities that exceed the Emission Performance Standard of 0.500 metric tonnes CO_2 per megawatt-hour[12] (1,100 pounds CO_2/MWh). Specifically, the SB 1368 Emission Performance Standard applies (EPS) applies to base load power from new power plants, new investments in existing power plants, and new or renewed contracts with terms of five years or more, including contracts with power plants located outside of California.[13] If a project, instate or out of state, plans to sell base load electricity to California utilities, the utilities will have to demonstrate that the project meets the EPS. *Base load* units are defined as units that operate at a capacity factor higher than 60 percent. As a project with a permit operating restriction of less than 60 percent of the year, electricity from ISEGs would not have to meet the SB 1368 EPS.

[11] Public Utilities Code § 8340 et seq.

[12] The Emission Performance Standard only applies to carbon dioxide, and does not include emissions of other greenhouse gases converted to carbon dioxide equivalent.

[13] See Rule at http://www.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/64072.htm

In addition to these programs, California is involved in the Western Climate Initiative, a multi-state and international effort to establish a cap and trade market to reduce greenhouse gas emissions in the Western United States and the Western Electricity Coordinating Council (WECC). The timelines for the implementation of this program are similar to those of AB 32, with full roll-out beginning in 2012. And as with AB 32, the electricity sector has been a major focus of attention.

ELECTRICITY PROJECT GREENHOUSE GAS EMISSIONS

Electricity use can be as simple as turning on a switch to operate a light or fan. The system to deliver the adequate and reliable electricity supply is complex and variable. But it operates as an integrated whole to meet demand, such that the dispatch of a new source of generation generally curtails or displaces one or more less efficient or less competitive existing sources. Within the system, generation resources provide electricity, or energy, generating capacity, and ancillary services to stabilize the system and facilitate electricity delivery, or movement, over the grid. *Capacity* is the instantaneous output of a resource, in megawatts. *Energy* is the capacity output over a unit of time, for example an hour or year, generally reported as megawatt-hours or gigawatt-hours (GWh). Ancillary services[14] include regulation, spinning reserve, non-spinning reserve, voltage support, and black start capability. Individual generation resources can be built and operated to provide only one specific service. Alternatively, a resource may be able to provide one or all of these services, depending on its design and constantly changing system needs and operations.

California is actively pursuing policies to reduce GHG emissions that include adding non-GHG emitting renewable generation resources to the system mix. The generation of electricity using fossil fuels, even in a back-up generator at a thermal solar plant, produces air emissions known as greenhouse gases in addition to the criteria air pollutants that have been traditionally regulated under the federal and state Clean Air Acts. Greenhouse gas emissions contribute to the warming of the earth's atmosphere, leading to climate change.

For fossil fuel-fired power plants and equipment, these include primarily carbon dioxide, with much smaller amounts of nitrous oxide (N_2O, not NO or NO_2, which are commonly known as NOx or oxides of nitrogen), and methane (CH_4 – often from unburned natural gas). Also included are sulfur hexafluoride (SF_6) from high voltage equipment, and hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) from refrigeration/chiller equipment. GHG emissions from the electricity sector are dominated by CO_2 emissions from the carbon-based fuels; other sources of GHG emissions are small and also are more likely to be easily controlled or reused/recycled, but are nevertheless documented here as some of the compounds have very large relative global warming potentials. Global warming potential is a relative measure, compared to carbon dioxide, of a compound's residence time in the atmosphere and ability to warm the planet. Mass emissions of GHG are converted into carbon dioxide equivalent metric tonnes (MTCO2E) for ease of comparison.

[14] See page CEC 2009b, page 95.

PROJECT CONSTRUCTION

Construction of industrial facilities such as power plants requires coordination of numerous equipment and personnel. The concentrated on-site activities result in short-term, unavoidable increases in vehicle and equipment emissions that include greenhouse gases. Construction of the proposed project has three phase, each of which would last about 24 months. There would be a 12 month-overlapping period between each phase, which would result in 4 years of entire construction period. The applicant provided a construction emission estimate that staff used to calculate greenhouse gas emissions for the entirety of the construction activities. The greenhouse gas emissions estimate, presented below in **Greenhouse Gas Table 2,** were converted by staff into MTCO2E and totaled.

Greenhouse Gas Table 2
ISEGS Estimated Potential Construction Greenhouse Gas Emissions

Construction Element	CO_2-equivalent (MTCO2E) [a,b]
Off-road Equipment	10,444
Heavy Delivery Trucks	1,925
Construction Worker Transportation	5,410
Construction Total	17,779

Source: Staff estimates using the applicant's criteria pollutant emissions estimates (BSE 2007a)
[a] One metric tonne (MT) equals 1.1 short tons or 2,204.6 pounds or 1,000 kilograms.
[b] The vast majority of the CO2E emissions, over 99 percent, are CO_2 from these combustion sources.

PROJECT OPERATIONS

Operations GHG emissions are shown in **Greenhouse Gas Table 3**. The proposed ISEGS project would cause GHG emissions from the power block maintenance activities, including mirror cleaning and minimal undesired vegetation removal, the weekly testing of the emergency generator and firewater pump, one hour per day of operation of each boiler, and employee trips.

Greenhouse Gas Table 3 shows what the proposed project, as permitted, could potentially emit in greenhouse gases on an annual basis. All emissions are converted to CO_2-equivalent and totaled. Electricity generation GHG emissions are generally dominated by CO_2 emissions from the carbon-based fuels; other sources of GHG are typically small and also are more likely to be easily controlled or reused/recycled. For this solar project the primary fuel, solar energy, is greenhouse gas free, but there is a natural gas-fired steam boiler for each of the three plants. Other comparatively large GHG emission sources for this project are the testing of the emergency generator engines, maintenance vehicles, and worker vehicles. Testing of the firewater pump engines, delivery trips and SF_6 equipment leakage provide additional minor sources of GHG emissions.

Greenhouse Gas Table 3
Estimated ISEGS Potential Operating Greenhouse Gas Emissions

	CO_2-equivalent (MTCO2E[a] per year)
Boilers	25,458
Emergency Generator Engines	346
Fire Pump Engine	15
Maintenance Vehicles	474
Worker Vehicles	1118
Delivery and Waste Haul Vehicles	22
Equipment Leakage (SF_6)	10
Total Project GHG Emissions – MTCO2E [b]	**27,444**
Facility MWh per year [c]	960,000
Facility GHG Performance (MTCO2E/MWh)	0.029

Sources: BSE 2007a, where staff updated the natural gas GHG emissions factors to use the latest ARB recommendations (ARB 2008a) and included all operating GHG emission sources in the estimate.
[a] One metric tonne (MT) equals 1.1 short tons or 2,204.6 pounds or 1,000 kilograms.
[b] The vast majority of the CO2E emissions, over 99 percent, are CO_2 from these emission sources.
[c] Approximately a 28 percent capacity factor. BSE2007a.

The proposed project would be permitted, on an annual basis, to emit over 27,000 metric tonnes of CO_2-equivalent per year if operated at its maximum permitted level. ISEGS is a solar project with a nightly shutdown so it will operate less than 60% of capacity; therefore, the project is not subject to the requirements of SB 1368 and the Greenhouse Gas Emission Performance Standard. However, the ISEGS, at 0.029 MTCO2E/MWh, would easily meet the requirements of SB 1368 and the Greenhouse Gas Emission Performance Standard of 0.500 MTCO2/MWh.

CLOSURE AND DECOMMISSIONING

Closure and decommissioning, as a one-time limited duration event, would have emissions that are similar in type and magnitude, but likely lower than, the construction emissions as discussed above.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Staff assesses three kinds of impacts: construction, operation, and cumulative effects. As the name implies, construction impacts result from the emissions occurring during the construction of the project. The operation impacts result from the emissions of the proposed project during operation. Cumulative impacts analysis assesses the impacts that result from the proposed project's incremental effect viewed over time. The impact of GHG emissions caused by this solar facility is characterized by considering how the power plant would affect the overall electricity system. The integrated electricity system depends on non-fossil and fossil-fueled generation resources to provide energy and satisfy local capacity needs. As directed by the OII (CEC 2009a), staff is refining and implementing the concept of a "blueprint" that describes the long-term roles (i.e.,

retirements and displacement) of fossil-fueled power plants in California's electricity system as we move to a high-renewable, low-GHG electricity system, which will include projects like ISEGS.

PROPOSED PROJECT

Construction Impacts

Staff does not believe that the small GHG emission increases from construction activities would be CEQA significant for several reasons. First, the period of construction will be short-term and the emissions intermittent during that period, not ongoing during the life of the project. Additionally, best practices control measures that staff recommends, such as limiting idling times and requiring, as appropriate, equipment that meet the latest emissions standards would further minimize greenhouse gas emissions since staff believes that the use of newer equipment will increase efficiency and reduce GHG emissions and be compatible with low-carbon fuel (e.g., bio-diesel and ethanol) mandates that will likely be part of the ARB regulations to reduce GHG from construction vehicles and equipment.

Direct/Indirect Operation Impacts and Mitigation

The proposed ISEGS promotes the state's efforts to move towards a high-renewable, low-GHG electricity system, and, therefore, reduce the amount of natural gas used by electricity generation and greenhouse gas emissions. As the *2007 Integrated Energy Policy* Report (CEC 2007, p. 184) noted:

> New natural gas-fueled electricity generation technologies offer efficiency, environmental, and other benefits to California, specifically by reducing the amount of natural gas used—and with less natural gas burned, fewer greenhouse gas emissions. Older combustion and steam turbines use outdated technology that makes them less fuel- and cost-efficient than newer, cleaner plants.… The 2003 and 2005 IEPRs noted that the state could help reduce natural gas consumption for electric generation by taking steps to retire older, less efficient natural gas power plants and replace or repower them with new, more efficient power plants.

Thus, in the context of the Energy Commission's *Integrated Energy Policy Report*, the ISEGS - solar-powered, limited GHG emissions and likely replacement of older existing plant capacity, furthers the state's strategy to promote generation system efficiency and reduce fossil fuel use and GHG emissions. As stated in the 2009 *Framework for Evaluating Greenhouse Gas Implications of Natural Gas-Fired Power Plants in California* (CEC 2009b, p.20):

> When one resource is added to the system, all else being held equal, another resource will generate less power. If the new resource has a lower cost or fewer emissions than the existing resource mix, the aggregate system characteristics will change to reflect the cheaper power and lower GHG emissions rate.

Net GHG emissions for the integrated electric system will decline when new renewable power plants are added to: 1) move renewable generation towards the 33 percent

target; 2) improve the overall efficiency, or GHG emission rate, of the electric system; or 3) serve load growth or capacity needs more efficiently, or with fewer GHG emissions.

The Role of ISEGS in Renewables Goals/Load Growth

As California moves towards an increased reliance on renewable energy, non-renewable energy resources maybe curtailed or displaced. These potential reduction in non-renewable energy, shown in **Greenhouse Gas Table 4**, could be as much as 36,000 GWh. These assumptions are conservative in that the forecasted growth in retail sales assumes that the impacts of planned increases in expenditures on (uncommitted) energy efficiency are already embodied in the current retail sales forecast[15]. If, for example, forecasted retail sales in 2020 were lowered by 10,000 GWh due to the success of increased energy efficiency expenditures, non-renewable energy needs fall by an additional 6,700 to 8,000 GWh/year, depending on the RPS level, totaling as much as 45,000 GWh per year of reduced non-renewable energy, depending on the RPS assumed.

Greenhouse Gas Table 4
Estimated Changes in Non-Renewable Energy Potentially Needed to Meet California Loads, 2008-2020

California Electricity Supply	**Annual GWh**	
Statewide Retail Sales, 2008, estimated [a]	265,185	
Statewide Retail Sales, 2020, forecast [a]	308,070	
Growth in Retail Sales, 2008-20	42,885	
Growth in Net Energy for Load [b]	46,316	
California Renewable Electricity	**GWh @ 20% RPS**	**GWh @ 33% RPS**
Renewable Energy Requirements, 2020 [c]	61,614	101,663
Current Renewable Energy, 2008	29,174	
Change in Renewable Energy-2008 to 2020 [c]	32,440	72,489
Resulting Change in Non-Renewable Energy [d]	13,876	(-36,173)

Source: Energy Commission staff 2009.
Notes:
a. Not including 8 percent transmission and distribution losses.
b. Based on 8 percent transmission and distribution losses, or 42,885 GWh x 1.08 = 46,316 GWh.
c. Renewable standards are calculated on retail sales and not on total generation, which accounts for 8 percent transmission and distribution losses.
d. Based on net energy (including 8 percent transmission and distribution losses), not based on retail sales

The Role of ISEGS in Retirements/Replacements

ISEGS would be capable of annually providing 960 GWh of renewable generation to replace resources that are or will likely be precluded from serving California loads. State policies, including GHG goals, are discouraging or prohibiting new contracts and new investments in high GHG-emitting, such as coal-fired, generation, generation that relies on water for once-through cooling, and aging power plants (CEC 2007). Some of the

[15] The extent to which uncommitted energy efficiency savings are already represented in the current Energy Commission demand forecast is a subject of study for the 2009 IEPR.

existing plants that are likely to require substantial capital investments to continue operation in light of these policies may be unlikely to undertake the investments and will retire or be replaced.

Replacement of High GHG-Emitting Generation

High GHG -emitting resources, such as coal, are effectively prohibited from entering into new contracts for California electricity deliveries as a result of the Emissions Performance Standard adopted in 2007 pursuant to SB 1368. Between now and 2020, more than 18,000 GWh of energy procured by California utilities under these contracts will have to reduce GHG emissions or be replaced; these contracts are presented in **Greenhouse Gas Table 5**.

Greenhouse Gas Table 5
Expiring Long-term Contracts with Coal-fired Generation 2009 – 2020

Utility	Facility [a]	Contract Expiration	Annual GWh Delivered to CA
PG&E, SCE	Misc In-state Qual.Facilities [a]	2009-2019	4,086
LADWP	Intermountain	2009-2013	3,163 [b]
City of Riverside	Bonanza, Hunter	2010	385
Department of Water Resources	Reid Gardner	2013 [c]	1,211
SDG&E	Boardman	2013	555
SCE	Four Corners	2016	4,920
Turlock Irrigation District	Boardman	2018	370
LADWP	Navajo	2019	3,832
		TOTAL	18,522

Source: Energy Commission staff based on Quarterly Fuel and Energy Report (QFER) filings.
Notes:
a. All facilities are located out-of-state except for the Miscellaneous In-state Qualifying Facilities.
b. Estimated annual reduction in energy provided to LADWP by Utah utilities from their entitlement by 2013.
c. Contract not subject to Emission Performance Standard, but the Department of Water Resources has stated its intention not to renew or extend.

This represents almost half of the energy associated with California utility contracts with coal-fired resources that will expire by 2030. If the State enacts a carbon adder[16], all the coal contracts (including those in **Greenhouse Gas Table 5**, which expire by 2020 and, other contracts that expire beyond 2020 and are not shown in the table) may be retired at an accelerated rate as coal-fired energy becomes uncompetitive due to the carbon adder or the capital needed to capture and sequester the carbon emissions. Also shown are the approximate 500 MW of in-state coal and petroleum coke-fired capacity that may be unlikely to contract with California utilities for baseload energy due to SB1368 Emission Performance Standard. As these contracts expire, new and existing generation resources will replace the lost energy and capacity. Some will come from renewable generation; some will come from new and existing natural gas fired

[16] A carbon adder or carbon tax is a specific value added to the cost of a project for per ton of associated carbon or carbon dioxide emissions. Because it is based on, but not limited to, actual operations and emission and can be trued up at year end, it is considered a simple mechanism to assign environmental costs to a project.

generation. All will emit substantially less GHG than the coal and petroleum coke-fired generation, which average about 1.0 $MTCO_2$/MWh without carbon capture and sequestration, resulting in a net reduction in GHG emissions from the California electricity sector.

Retirement of Generation Using Once-Through Cooling

The State Water Resource Control Board (SWRCB) has proposed substantial changes to OTC units, shown in **Greenhouse Gas Table 6**, which would likely require retrofit, retirement, or substantial curtailment of dozens of generating units. In 2008, these units collectively produced about 58,000 GWh. While those OTC facilities owned and operated by utilities and recently-built combined cycles may well install dry or wet cooling towers, it is unlikely that the aging, merchant plants will do so. Most of these units operate at low capacity factors, suggesting a limited ability to compete in the current electricity market. Although the timing would be uncertain, new resources would out-compete aging plants and would displace the energy provided by OTC facilities and likely accelerate the retirements.

Any additional costs associated with complying with the SWRCB regulation would be amortized over a limited revenue stream today and into the foreseeable future. Their energy and much of their dispatchable, load-following capability will have to be replaced. These units constitute over 15,000 MW of merchant capacity and 17,800 GWh of merchant energy. Of this, much but not all of the capacity and energy are in local reliability areas, requiring a large share of replacement capacity – absent transmission upgrades – to locations in the same local reliability area. **Greenhouse Gas Table 6** provides a summary of the utility and merchant energy supplies affected by the OTC regulations.

New generation resources that can either provide local support or energy will emit substantially less GHGs. Existing aging and OTC natural gas generation average 0.6 to 0.7 MTCO2/MWh, which is much higher than a renewable project like ISEGS. When a project can provide energy and capacity, given its location, it can provide a net reduction in GHG emissions from the California electricity sector. A project like ISEGS located far from the coastal load pockets like the Greater Los Angeles Local Capacity Area, would more likely provide energy support to facilitate the retirement of some aging and/or OTC power plants, but would not likely provide any local capacity support at or near the coastal OTC units.

Greenhouse Gas Table 6
Units Utilizing Once-Through Cooling: Capacity and 2008 Energy Output [a]

Plant, Unit Name	Owner	Local Reliability Area	Aging Plant?	Capacity (MW)	2008 Energy Output (GWh)	GHG Performance (MTCO2/MWh)
Diablo Canyon 1, 2	Utility	None	No	2,232	17,091	Nuclear
San Onofre 2, 3	Utility	L.A. Basin	No	2,246	15,392	Nuclear
Broadway 3 [b]	Utility	L.A. Basin	Yes	75	90	0.648
El Centro 3, 4 [b]	Utility	None	Yes	132	238	0.814
Grayson 3-5 [b]	Utility	LADWP	Yes	108	150	0.799
Grayson CC [b]	Utility	LADWP	Yes	130	27	0.896
Harbor CC	Utility	LADWP	No	227	203	0.509
Haynes 1, 2, 5, 6	Utility	LADWP	Yes	1,046	1,529	0.578
Haynes CC [c]	Utility	LADWP	No	560	3,423	0.376
Humboldt Bay 1, 2 [a]	Utility	Humboldt	Yes	107	507	0.683
Olive 1, 2 [b]	Utility	LADWP	Yes	110	11	1.008
Scattergood 1-3	Utility	LADWP	Yes	803	1,327	0.618
Utility-Owned				7,776	39,988	0.693
Alamitos 1-6	Merchant	L.A. Basin	Yes	1,970	2,533	0.661
Contra Costa 6, 7	Merchant	S.F. Bay	Yes	680	160	0.615
Coolwater 1-4 [b]	Merchant	None	Yes	727	576	0.633
El Segundo 3, 4	Merchant	L.A. Basin	Yes	670	508	0.576
Encina 1-5	Merchant	San Diego	Yes	951	997	0.674
Etiwanda 3, 4 [b]	Merchant	L.A. Basin	Yes	666	848	0.631
Huntington Beach 1, 2	Merchant	L.A. Basin	Yes	430	916	0.591
Huntington Beach 3, 4	Merchant	L.A. Basin	No	450	620	0.563
Mandalay 1, 2	Merchant	Ventura	Yes	436	597	0.528
Morro Bay 3, 4	Merchant	None	Yes	600	83	0.524
Moss Landing 6, 7	Merchant	None	Yes	1,404	1,375	0.661
Moss Landing 1, 2	Merchant	None	No	1,080	5,791	0.378
Ormond Beach 1, 2	Merchant	Ventura	Yes	1,612	783	0.573
Pittsburg 5-7	Merchant	S.F. Bay	Yes	1,332	180	0.673
Potrero 3	Merchant	S.F. Bay	Yes	207	530	0.587
Redondo Beach 5-8	Merchant	L.A. Basin	Yes	1,343	317	0.810
South Bay 1-4	Merchant	San Diego	Yes	696	1,015	0.611
Merchant-Owned				15,254	17,828	0.605
Total In-State OTC				23,030	57,817	

Source: Energy Commission staff based on Quarterly Fuel and Energy Report (QFER) filings.
a. OTC Humboldt Bay Units 1 and 2 are included in this list. They must retire in 2010 when the new Humboldt Bay Generating Station (not ocean-cooled), currently under construction, enters commercial operation.
b. Units are aging but are not OTC.

Closure and Decommissioning

Eventually the facility will close, either at the end of its useful life or due to some unexpected situation such as a natural disaster or catastrophic facility breakdown. When the facility closes, all sources of air emissions would cease to operate and thus impacts associated with those greenhouse gas emissions would no longer occur. The only other expected, albeit temporary, GHG emissions would be equipment exhaust (off-road and on-road) from the dismantling activities. These activities would be of much a shorter duration than construction of the project, equipment are assumed to have

lower comparative GHG emissions due to technology advancement, and would be required to be controlled in a manner at least equivalent to that required during construction. It is assumed that the beneficial GHG impacts of this facility, displacement of fossil fuel fired generation, would be replaced by the construction of newer more efficiency renewable energy or other low GHG generating technology facilities. Also, the recycling of the facility components (steel, concrete, etc.) could indirectly reduce GHG emissions. Therefore, while there will be a temporary adverse greenhouse gas CEQA impacts during decommissioning they are expected to be less than significant.

ALTERNATIVE 1 – NO ACTION ALTERNATIVE

In the No Project / No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan.

The results of the No Project / No Action Alternative would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project.
- The benefits of the proposed project in displacing fossil fuel fired generation and reducing associated greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

If this project is not approved, renewable projects would likely be developed on other sites in the Mojave Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are two large solar projects proposed on BLM land in California and Nevada within a few miles of the Ivanpah site. In addition, there are currently 70 applications for solar projects covering 575,155 acres pending with BLM in the California Desert District.

CUMULATIVE IMPACTS

Cumulative impacts are defined as "two or more individual effects which, when considered together, are considerable or . . . compound or increase other environmental impacts" (CEQA Guidelines § 15355). "A cumulative impact consists of an impact that is created as a result of a combination of the project evaluated in the EIR together with other projects causing related impacts" (CEQA Guidelines § 15130[a][1]). Such impacts may be relatively minor and incremental, yet still be significant because of the existing environmental background, particularly when one considers other closely related past, present, and reasonably foreseeable future projects.

This entire assessment is a cumulative impact assessment. The project alone would not be sufficient to change global climate, but would emit greenhouse gases and therefore has been analyzed as a potential cumulative impact in the context of existing GHG regulatory requirements and GHG energy policies.

COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

ISEGS, as a solar energy generation project, is exempt from the mandatory GHG emission reporting requirements for electricity generating facilities as currently required by the California Air Resources Board (ARB) for compliance with the California Global Warming Solutions Act of 2006 (AB 32 Núñez, Statutes of 2006, Chapter 488, Health and Safety Code sections 38500 et seq.) (ARB 2008a).

Since this power project would be permitted for less than a 60% annual capacity factor, the project is not subject to the requirements of SB 1368 and the Emission Performance Standard.

NOTEWORTHY PUBLIC BENEFITS

Greenhouse gas related noteworthy public benefits include the construction of renewable and low-GHG emitting generation technologies and the potential for successful integration into the California and greater WECC electricity systems.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

No public or agency comments were received on the PSA GHG analysis. An intervenor, Basin and Range Watch (BRW) did provide two comments[17] related to greenhouse gases.

BRW Comment 3

This comment notes that deserts have recently been found to be stronger carbon sinks than previously thought and questions whether the project would reduce GHG emissions at a rate equal to or more than the project caused reduction in biological and non-biological carbon uptake in the project area.

Staff Response

Air quality staff cannot answer the question of how much the natural carbon uptake, biological or non-biological, at the project site might diminish due to this project. However, staff can try to determine the amount of carbon that would be displaced by the project. The following provides a comparison of the CO_2 emissions from the proposed ISEGS and approximate typical range of CO_2 emissions from other types of power plants:

Type of Power Plant	GHG Emission Performance MTCO2/MW
ISEGS	0.029
Natural Gas Combined Cycle	0.370 to 0.430
Natural Gas Fired Boiler	0.550 to 0.650
Natural Gas Peaking Turbine	0.550 to 0.900
Coal Fired Boiler	~1.000

[17] The comments have been paraphrased for brevity and clarity.

The difference in CO_2 emissions, depending on what type of energy source is displaced and given the anticipated annual generation of 960,000 MWh per year for ISEGS, would be on the order of 330,000 to 930,000 metrics tons per year of CO_2 emissions reduced through displacement of fossil fuel fired energy. To put this in perspective, the CO_2 emissions displaced per acre of disturbed land, the project would disturb 4,065 acres, would be on the order of 80 to 230 metric tons of CO_2 and 22 to 62 metric tons of carbon per year per disturbed acre. Converting these units to those used in the comment's cited journal paper (grams of carbon per cubic meter – g/m^3), provides on the order of 5,400 to 15,500 g/m^3 of displaced carbon per year. This is well over the values of annual desert carbon uptake, which ranged from 62 to 622 g/m^3 for all measurements and was noted to be 100 g/m^3 for measurements in the Mojave Desert. Therefore, it is concluded that the project would reduce GHG emissions at a rate that is much greater than any increase the project would cause due to a reduction in natural CO_2 uptake at the project site.

BRW Comment 17

This comment noted concern over the 90 jobs and the GHG emissions from commuting to the job site and questioned whether worker would be required to drive electric cars.

Staff Response

The Energy Commission does not have the authority to require private individuals to purchase or use specific types of vehicles. Additionally, the GHG emissions for these 90 workers is conservatively estimated to impact total plant GHG emission performance by only 0.001 MTCO2/MWh. Staff also notes that the integration of renewable energy resources will often include the siting of remote generation facilities that have both comparatively high staffing requirements and travel distance requirements. Staff has concluded that no additional measures, beyond those already included in the Air Quality section and Traffic and Transportation section, are necessary to mitigate this impact.

CONCLUSIONS

The Ivanpah Solar Electric Generating System project would emit considerably less greenhouse gases (GHG) than existing power plants and most other generation technologies, and thus would contribute to continued improvement of the overall western United States, and specifically California, electricity system GHG emission rate average. The project would lead to a net reduction in GHG emissions across the electricity system that provides energy and capacity to California. Thus, staff believes that the project would result in a cumulative overall reduction in GHG emissions from the state's power plants, would not worsen current conditions, and would thus not result in CEQA impacts that are cumulatively significant.

Staff does not believe that the GHG emission increases typical from construction activities would be CEQA significant for several reasons. First, the period of construction would be short-term and not ongoing during the life of the project. Additionally, the best practices control measures that staff recommends, such as limiting idling times and requiring, as appropriate, equipment that meets the latest emissions standards, would further minimize greenhouse gas emissions since staff believes that the use of newer equipment will increase efficiency and reduce GHG

emissions and be compatible with low-carbon fuel (e.g., bio-diesel and ethanol) mandates that will likely be part of the ARB regulations to reduce GHG from construction vehicles and equipment. For all these reasons, staff would likely conclude that the short-term emission of greenhouse gases during construction would be sufficiently reduced and would, therefore, not be CEQA significant.

The Ivanpah Solar Electric Generating System project, as a solar project with a nightly shutdown will operate less than 60% of capacity and is therefore not subject to the requirements of SB 1368 and the Greenhouse Gas Emission Performance Standard. However, the Ivanpah Solar Electric Generating System project would easily meet the requirements of SB 1368 and the Greenhouse Gas Emission Performance Standard.

MITIGATION MEASURES/PROPOSED CONDITIONS OF CERTIFICATION

No Conditions of Certification related to Greenhouse Gas emissions are proposed. The project owner would comply with any future applicable GHG regulations formulated by the ARB, such as GHG reporting or emissions cap and trade markets.

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BIOLOGICAL RESOURCES

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SUMMARY OF CONCLUSIONS

This section summarizes the Energy Commission staff's analysis and conclusions about the impacts of the ISEGS project, briefly describes appropriate mitigation for those impacts, and identifies issues that require resolution before finalizing the mitigation recommendations. It also summarizes the analysis by BLM staff regarding impacts and mitigation to biological resources. This section provides a summary of the analyses discussed in this document but does not make final decisions for either agency.

The Ivanpah Solar Electric Generating System (ISEGS) project would have major impacts to the biological resources of the Ivanpah Valley, substantially affecting many sensitive plant and wildlife species and eliminating a broad expanse of relatively undisturbed Mojave Desert habitat. Approximately 4,073 acres of occupied desert tortoise habitat would be permanently lost and a minimum of 25 desert tortoises would need to be translocated west of the ISEGS project site. These actions would require state and federal endangered species "take" authorization. In addition to direct loss of habitat, the project would fragment and degrade adjacent habitat, and could promote the spread of invasive non-native plants and desert tortoise predators such as ravens. These impacts would directly and adversely affect habitat for a threatened species (the desert tortoise), and would likely be highly controversial. Based on these factors, the proposed project would result in impacts that would be significant with respect to NEPA significance criteria in 40 CFR 1508.27.

Other special-status wildlife species potentially impacted by the project because of loss of breeding and/or foraging habitat include burrowing owl, loggerhead shrike, Crissal thrasher, golden eagle, and American badger. The project would also affect approximately 2,000 ephemeral drainage segments on the ISEGS site, potentially resulting in direct or indirect impacts to the wildlife functions and values provided by 198 acres of waters of the state.

The ISEGS project site supports a diverse flora including numerous special-status plant species. Eight special-status plant species, only one of which is considered sensitive by the Bureau of Land Management (BLM), would be directly impacted by construction of ISEGS. Energy Commission staff consider impacts to five of these (Mojave milkweed, desert pincushion, nine-awned pappus grass, Parish's club-cholla, and Rusby's desert-mallow) to be significant according to California Environmental Quality Act (CEQA) guidelines because the project would eliminate a substantial portion of their documented occurrences in the state. Depending on the degree of avoidance that the applicant can achieve, Energy Commission staff's proposed avoidance and minimization measures may reduce impacts to three of these species (desert pincushion, nine-awned pappus grass, and Parish's club-cholla) to less-than-significant levels. However, impacts to Mojave milkweed and Rusby's desert-mallow would remain significant in a CEQA context even after implementation of the special-status plant impact avoidance and minimization measures described in Energy Commission staff's proposed conditions of certification.

The BLM and Energy Commission staffs (hereafter jointly referred to as staff unless otherwise noted) have concluded that without mitigation the ISEGS project would be a substantial contributor to the cumulatively significant loss of Ivanpah Valley's biological resources, including the threatened desert tortoise and other special-status species. Impact avoidance and minimization measures described in staff's analysis and included in the conditions of certification would help reduce impacts to sensitive biological resources. However, compensatory measures are necessary to offset project-related losses, and to assure compliance with state and federal laws such as the federal and state endangered species acts and regulations protecting waters of the state. In the case of special-status plants, impacts would remain significant according to CEQA standards despite compensatory mitigation for other biological resources.

Compensatory mitigation for desert tortoise typically involves balancing the acreage of habitat loss with acquisition of lands that would be initially improved, protected and maintained to support healthy populations of desert tortoise. The compensation is achieved by improving the carrying capacity of the acquired acreage (for example, by habitat restoration, fencing, road closures) so that more desert tortoise will survive and reproduce on these lands, thus offsetting over time the decrease in numbers of tortoise resulting from the habitat loss.

To fully offset impacts, the California Endangered Species Act (CESA) requires a full mitigation finding, which usually contemplates a mitigation ratio greater than 1:1 for compensation lands (i.e., acquisition or preservation of one acre of compensation lands for every acre lost). On past energy projects considered by the Energy Commission, the California Department of Fish and Game (CDFG) has required a 3:1 ratio to meet the CESA full mitigation standard for good quality habitat such as that found at the ISEGS project site. The higher ratio reflects the limits to increases in carrying capacity that can be achieved on the acquired lands, even with implementation of all possible protection and enhancement measures. The BLM applies a 1:1 compensation ratio because they generally pursue desert tortoise recovery goals not through parcel by parcel acquisitions and management, but rather through implementation of region-wide management plans and land use planning as described in the Northern and Eastern Mojave (NEMO) Desert Management Plan (BLM 2002) and the Desert Tortoise Recovery Plan (USFWS 1994).

Energy Commission staff proposes compensation to achieve full mitigation at a 3:1 ratio for loss of desert tortoise habitat and for other CEQA significant impacts for the BrightSource ISEGS project. This compensation ratio is consistent with past Energy Commission projects and with Incidental Take Permits (ITPs) issued by CDFG in the region. The 3:1 ratio has also been proposed by the applicant (Ellison, Schneider & Harris LLP 2009). At least two thirds of the 3:1 mitigation could be achieved by acquisition of no less than 8,146 acres of land in the Mojave Desert providing adequate habitat and capable of increasing the carrying capacity for desert tortoise. The remaining third of the 3:1 compensatory mitigation would be developed in accordance with BLM's desert tortoise mitigation requirements as described in the NEMO. BLM's 1:1 mitigation plan has not yet been finalized, but is likely to include acquisition of private lands within the Desert Wildlife Management Area (DWMA) portion of the Eastern Mojave Recovery Unit and in the Mojave National Preserve, and with additional management and enhancement projects that would benefit the desert tortoise. The specifics of the desert tortoise acquisition and enhancement actions would be

developed by BLM in collaboration with Energy Commission staff, CDFG and the U.S. Fish and Wildlife Service (USFWS) in accordance with guidance from desert tortoise recovery plans (USFWS 2004, 2008a).

For the desert tortoise habitat compensation to be biologically effective, and thus mitigate CEQA impacts to desert tortoise to less-than-significant levels, and meet the full mitigation requirements of CESA, the acquired lands must (1) be protected in perpetuity, and (2) a funding mechanism must be established to undertake initial habitat improvements, and to sustain long-term management and habitat enhancement. Funding comes from an endowment provided by the applicant to create enough income to cover annual stewardship costs on the acquired lands, as well as a buffer to offset inflation. Funding for initial habitat improvements is also required for those actions needed immediately upon acquisition of the property to secure it and remove hazards. Energy Commission staff's proposed Condition of Certification **BIO-17** describes the funding security needed for land acquisition and long-term protection and management for the acquired mitigation lands.

Energy Commission staff developed the proposed Condition of Certification **BIO-17** based largely on CDFG recommendations from past Energy Commission projects, but CDFG has not yet provided formal guidance describing their requirements for satisfying CESA in writing other than to convey orally to staff that they would concur with a combined 3:1 mitigation package for desert tortoise for this project. Staff is not making any assumptions as to whether CDFG would agree with the Energy Commission staff's calculation of security costs (acquisition costs, initial habitat improvement, and long-term management endowment). However, based on the July 23, 2009 letter from the BLM to CDFG, staff believes CDFG would concur with including BLM's proposed mitigation approach as part of the complementary mitigation package to satisfy CESA's full mitigation standard if the provisions described by BLM in that letter were in place (BLM 2009e).

Energy Commission staff have concluded that the 2:1 compensatory mitigation, as described in staff's proposed Condition of Certification **BIO-17**, combined with the BLM 1:1 mitigation described conceptually above, would meet CESA's full mitigation standard pending resolution of the few issues described below. Staff considers the combination of these two mitigation approaches to be a complementary and complete mitigation package that would achieve full mitigation and would satisfy federal and state requirements for mitigating impacts to desert tortoise. However, a few issues need to be resolved before finalizing this complementary BLM-Energy Commission mitigation package:

- In Perpetuity Protection: Mitigation lands must be protected in perpetuity to satisfy Energy Commission and CDFG requirements. For BLM mitigation, acquisition of private lands within the DWMAs and the Mojave National Preserve would satisfy this requirement because the surrounding protective land uses would prevail. As described in the July 23, 2009 letter, BLM would provide some sort of assurances for long-term protection if these lands are to be counted as fulfilling part of CESA's full mitigation standard. To address this issue BLM has recently proposed development of deed restriction language and a Memorandum of Understanding between BLM and CDFG to offer protection to BLM-managed mitigation lands.

- Enhancement Actions: Staff has yet to develop a specific program of enhancement actions other than land acquisition that would fulfill BLM's 1:1 mitigation requirements and CESA's full mitigation standard. Proposed enhancement actions on BLM lands such as fencing and habitat restoration would need to be fully analyzed and disclosed to satisfy NEPA requirements. BLM will collaborate with Energy Commission staff, CDFG and USFWS in the development of the specific desert tortoise enhancement actions.
- Process for Mitigation Compliance: Staff needs to integrate CDFG and BLM mitigation processes and develop a mechanism that provides compliance monitoring of enhancement actions on BLM lands. For land acquisitions, BLM, CDFG and the Energy Commission have well developed and transparent procedures to track expenditures and acquisitions. A similar mechanism is needed to verify fulfillment of enhancement actions such as fencing or habitat restoration on BLM lands. BLM and Energy Commission staff will work together to develop a process that allows tracking and verification of enhancement actions for desert tortoise.

Energy Commission staff has determined that if these issues are resolved, the proposed land acquisitions and enhancement activities described above would satisfy requirements of the California Endangered Species Act. Except for the special-status plant impacts described earlier, this mitigation would also reduce CEQA impacts to less-than-significant levels. Staff anticipates resolution of these outstanding issues by working closely and cooperatively with USFWS, CDFG, and the applicant to finalize a mitigation and enhancement plan that would offset impacts to desert tortoises.

INTRODUCTION

This section of the Final Staff Assessment/Draft Environmental Impact Report (FSA/DEIS) provides staff's analysis of potential impacts to biological resources from the construction and operation of the Ivanpah Solar Electric Generating System (ISEGS) project. Information provided in this document addresses potential impacts to special-status species and areas of critical biological concern. This analysis also describes the biological resources at the project site and at the locations of ancillary facilities. This document explains the need for mitigation, evaluates the adequacy of mitigation proposed by the applicant, and specifies additional mitigation measures. It also describes compliance with applicable laws, ordinances, regulations, and standards (LORS), and recommends conditions of certification.

This analysis is based, in part, upon information provided in the Application for Certification (AFC) for ISEGS (BSE 2007a); responses to staff data requests; site visits or field work conducted on April 20, 2007, January 4, 2008, and May 23, 2008; data response staff workshops; and discussions with experts and various agency, non-profit organization, and applicant representatives.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The applicant will need to abide by the laws, ordinances, regulations, and standards (LORS) during project construction and operation, as listed in **Biological Resources Table 1**.

Biological Resources Table 1
Laws, Ordinances, Regulations, and Standards

Applicable Law	Description
Federal	
Federal Endangered Species Act (Title 16, United States Code, section 1531 et seq., and Title 50, Code of Federal Regulations, part 17.1 et seq.)	Designates and provides for protection of threatened and endangered plant and animal species, and their critical habitat.
Migratory Bird Treaty (Title 16, United States Code, sections 703 through 711)	Makes it unlawful to take or possess any migratory nongame bird (or any part of such migratory nongame bird) as designated in the Migratory Bird Treaty Act.
Clean Water Act (Title 33, United States Code, sections 1251 through 1376, and Code of Federal Regulations, part 30, section 330.5(a)(26))	Requires the permitting and monitoring of all discharges to surface water bodies. Section 404 requires a permit from the U.S. Army Corps of Engineers (USACE) for a discharge from dredged or fill materials into waters of the U.S., including wetlands. Section 401 requires a permit from a regional water quality control board (RWQCB) for the discharge of pollutants. By federal law, every applicant for a federal permit or license for an activity that may result in a discharge into a California water body, including wetlands, must request state certification that the proposed activity will not violate state and federal water quality standards.
Bald and Golden Eagle Protection Act (Title 16, United States Code section 668)	This law provides for the protection of the bald eagle and the golden eagle by prohibiting, except under certain specified conditions, the take, possession, and commerce of such birds. The 1972 amendments increased penalties for violating provisions of the Act or regulations issued pursuant thereto and strengthened other enforcement measures. Rewards are provided for information leading to arrest and conviction for violation of the Act.
California Desert Protection Act of 1994	An Act of Congress which established 69 wilderness areas, the Mojave National Preserve, expanded Joshua Tree and Death Valley National Monuments and redefined them as National Parks. Lands transferred to the National Park Service were formerly administered by the BLM and included substantial portions of grazing allotments, wild horse and burro Herd Management Areas, and Herd Areas.
California Desert Conservation Area Plan	The California Desert Conservation Area (CDCA) comprises one of two national conservation areas established by Congress at the time of the passage of the Federal Land and Policy Management Act (FLPMA). The FLPMA outlines how the BLM will manage public lands. Congress specifically provided guidance for the management of the CDCA and directed the development of the 1980 CDCA Plan.

Applicable Law	Description
Northern and Eastern Mojave (NEMO) Desert Management Plan	As an amendment to the CDCA Plan, the BLM produced the Northern and Eastern Mojave (NEMO) Desert Management Plan (BLM 2002). This document consists of proposed management actions and alternatives for public lands in the NEMO Planning Area. This area encompasses 3.3 million acres and is located in the Mojave Desert in southeastern California adjacent to Nevada. The area borders Nevada on the east, Fort Irwin and the West Mojave (WEMO) Planning Area on the west, and I-40 and the Northern and Eastern Colorado (NECO) Planning Area on the south. The ISEGS site is located in the southeastern portion of the NEMO Planning Area Boundary.
State	
California Endangered Species Act of 1984 (Fish and Game Code, sections 2050 through 2098)	Protects California's rare, threatened, and endangered species.
California Code of Regulations (Title 14, sections 670.2 and 670.5)	Lists the plants and animals of California that are declared rare, threatened, or endangered.
Fully Protected Species (Fish and Game Code, sections 3511, 4700, 5050, and 5515)	Designates certain species as fully protected and prohibits the take of such species or their habitat unless for scientific purposes (see also California Code of Regulations Title 14, section 670.7).
Nest or Eggs (Fish and Game Code section 3503)	Protects California's birds by making it unlawful to take, possess, or needlessly destroy the nest or eggs of any bird.
Birds of Prey (Fish and Game Code section 3503.5	Unlawful to take, possess, or destroy any birds in the orders Falconiformes and Strigiformes or to take, possess, or destroy the nest or eggs of any such bird.
Migratory Birds (Fish and Game Code section 3513)	Protects California's migratory birds by making it unlawful to take or possess any migratory nongame bird as designated in the Migratory Bird Treaty Act or any part of such migratory nongame birds.
Significant Natural Areas (Fish and Game Code section 1930 et seq.)	Designates certain areas such as refuges, natural sloughs, riparian areas, and vernal pools as significant wildlife habitat.
California Environmental Quality Act (CEQA), CEQA Guidelines Section 15380	CEQA defines rare species more broadly than the definitions for species listed under the state and federal Endangered Species Acts. Under section 15830, species not protected through state or federal listing but nonetheless demonstrable as "endangered" or "rare" under CEQA should also receive consideration in environmental analyses. Included in this category are many plants considered rare by the California Native Plant Society (CNPS) and some animals on the CDFG's Special Animals List.

Applicable Law	Description
Streambed Alteration Agreement (Fish and Game Code sections 1600 et seq.)	Regulates activities that may divert, obstruct, or change the natural flow or the bed, channel, or bank of any river, stream, or lake in California designated by CDFG in which there is at any time an existing fish or wildlife resource or from which these resources derive benefit. Impacts to vegetation and wildlife resulting from disturbances to waterways are also reviewed and regulated during the permitting process.
California Native Plant Protection Act of 1977 (Fish and Game Code section 1900 et seq.)	Designates state rare, threatened, and endangered plants.
California Desert Native Plants Act of 1981 (Food and Agricultural Code section 80001 et seq. and California Fish and Game Code sections 1925-1926)	Protects non-listed California desert native plants from unlawful harvesting on both public and private lands in Imperial, Inyo, Kern, Los Angeles, Mono, Riverside, San Bernardino, and San Diego counties. Unless issued a valid permit, wood receipt, tag, and seal by the commissioner or sheriff, harvesting, transporting, selling, or possessing specific desert plants is prohibited. In the Ivanpah area, such plants include cacti, yuccas, and catclaw acacia (*Acacia greggii*).
Local	
San Bernardino County General Plan: Conservation/Open Space Element of the County General Plan (County of San Bernardino, 2007)	Includes objectives to preserve water quality and open space to benefit biological resources, and specific policies and goals for protecting areas of sensitive plant, soils and wildlife habitat and for assuring compatibility between natural areas and development. Although ISEGS is not located on lands under county jurisdiction, the general plan provides objectives which are consistent with some of the LORS listed above.

SETTING

REGIONAL SETTING

The proposed ISEGS would be located in Southern California's Mojave Desert, approximately 3 miles southwest of the Nevada border, to the west of Ivanpah Dry Lake. The project would be located in San Bernardino County, California, on federal (public) land managed by the BLM. The proposed project area is situated on a bajada (alluvial fan with many washes) that extends eastward from the surrounding Clark Mountains to Ivanpah Dry Lake. The Primm Valley Golf Club is immediately east of the proposed project area. Primm, Nevada is the nearest town, located just over the state line and approximately 4.5 miles east along Interstate 15 (I-15), which lies east of the proposed ISEGS (approximately 0.8 mile at its closest point). Immediately west and less than 3 miles south of the project are units of the Mojave National Preserve. Approximately 4.5 miles and 15 miles northeast along I-15 are a retail/casino center with residential facilities and the town of Jean, respectively. The outskirts of greater Las Vegas lie approximately 32 miles north-northeast of the proposed ISEGS.

Project Area and Description

The applicant has proposed to locate the ISEGS project in the Mojave Desert, near the Nevada border in San Bernardino County, California, on land administered by the

Bureau of Land Management (BLM). The proposed project site is located 4.5 miles southwest of Primm, Nevada, and 0.5 mile west of the Primm Valley Golf Club, which is located just west of the Ivanpah Dry Lake. Access to site is from the Yates Well Road Interchange on Interstate 15 (I-15) via Colosseum Road. See **Project Description Figure 1**.

The applicant for this project consists of Solar Partners I, LLC; Solar Partners II, LLC; Solar Partners IV, LLC; and Solar Partners VIII, LLC (applicant), which are subsidiaries of BrightSource Energy, Inc. On August 31, 2007, the applicant filed an Application for Certification (AFC) with the California Energy Commission (Energy Commission) seeking permission to develop the Ivanpah Solar Electric Generating System (ISEGS) project. The applicant filed four right-of-way (ROW) applications with the BLM for the ISEGS project on August 29, 2007. The four applications include an application for shared facilities including a substation, administration and maintenance buildings within a construction logistics area, and separate applications for the three power plants. On October 31, 2007, the Energy Commission accepted the AFC as data adequate. The applicant's development plans have been updated several times since filing its original AFC and ROW applications with the most substantial revisions summarized in the **Project Description** section of this document.

The proposed project would cause permanent disturbance of about 3,713 acres, temporary disturbance of 321 acres, and including the existing transmission line corridor of about 39 acres within the Construction Logistics area (CH2MHill 2009f), ISEGS would utilize about 4,073 acres (6.4 square miles) of federal land managed by BLM.

The ISEGS project area has increased by about 673 acres from 3,400 to 4,073 acres comparing the applicant's initial plans in the AFC to the current plan of development. The first incremental increase in project area of 300 acres, from 3,400 to 3,700 acres, is associated with the increase in spacing between heliostats as proposed in the Optimized Project Design and is necessary as a result of doubling the mirror area of each heliostat from about 7 to 14 square meters in order to avoid one heliostat shading another. The second incremental increase in project area of 365 acres, from 3,700 to 4,065 acres, is a result of the applicant proposing the addition of stormwater detention ponds. These have since been eliminated from the applicant's proposal without any adjustment downward in the project area.

The current project design also increases the heliostat surface area compared to the applicant's initial plans described in the AFC. The number of heliostats described under the Optimized Project Design (55,000 each for Ivanpah 1 and 2, and 104,000 for Ivanpah 3) represents the maximum number of heliostats that would be constructed; however, all of them may not be constructed. Although the number of heliostats within Ivanpah 1 and 2 have been reduced about 19.1%, the doubling of mirror area for each heliostat would result in the permitted surface area of the heliostats increasing about 61.8% from about 5,283,600 square feet (~490,960 square meters) to about 8,547,000 square feet (~794,200 square meters). In Ivanpah 3, with a 23.5% reduction in the number of heliostats, the doubling of mirror area for each heliostat would result in the permitted reflective surface area to increase about 52.9% from about 10,567,200 square feet (~981,920 square meters) to about 16,161,600 square feet (~1,501,760 square meters).

This added heliostat surface area increase would result in additional electricity production (MW-hours) on an annual basis with no change in installed capacity (MW) and with only a small amount of additional land. Under the Optimized Project Design, the applicant has not proposed any changes in the steam turbine-generators and interconnection capacity. For Ivanpah 1 and 2, the applicant's reduction in solar power towers from three to one each, the last rows are farther from the towers. Energy collection is less efficient the farther the mirrors are from the tower receivers, so additional heliostat surface area (approximately 5 to 10 percent) is needed to achieve the same annual energy output. Adding heliostat surface area results in increased heat to the solar power tower receivers and increased steam to the steam turbine during early morning and evening hours which otherwise would have resulted in lower production hours. During the peak hours of the day, these additional mirrors would be placed on standby since the steam turbine remains the same size and cannot accept additional steam.

This **Project Description** section provides an updated discussion of the ISEGS solar power plant equipment and facilities (heliostats, solar power towers, and power block, construction logistics area), the natural gas pipeline, water supply and discharge, access roads and maintenance paths, transmission system interconnections and telecommunications facilities. The **Project Description** also includes a detailed description of how project construction would be conducted for each of the three phases of the project, stormwater and waste management, and project decommissioning.

Vegetation and Wildlife

The ISEGS site is located on and surrounded by undisturbed, natural land, with the exception of the Primm Valley Golf Club and I-15 to the east and a transmission line and associated unpaved roads. Vegetation on the site and in the immediate project area consists of primarily Mojave creosote bush scrub, with Mojave yucca – Nevada ephedra scrub, and Mojave wash scrub also represented. Plant communities at the ISEGS site are characterized by an unusually high diversity and density of native succulents and relatively low levels of noxious weeds. Elevations in the project area range from approximately 3,150 to 2,850 feet above mean sea level (BSE 2007a). The Clark Mountain Range occurs to the north and west of the project area, and the topography slopes gradually down to the east and southeast toward Ivanpah Dry Lake on the alluvial fans and bajada on the Clark Mountains' east and south flanks. Approximately 2,000 ephemeral washes, which form part of the regional bajada, occur throughout the project area. The northernmost phase of the project site is immediately flanked by two hills: a limestone hill to the west and a metamorphic hill to the east.

The dominant plant community on the site, Mojave creosote bush scrub, is common in the Mojave Desert and is comprised of drought-adapted native shrubs. A census of all individuals of California barrel cactus (*Ferocactus cylindraceus* var. *lecontei*) and clustered barrel cactus (*Echinocactus polycephalus* var. *polycephalus*) recorded 2,869 individuals of California barrel cactus and 3,501 individuals of clustered barrel cactus within the project area. Densities were estimated at one to two mature barrel cacti per acre for the site overall (BSE 2007a, p. 5.2-105, CH2M Hill 2008c). The applicant

documented densities of 15 mature barrel cacti per acre in some localized areas. This density is unusual because it occurs on a bajada rather than on rocky slopes where high barrel cactus densities would be expected (BSE 2007a, p. 5.2-28).

Annual plants are also characteristic of Mojave creosote bush scrub but were notably absent during the applicant's initial field surveys in 2007 due to low rainfall (BSE 2007a, p. 5.2-18). Follow-up field surveys were conducted in 2008 to characterize annual plant cover. In the project area, creosote bush (*Larrea tridentata)* is dominant in Mojave creosote bush scrub, and the following are commonly associated perennial species: burrobush (*Ambrosia dumosa*), clustered barrel cactus, Nevada ephedra (*Ephedra nevadensis)*, California barrel cactus, cheesebush (*Hymenoclea salsola*), and Mojave yucca (*Yucca shidigera*) (BSE 2007a, p. 5.2-9). Additional plant communities and habitats within the project footprint include disturbed land associated with roads and transmission lines, Mojave wash scrub (contains acacia as described below), and numerous ephemeral washes also that occur on the site (BSE 2007a, pp. 5.2B-4 and 5.2-27). Additional vegetation types within a one-mile radius of the project footprint include Mojave yucca – Nevada ephedra scrub and limestone pavement plain (BSE 2007a, p. 5.2-79). Plant communities of each of the three sites are described below.

Ivanpah 1

Ivanpah 1, the southernmost site, consists almost entirely of the Larrea-Ambrosia subtype of creosote bush scrub and occurs mainly in a form characterized by a low density and diversity of shrubs and cacti and a very low density of Mojave yucca. Here, the dominant shrubs of the larrea-ambrosia subtype are mainly less than 3 feet in height, with many less than 1 foot in height, and relatively widely spaced. Creosote bush and burrobush are the most common shrubs, with cheesebush, pima ratany (*Krameria erecta*), Nevada ephedra, Mojave Desert California buckwheat (*Eriogonum fasciculatum* ssp. *polifolium*), silver cholla (*Opuntia echinocarpa*), buckhorn cholla (*Opuntia acanthocarpa* var. *coloradensis*), beavertail cactus (*Opuntia basilaris* var. *basilaris*), and pencil cholla (*Opuntia ramosissima*) all present in much lower abundance. Barrel cacti of both species (i.e., California barrel cactus and clustered barrel cactus) and Mojave yucca are present in low to very low numbers. The topography of the Ivanpah 1 site is relatively flat, although it is broken by a number of small to medium-sized ephemeral washes dominated by cheesebush.

Ivanpah 2

Vegetation of Ivanpah 2 consists predominantly of the larrea-ambrosia subtype of Mojave creosote bush scrub. This vegetation subtype varies in shrub and cactus density and species diversity from areas that are moderate in density and diversity at the upper elevation west end to areas that are low in density and diversity at the lower elevation east end. Creosote bush and burrobush are the dominant shrubs and are typically 1 to 4 feet in height. Associated species include: cheesebush, pima ratany, Nevada ephedra, Mojave Desert California buckwheat, silver cholla, buckhorn cholla, beavertail cactus, and pencil cactus. The density of barrel cacti, including California barrel cactus and clustered barrel cactus, and Mojave yucca, is highest in the northern third of the site, moderately high in the western half of the site, and lowest in the southern half, especially to the east.

The topography is relatively flat overall and dissected by many small to medium-sized ephemeral washes with active channels usually less than 5 feet wide that flow from west to east in the northern half of Ivanpah 2 and trend from southwest to northeast and east in the southern half of Ivanpah 2. The vegetation of most of these is composed mainly of shrub species typical of larrea-ambrosia scrub. Cheesebush washes are in higher densities than in adjacent areas. North of Colosseum Road, in the southern half of Ivanpah 2, is a large drainage complex up to 75 feet wide in some areas, although the active channels are much narrower. This large wash system supports Mojave wash scrub, although in a form distinguished mainly by the presence of catclaw acacia (*Acacia greggii*). This form has lower shrub species diversity than the Mojave wash scrub observed in Ivanpah 3.

Ivanpah 3

Ivanpah 3 is the northernmost and largest of the three proposed sites and supports more complex plant communities than Ivanpah I and 2. The larrea-ambrosia scrub subtype of Mojave creosote bush scrub is the most common vegetation type and occurs throughout Ivanpah 3, covering about 75 to 80 percent of the site. The larrea mixed scrub subtype of Mojave creosote bush scrub occurs north and south of the limestone hill, along the southwest margin, and also immediately adjacent to the northern boundary of Ivanpah 3. In the western and northern parts of Ivanpah 3, larrea mixed scrub patches alternate with patches of larrea-ambrosia scrub. Some of the larger drainage features, which are concentrated in the northern and western sections of Ivanpah 3, contain well-developed Mojave wash scrub. Within Ivanpah 3, the larrea-ambrosia scrub subtype varies from the low density-low diversity form to the high density-high diversity form. The patterns are complex but, in general, vegetation with lower densities and diversity of shrubs and cacti, and lower densities of Mojave yucca, is more widespread in the southeastern section of Ivanpah 3.

The elevation gradient within Ivanpah 3 trends very gradually downward from approximately 3,400 feet at the western margin to about 2,985 feet at the southeastern corner. The topography of Ivanpah 3 is more strongly undulating than that of Ivanpah 1 and 2 due to the presence of many small to large ephemeral wash drainage features that trend generally in a west-to-east direction. Mojave wash scrub is well-developed in some of the larger ephemeral wash drainage features in the northern and western sections of Ivanpah 3. These drainage features are typically 30 to 75 feet wide bank-to-bank, although the active channels occupy only a small portion of the entire feature.

Mojave wash scrub within Ivanpah 3 varies in density and diversity of shrubs. The dominant shrubs are drought-deciduous and are typically 3 to 10 feet in height. The best-developed stands include many large individuals of catclaw acacia, some scattered large desert-willow (*Chilopsis linearis*), and a variety of wash-associated smaller shrubs, including: cheesebush, desert almond (*Prunus fasciculata*), black-banded rabbitbrush (*Chrysothamnus paniculatus*), bladder sage (*Salazaria mexicana*), Cooper's boxthorn (*Lycium cooperi*), and Anderson's boxthorn (*Lycium andersonii*).

Noxious Weeds

Noxious weeds are species of non-native plants included on the weed lists of the California Department of Food and Agriculture (CDFA 2007), the California Invasive Plant Council, or those weeds of special concern identified by BLM. Noxious weeds were relatively low in abundance and diversity throughout the ISEGS project area. Eight species of invasive weeds were detected during the 2007/2008 floristic surveys (CH2M Hill 2008c), as described below.

- **Sahara mustard, or African mustard**, (*Brassica tournefortii*) was found at two locations, in Ivanpah 3 and in the utility corridor. This species is of high concern; Cal-IPC has declared this plant highly invasive (Cal-IPC 2006) and recommends that it should be eradicated whenever encountered.
- **Red brome** (*Bromus madritensis* ssp. *rubens*) is widespread in the project area, occurring at 961 widely scattered locations, mostly at disturbed sites. It is an introduced Eurasian grass adapted to microhabitats that can be frequently found at the base of desert shrubs. It can also form carpet cover in pockets of fine grained soils in rough terrain off the bajada. It is widespread and abundant in the Mojave Desert and has been found in the ISEGS site. Seeds from this species can disperse readily and across large distances. Cal-IPC has declared this plant highly invasive (Cal-IPC 2006). Because of its widespread distribution, red brome is not considered feasible for general control.
- **Cheat grass** (*Bromus tectorum*) was found at nine widely scattered locations in the ISEGS site. It is among the most widely distributed invasive plant species in the western U.S. Closely related to red brome, it is adapted to colder steppe and woodland habitats. Cal-IPC has declared this plant highly invasive (Cal-IPC 2006). Because of its widespread distribution, cheat grass is not considered feasible for general control.
- **Mediterranean grass** (*Schismus* spp.) was observed patchily distributed throughout the project site. Cal-IPC has determined that this plant has a limited invasiveness rating in California (Cal-IPC 2006). BLM and other agencies recognize that because of the widespread distribution of Mediterranean grass, this species is not considered feasible to control.
- **Russian thistle** (*Salsola* sp.) was recorded along the Colosseum Road access route. Although all invasive plants share the trait of being adapted to disturbed habitat, Russian thistle or tumbleweed (*Salsola tragus*) particularly tends to be restricted to roadway shoulders and other sites where the soil has been recently disturbed. This species was not observed at the project site, but is a common invader on disturbed sites. After summer rains in 2008, widespread areas on the northern margin of Ivanpah Playa were covered with a thick growth of tumbleweed. Cal-IPC has determined that this plant has a limited invasiveness rating in California (Cal-IPC 2006). There is a high potential that Russian thistle could become established in the construction area and this species should be eradicated if observed.

- **London rocket** (*Sisymbrium irio*) is widespread throughout the warm deserts of North America. It was identified near the project site along Colosseum Road in the southern half of Ivanpah 2. Cal-IPC has declared this plant moderately invasive (Cal-IPC 2006).
- **Mediterranean tamarisk or saltcedar** (*Tamarix ramosissima*) has been observed near the project site; however, it is a riparian plant and is therefore restricted to habitats where there is perennial saturation such as springs and seeps, or runoff from poorly maintained water pipelines or well pumps. Cal-IPC has declared this plant highly invasive (Cal-IPC 2006).
- **Filaree or storksbill** (*Erodium cicutarium*) is a widespread annual species common in disturbed habitats, and was detected at the ISEGS site. It can form dense, transient populations when conditions are suitable. It has a limited overall rating by Cal-IPC, generally because the ecological impacts of the species are minor. Because of its widespread distribution, eradication of filaree is not considered feasible.

Ephemeral Drainages and Waters of the State

Description of Project Area Drainages

The project area is located in the Ivanpah hydrologic unit of the South Lahontan Watershed, which includes approximately 278,486 acres in the Ivanpah and Pahrump Valleys of California and Nevada (BSE 2007a). All drainage from the surrounding mountains and alluvial fans collect in closed basins in the Ivanpah Valley. Streams, washes, and playas are dry most of the year, with surface water only present in response to storm events. Ivanpah Dry Lake is located approximately 2 miles east and down slope of the project area. The extensive dry lake bed covers approximately 35 square miles and is located in California adjacent to the California/Nevada border. Two mapped springs, Whisky Spring and Ivanpah Spring, are located approximately 1.6 miles west of the proposed project site in the foothills of the Clark Mountains.

The project area is located on a broad bajada that extends from the base of the Clark Mountains to the western shoreline of Ivanpah Lake, with numerous ephemeral washes occurring throughout the broad, coalescing, alluvial fans that convey storm water runoff from the mountains towards Ivanpah Dry Lake. These washes range in size from small (1 to 4 feet wide), weakly expressed erosional features to large, broad over 85 feet wide. A total of 1,973 segments of ephemeral washes were mapped in the project area (CH2M Hill 2008d). These washes encompass 198.72 acres, with a cumulative length of 291 miles of channels (CH2M Hill 2008d, Table 3.1-2, p 3-5). Approximately 1,400 of the ephemeral washes are small and are common and widespread throughout the entire project area. The larger washes are most abundant in the northern section of Ivanpah 3 as well as the east and west sides of Ivanpah 2. The larger washes tend to dissipate into smaller, more braided channels as they progress downslope. The majority of the drainages terminate prior to reaching Ivanpah Dry Lake with defined erosion features diminishing and becoming broad surface flow only. All of the ephemeral washes identified in the study area typically flow only in response to storm events. No wetlands or riparian habitat occurs within the ISEGS project area.

The active flow channels of the smaller washes are generally devoid of vegetation and typically have a sandy-gravel substrate, although some washes also contained cobble and scattered larger rocks. Most of the larger channels typically contained scattered vegetation including creosote bush and cheesebush especially in braided channels that contain slightly elevated areas intermixed with the active flow channels. Mojave wash scrub is limited to the larger washes (typically over 15 feet) with sandy gravel substrate and well-defined banks. Vegetation associated with these features includes catclaw, cheesebush, Mojave Desert California buckwheat, desert willow, black-banded rabbitbrush, bladder-sage, desert almond (*Prunus fasciculata*), Virgin River encelia (*Encelia virginensis*), Anderson's and Cooper's, sand-wash groundsel (*Senecio flaccidus* var. *monoensis*), wire lettuce (*Stephanomeria pauciflora*), and blue sage (*Salvia dorrii*).

Functions and Values of ISEGS Ephemeral Drainages

Ephemeral drainages on the project site are typical of the drainages that characterize most of the arid southwest in that they are ephemeral streams rather than perennial (an ephemeral stream is defined as one that flows briefly in direct response to precipitation). Dry desert washes support many of the same hydrological and ecological processes as perennial streams, and provide the following functions and values: landscape hydrologic connections; stream energy dissipation during high-water flows that reduces erosion and improves water quality; water supply and water-quality filtering; surface and subsurface water storage; groundwater recharge; sediment transport, storage, and deposition aiding in floodplain maintenance and development; nutrient cycling; wildlife habitat and movement/migration corridors; and support for vegetation communities that help stabilize stream banks and provide wildlife habitat (Levick et al. 2008).

Staff concludes that the ephemeral drainages at the ISEGS project site provide substantial hydrological and biological values and functions, including: hydrological connections with Ivanpah Dry Lake; stream energy dissipation during high-water flows that reduces erosion and improves water quality; surface and subsurface water storage; groundwater recharge; sediment transport, storage, and deposition aiding in floodplain maintenance and development; nutrient cycling; support for vegetation communities that help stabilize stream banks and provide wildlife habitat and a movement corridor.

Jurisditional Status

The applicant submitted a wetland delineation report to the United States Army Corps of Engineers (USACE) in February, 2008, which was subsequently revised and resubmitted in September 2008 (CH2M Hill 2008d). On May 28, 2009 the USACE made their jurisdictional determination and concluded that the ISEGS project would not discharge dredged or fill material into a water of the United States or an adjacent wetland, and therefore would not be subject to jurisdiction under Section 404 of the Clean Water Act (USACE 2009).

Under California State law, waters of the State refers to any surface water or groundwater within the boundaries of the state (California Water Code § 13050(e)). All the ephemeral drainages within the ISEGS project site are considered waters of the State (Stone 2009).

Wildlife

The diverse plant communities and landscape features in and around the ISEGS site support a correspondingly high diversity of wildlife. Reptiles detected during the 2007/2008 surveys include desert tortoise, side-blotched lizard (*Uta stansburiana*), desert iguana (*Dipsosaurus dorsalis*), long-nosed leopard lizard (Gambelia wislizenii), western whiptail (*Cnemidophorus tigris*), zebra-tailed lizard (*Callisaurus draconoides*), common collared lizard (*Crotaphytus collaris*), and sidewinder (*Crotalus cerastes*). The banded Gila monster (*Heloderma suspectum cinctum*) was not detected during the surveys, but this large, seldom-seen lizard may occur in the project vicinity.

The diverse landscape features, vegetation, forage, and prey availability at the ISEGS project area is likely to attract a variety of mammal species such as Audubon's cottontail (*Sylvilagus audubonii*), black-tailed jackrabbit (*Lepus californicus*), whitetail antelope squirrel (*Ammospermophilus leucurus*), desert kit fox (*Vulpes macrotis*), and coyote (*Canis latrans*). Given the proximity of the Clark Mountains, it is likely that mule deer (*Odocoileus hemionus hemionus*) and desert bighorn sheep (*Ovis canadensis nelsoni*) move down into the upper elevations of the valley, including the ISEGS project area, to forage (CH2M Hill 2008). It is also likely that portions of Ivanpah Valley provide movement corridors for mule deer and this bighorn sheep subspecies (CH2M Hill 2008).

The ISEGS project area provides forage, cover, roosting, and nesting habitat for a variety of bird species. Resident and migratory birds occur at the ISEGS site during the winter, migratory, and breeding seasons, including birds such as Say's phoebe (*Sayornis saya*), black-throated sparrow (*Amphispiza bilineata*), white-crowned sparrow (*Zonotrichia leucophrys*), sage sparrow (*Amphispiza belli*), blue-gray gnatcatcher (*Polioptila caerulea*), cactus wren (*Campylorhynchus brunneicapillus*), verdin (*Auriparus flaviceps*), western kingbird (*Tyrannus verticalis*), sage thrasher (*Oreoscoptes montanus*), house finch (*Carpodacus mexicanus*), lesser nighthawk (*Chordeiles acutipennis*), common ground-dove (Columbina passerina), mourning dove (*Zenaida macroura*), Gambel's quail (*Callipepla gambelii*), American kestrel (*Falco sparverius*), burrowing owl (*Athene cunicularia*), and red-tailed hawk (*Buteo jamaicensis*).

Special-Status Species

Biological Resources Table 2 lists special-status species that are known to occur or could potentially occur in the project vicinity. Many of these special-status plants and animals are unlikely to occur at the ISEGS site due to lack of suitable habitat. However, quite a few were detected during the 2007/2008 surveys or otherwise known to occur at or near the site and those are indicated by **bold-face type**.

Biological Resources Table 2
Special-Status Species Known or Potentially Occurring in the ISEGS Project Area and Vicinity

PLANTS		
Common Name	***Scientific Name***	**Status State/Fed/CNPS/BLM**
Mormon needle grass	*Achnatherum aridum*	__/__/2.3
Clark Mountain agave*	***Agave utahensis* var. *nevadensis***	**__/__/4.2**
Desert ageratina	*Ageratina herbacea*	__/__/2.3
Coyote gilia	*Aliciella triodon*	__/__/2.2
Small-flowered androstephium	***Androstephium breviflorum***	**__/__/2.23**
White bear poppy	*Arctomecon merriamii*	__/__/2.2
Mojave milkweed	***Asclepias nyctaginifolia***	**__/__/2.1**
Cima milk-vetch	*Astragalus cimae* var. *cimae*	__/__/1B.2
Providence Mountain milk-vetch	*Astragalus nutans*	__/__/4.2
Scaly cloak fern	*Astrolepis cochisensis* ssp. *cochisensis*	__/__/2.3
Black grama	*Bouteloua eriopoda*	__/__/4.2
Red grama	*Bouteloua trifida*	__/__/2.3
Alkali mariposa lily	*Calochortus striatus*	__/__/1B.2
Purple bird's-beak	*Cordylanthus parviflorus*	__/__/2.3
Desert pincushion	***Coryphantha chlorantha***	**__/__/2.1**
Viviparous foxtail cactus*	***Coryphantha vivipara* var. *rosea***	**__/__/2.2**
Winged cryptantha	*Cryptantha holoptera*	__/__/4.3
Gilman's cymopterus	*Cymopterus gilmanii*	__/__/2.3
Utah vine milkweed	***Cynanchum utahense***	**__/__/4.2**
Nine-awned pappus grass	***Enneapogon desvauxii***	**__/__/2.2**
Naked-stemmed daisy	*Enceliopsis nudicaulis* ssp. *nudicaulis*	__/__/4.3
Limestone daisy	*Erigeron uncialis* var. *uncialis*	__/__/1B.2
Forked buckwheat	*Eriogonum bifurcatum*	__/__/1B.2
Hairy erioneuron	*Erioneuron pilosum*	__/__/2.3
Clark Mountain spurge	*Euphorbia exstipulata* var. *exstipulata*	__/__/2.1
Wright's bedstraw	*Galium wrightii*	__/__/2.3
Pungent glossopetalon	*Glossopetalon pungens*	__/__/1B.2
Parish club-cholla	***Grusonia parishii***	**__/__/2.2**
Hairy-podded fine-leaf hymenopappus	*Hymenopappus filifolius* var. *eriopodus*	__/__/2.3
Jaeger's ivesia	*Ivesia jaegeri*	__/__/1B.3
Knotted rush	*Juncus nodosus*	__/__/2.3
Hillside wheat grass	*Leymus salinus* ssp. *mojavensis*	__/__/2.3
Plains flax	*Linum puberulum*	__/__/2.3
Spearleaf	*Matelea parvifolia*	__/__/2.3
Rough menodora	*Menodora scabra*	__/__/2.3
Polished blazing star	*Mentzelia polita*	__/__/1B.2
Utah mortonia*	***Mortonia utahensis***	**__/__/4.3**
Tough muhly	*Muhlenbergia arsenei*	__/__/2.3

PLANTS		
Common Name	***Scientific Name***	**Status State/Fed/CNPS/BLM**
Crowned muilla	*Muilla coronata*	__/__/4.2
False buffalo-grass	*Munroa squarrosa*	__/__/2.2
Cave evening-primrose*	***Oenothera cavernae***	**__/__/2.1**
Short-joint beavertail	*Opuntia basilaris* var. *brachyclada*	__/__/1B.2
Curved-spine beavertail	*Opuntia curvospina*	__/__/2.2
Spiny cliff-brake	*Pellaea truncata*	__/__/2.3
White-margined beardtongue	*Penstemon albomarginatus*	__/__/1B.2
Rosy two-toned beardtongue	*Penstemon bicolor* ssp. *roseus*	__/__/2.3
Limestone beardtongue	*Penstemon calcareous*	__/__/1B.3
Death Valley beardtongue	*Penstemon fruticiformis* var. *amargosae*	__/__/1B.3
Stephen's beardtongue	*Penstemon stephensii*	__/__/1B.3
Thompson's beardtongue	*Penstemon thompsoniae*	__/__/2.3
Utah beardtongue	*Penstemon utahensis*	__/__/2.3
Aven Nelson's phacelia	*Phacelia anelsonii*	__/__/2.3
Barneby's phacelia	*Phacelia barnebyana*	__/__/2.3
Sky-blue phacelia	*Phacelia coerulea*	__/__/2.3
Parish's phacelia	*Phacelia parishii*	__/__/1B.1
Jaeger's phacelia	*Phacelia perityloides* var. *jaegeri*	__/__/1B.3
Chambers' physaria	*Physaria chambersii*	__/__/2.3
Small-flowered rice grass	*Piptatherum micranthum*	__/__/2.3
Desert portulaca	***Portulaca halimoides***	**__/__/4.3**
Abert's sanvitalia	*Sanvitalia abertii*	__/__/2.2
Many-flowered schkuhria	*Schkuhria multiflora* var. *multiflora*	__/__/2.3
Johnson's bee-hive cactus	*Sclerocactus johnsonii*	__/__/2.2
Mojave spike-moss	*Selaginella leucobryoides*	__/__/4.3
Rusby's desert-mallow	***Sphaeralcea rusbyi* var. *eremicola***	**__/__/1B.2/S**

WILDLIFE		
Common Name	***Scientific Name***	**Status State/Fed/BLM**
Reptiles		
Desert tortoise	***Gopherus agassizii***	**FT/ST/__**
Banded gila monster	*Heloderma suspectum cinctum*	__/SC/S
Birds		
Burrowing owl	***Athene cunicularia***	**CSC/FSC/__**
Golden eagle	***Aquila chrysaetos***	**CSC, FP/FSC/S**
Vaux's swift	***Chaetura vauxi***	**__/FSC/__**
Gray-headed junco	*Junco hyemalis caniceps*	WL/FSC/__
Loggerhead shrike	***Lanius ludovicianus***	**CSC/FSC/__**
Hepatic tanager	*Piranga flava*	WL/FSC/__
Summer tanager	*Piranga rubra*	CSC/__/__

WILDLIFE		
Common Name	***Scientific Name***	**Status State/Fed/BLM**
Brewer's sparrow	***Spizella breweri***	**__/BCC/__**
Bendire's thrasher	*Toxostoma bendirei*	CSC/BCC/S
Crissal thrasher	***Toxostoma crissale***	**CSC/BCC/__**
Le Conte's thrasher	***Toxostoma lecontei***	**WL/BSS/__**
Virginia's warbler	*Vermivora virginiae*	WL/BCC/__
Gray vireo	*Vireo vicinior*	CSC/BCC/S
Mammals		
Townsend's big-eared bat	*Corynorhinus townsendii*	CSC/__/S
Pallid bat	*Antrozous pallidus*	CSC/__/S
Long-legged myotis	*Myotis volans*	__/__/S
Nelson's bighorn sheep	*Ovis canadensis nelsoni*	__/__/S
American badger	***Taxidea taxus***	**CSC/__**

Bold-face-type species names are those observed on or near the proposed project site or plants observed in the one-mile buffer by the applicant during the 2007/08 field surveys.

* Found in buffer area surveys only. For all but Utah mortonia; no specific location information was included in the applicant's final botanical plant report (CH2M Hill 2008x).

Sources: CNDDB 2009 (Ivanpah Lake, State Line Pass, Mesquite Lake, Clark Mountain, Mescal Range, Mineral Hill, Nipton, and Desert USGS Quads); Plants: CNPS 2009, CDFG 2009; Animals: CDFG Special Animals List;

Status Codes:

Federal: FE - Federally listed endangered: species in danger of extinction throughout a significant portion of its range
FT - Federally listed, threatened: species likely to become endangered within the foreseeable future
BCC: Fish and Wildlife Service: Birds of Conservation Concern: Identifies migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent highest conservation priorities <www.fws.gov/migratorybirds/reports/BCC2002.pdf>

State CSC = California Species of Special Concern Species of concern to CDFG because of declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction.
SE - State listed as endangered
ST = State listed as threatened
WL = State watch list

California Native Plant Society
List 1B - Rare, threatened, or endangered in California and elsewhere
List 2 - Rare, threatened, or endangered in California but more common elsewhere
List 3 - Plants which need more information
List 4 - Limited distribution – a watch list
0.1 - Seriously threatened in California (high degree/immediacy of threat)
0.2 - Fairly threatened in California (moderate degree/immediacy of threat)
0.3 - Not very threatened in California (low degree/immediacy of threats or no current threats known)

BLM: Sensitive: Bureau of Land Management
BLM Manual §6840 defines sensitive species as"…those species that are (1) under status review by the FWS/NMFS; or (2) whose numbers are declining so rapidly that Federal listing may become necessary, or (3) with typically small and widely dispersed populations; or (4) those inhabiting ecological refugia or other specialized or unique habitats." <www.blm.gov/ca/pdfs/pa_pdfs/biology_pdfs/SensitiveAnimals.pdf>

Special-Status Plant Species

Many special-status plant species were documented in the ISEGS project area, vicinity, and buffer areas during botanical surveys (CH2M Hill 2008x). No state or federally listed plant species occur within the ISEGS project area, but eight plant species listed by the

California Native Plant Society (CNPS) are known to occur on the site or in the immediate vicinity. This analysis discusses the following CNPS Lists, which are defined as follows:

List 1A: Plants Presumed Extinct in California

List 1B: Plants Rare, Threatened, or Endangered in California and Elsewhere.

List 2: Plants Rare, Threatened, or Endangered in California, but More Common Elsewhere

One of these, Rusby's desert-mallow, is also a BLM sensitive species. Information on the natural history, distribution, and status of these species on the project area is provided below. The status information is based on the results of the applicant's floristic surveys conducted in 2007/2008 (CH2M Hill 2008c). In addition to the floristic surveys, staff searched databases and files of the CDFG's California Natural Diversity Database (CNDDB), NatureServe (an international network of natural heritage programs), CNPS, and the Consortium of California Herbaria (2008) data, including information not yet entered into the CNDDB and CNPS databases. Four special-status plants (Clark Mountain agave, viviparous foxtail cactus, Utah mortonia, and cave evening-primrose) are not discussed in detail below because they were found outside the project footprint during buffer area surveys, would not be impacted by the project, and locations were not included for most of these plants in the applicant's final botanical report.

Small-Flowered Androstephium (Androstephium breviflorum)

Small-flowered androstephium is a bulbiferous herb found mainly in San Bernardino County, though it has been recorded in adjacent Riverside County and possibly Inyo County. This species also occurs in Arizona, Nevada, and Utah. It is found in dry, loose sandy to rocky soils and on sand dunes and alluvial fans. The CNDDB Element Occurrence records are all presumed extant. In addition, approximately 31 occurrences were documented in the AFC for the Stirling Energy Systems Solar One Project (SES 2008). This species was not detected in 2007, but in 2008 a total of 12 individuals were mapped in four locations on the ISEGS project site, within Ivanpah 1 and 2, in Mojave creosote bush scrub. Many new occurrences of this species have been found in recent years and the project area includes only a very small portion of its total distribution in California.

Mojave Milkweed (Asclepias nyctaginifolia)

The California distribution of Mojave milkweed is limited to a very small area in eastern San Bernardino County. Currently, it is known from less than 25 occurrences, 16 of which occur in Ivanpah Valley in the project area (CNDDB 2009) **(Biological Resources Figure 1).** Its distribution outside of Ivanpah Valley is limited to a few very old historic collections and only two other populations that have been confirmed extant (CNDDB 2009, Calflora 2009). This perennial plant also occurs in Arizona, New Mexico, and Nevada but it has a CNDDB state rank of S1 (critically imperiled and vulnerable to extirpation from the state due to extreme rarity).The habitat of Mojave milkweed in California includes washes and dry slopes from about 3,000 to 5,100 feet in Mojavean desert scrub and pinyon and juniper woodland (CNPS 2008). In 2008, 202 individuals of Mojave milkweed were mapped in 59 locations mainly in small washes in Ivanpah 1, 2

and 3. Within the project area Mojave milkweed typically grows in small- to medium-sized washes with sandy to gravelly substrates.

Desert Pincushion (Coryphantha chlorantha)

Desert pincushion is a stem succulent found in the Mojave Desert in San Bernardino and Inyo counties, and also occurs in Arizona, Nevada, and Utah. CNDDB currently lists fewer than 25 documented occurrences in California, approximately one-third of which occur in the project area (CNDDB 2009). It has a CNDDB global rank of G2 (imperiled and at high risk of extinction due to a very restricted global range) and a CNDDB state rank of S1 (critically imperiled). In California its habitat is gravelly or rocky carbonate substrates. In California, desert pincushion is known from the Mojave Desert, in San Bernardino and Inyo counties (CNDDB 2009); it also occurs in Nevada, Arizona and Utah. Desert pincushion's distribution in California is apparently restricted to a few mountain ranges in the eastern Mojave Desert, in eastern San Bernardino County and southeastern Inyo County. Desert pincushion is widely scattered throughout the project area. In 2008, 477 individuals of this species were mapped in 177 locations during protocol-level surveys, within Ivanpah 1, 2 and 3, the construction logistics area, and the utility corridor. In 2007, an additional 122 individuals were found in 114 locations. The combined total for 2007 and 2008 is 599 individuals in 291 locations. Most individuals were found in Mojave creosote bush scrub.

Utah Vine Milkweed (Cynanchum utahense)

Utah vine milkweed is a perennial herb found in the Mojave Desert in San Bernardino County and in the Colorado Desert in Riverside, Imperial, and San Diego Counties. This species also occurs in Arizona, Nevada, and Utah (CNDDB 2009). In California its habitat is sandy and gravelly soils, often in washes climbing up through shrubs. The CNDDB electronic files do not track CNPS List 4 species, but staff found two Element Occurrences in the CNDDB paper files. Herbarium records noted approximately 42 additional occurrences. In 2008, 991 individuals were found in 146 locations, mainly in Ivanpah 1 and 2. In 2007, three individuals were mapped in three locations, all within Ivanpah 1. Most individuals were found in small washes in Mojave creosote bush scrub. The total for 2007 and 2008 on the Ivanpah Project site is 994 individuals in 149 locations. In addition, one occurrence was documented in the AFC for the Stirling Energy Systems Solar One Project (SES 2008).

Nine-Awned Pappus Grass (Enneapogon desvauxii)

Nine-awned pappus grass is a widespread species of the southwestern U.S., Mexico and South America, but the California range of this species is restricted to a small portion of eastern Mojave Desert, in San Bernardino County (CNDDB 2009). It has a CNDDB state rank of S2 (imperiled). It is currently known from fewer than 25 documented occurrences. Habitat of nine-awned pappus grass in California consists of rocky slopes, crevices, calcareous soils, in desert woodland. In the Ivanpah Valley, this species occurs on the often north-facing sides of medium-sized to large washes, and on cobble mounds within and outside of washes that include some calcareous rocks, from 2,900 to 3,400 feet, in Mojave creosote bush scrub. In 2007, no individuals of this species were detected within the ISEGS project area, but in the 2008 surveys 8,145 plants were documented, suggesting that the population varies widely in response to seasonal variation in precipitation and other climate variables..`

Parish's Club-Cholla (Grusonia parishii)

The California range of Parish's club-cholla has a CNDDB state rank of S2 (imperiled). Currently, it is known from fewer than 20 occurrences but it has a wider range in California that extends south into Riverside County. Nearly 30 percent of the documented occurrences to date occur within the project area (CNDDB 2009). This stem succulent also occurs in Nevada, Arizona, and possibly Texas. The habitat of Parish's club-cholla within the project area consists of sandy to somewhat gravelly uplands in the larrea-ambrosia sub-type of Mojave creosote bush scrub. Parish's club-cholla is abundant within the ISEGS project area, where it is discontinuously distributed, with most locations found in Ivanpah 1 and 3, and the construction logistics area. This species grows in clones consisting of spreading mats that may form separate patches over time. One 'mat' (dense, clonal clumps) was defined as one individual during the 2007-2008 surveys. In 2008, 196 clumps or mats of Parish's club-cholla were mapped at 47 locations within Ivanpah 1, the construction logistics area, and the utility corridor. In 2007, 143 were mapped within 96 locations in Ivanpah 1 and 3, and the construction logistics area. For 2008 and 2007 combined, 339 individuals were mapped in 143 locations.

Desert portulaca (Portulaca halimoides)

Desert portulaca is a late summer/early fall blooming annual found in Riverside and San Bernardino Counties, and possibly San Diego County. This species also occurs in Nevada, Arizona, Utah, Colorado, New Mexico, Oklahoma, Texas, and Baja California. Habitat of desert portulaca consists of sandy washes and flats, from about 3,000 to 3,600 feet in elevation. Herbarium records noted 16 different occurrences, not including the one collected from the project site. Desert portulaca is a CNPS List 4 species that has a plant of limited distribution but is not considered rare from a statewide perspective so its distribution is not tracked by CNDDB.

At the ISEGS project area, no individuals of desert portulaca were detected during field surveys conducted in April, May, and June 2007, or in April 2008. However, desert portulaca was observed within the ISEGS project area in October 2007, following rains in August 2007. Quantitative data on the distribution and abundance of desert portulaca within the ISEGS project area are not available, but one individual was detected at the site. The plant's location in the project area was not mapped in the applicant's final botanical report (CH2M Hill 2008x).

Rusby's Desert-Mallow (Sphaeralcea rusbyi var. eremicola)

Rusby's desert-mallow is a California endemic perennial herb; it is documented globally from less than 30 occurrences in Inyo and San Bernardino Counties in the Death Valley Region and Eastern Mojave Desert in the Clark Mountain Range. It has a CNDDB state rank of S2 (imperiled). It occurs in the Clark Mountain Range at Ivanpah Springs, on desert slopes and gravelly sandy washes and often in carbonate and limestone substrate, extending into the project area. This plant is the only BLM-sensitive plant species detected on site. This species was not detected during the 2007 surveys, but in 2008 15 individuals were mapped in 12 locations in Mojave creosote bush scrub within Ivanpah 1, 2, and 3, the construction logistics area, and the utility corridor.

Special-Status Wildlife Species - Birds

Western Burrowing Owl (Athene cunicularia hypugaea)

Western burrowing owls inhabit arid lands throughout much of the western United States and southern interior of western Canada (Haug et al. 1993). In the Mojave Desert region, and in many other areas, this species has declined because of habitat modification, poisoning of its prey, and introduced nest predators. The burrowing owl is diurnal and usually non-migratory in this portion of its range.

Burrowing owls are unique among the North American owls in that they nest and roost in abandoned burrows, especially those created by California ground squirrels, San Joaquin kit fox, desert tortoise, and other wildlife. Burrowing owls have a strong affinity for previously occupied nesting and wintering habitats. They often return to burrows used in previous years, especially if they were successful at reproducing there in previous years (Gervais et al. 2008). The southern California breeding season (defined as from pair bonding to fledging) generally occurs from February to August with peak breeding activity from April through July (Haug et al. 1993).

In the Mojave Desert, burrowing owls generally occur at low densities in scattered populations, but they can be found in much higher densities near agricultural lands where rodent and insect prey tend to be more abundant (Gervais et al. 2008). Burrowing Owls tend to be opportunistic feeders. Large arthropods, mainly beetles and grasshoppers, comprise a large portion of their diet. Small mammals, especially mice and voles (*Microtus*, *Peromyscus*, and *Mus* spp.), are also important food items. Other prey animals include reptiles and amphibians, young cottontail rabbits, bats, and birds, such as sparrows and horned larks. Consumption of insects increases during the breeding season (Haug et al. 1993).

This species was detected on the ISEGS site during the 2008 surveys but not in 2007. Suitable habitat was identified. No owls, feathers, active burrows, pellets or whitewash were observed. The size and status of burrowing owl population at the project site is not known. The ISEGS site provides suitable foraging and breeding habitat for this species.

Golden Eagle (Aquila chrysaetos)

Throughout most of the western United States golden eagles are mostly year-round residents, breeding from late January through August with peak activity in March through July (Kochert et al. 2002). Migratory patterns are usually fairly local in California where adults are relatively sedentary, but dispersing juveniles sometimes migrate south in the fall. This species is generally considered to be more common in southern California than in the northern part of the state (USFS 2008).

Habitats for this species typically include rolling foothills, mountain areas, and deserts. Golden eagles need open terrain for hunting and prefer grasslands, deserts, savanna, and early successional stages of forest and shrub habitats. Golden eagles primarily prey on lagomorphs and rodents but will also take other mammals, birds, reptiles, and some carrion (Kochert et al. 2002). This species prefers to nest in rugged, open habitats with canyons and escarpments, with overhanging ledges and cliffs and large trees used as cover. Golden eagles were detected on the ISEGS project site, but are unlikely to

nest there because of the absence of suitable nesting habitat. However, the Clark Mountains, just north of the project area, provide suitable nesting habitat for this species, and the ISEGS site provides foraging habitat.

Loggerhead Shrike (Lanius ludovicianus)

Loggerhead shrikes are uncommon residents throughout most of the southern portion of their range, including southern California. In southern California they are generally much more common in interior desert regions than along the coast (Humple 2008). In the Mojave Desert this species appears to be most numerous in flat or gently sloping deserts and desert/scrub edges, especially along the eastern slopes of mountainous areas (Humpel 2008). Loggerhead shrikes initiate their breeding season in February and may continue with raising a second brood as late as July; they often re-nest if their first nest fails or to raise a second brood (Yosef 1996).

This species can be found within lowland, open habitat types, including creosote scrub and other desert habitats, sage scrub, non-native grasslands, chaparral, riparian, croplands, and areas characterized by open scattered trees and shrubs. Fences, posts, or other potential perches are typically present. In general, loggerhead shrikes prey upon large insects, small birds, amphibians, reptiles, and small rodents over open ground within areas of short vegetation, usually impaling prey on thorns, wire barbs, or sharp twigs to cache for later feeding (Yosef 1996). Loggerhead shrikes were detected on the ISEGS site and are year-round residents, using the site for nesting, foraging, and cover.

Le Conte's Thrasher (Toxostoma lecontei)

This species inhabits some of the hottest and driest habitats in the arid southwest, including the Mojave Desert where they occur year-round. Preferred habitats include sparse desert scrub, alkali desert scrub, and desert succulent scrub habitats with open desert washes. They seek gentle to rolling slopes bisected by dry desert washes, conditions found on alluvial fans that are found in the project area. The Le Conte's thrasher population densities are among the lowest of passerine (perching) birds, estimated at less than five birds per square kilometer in optimal habitats (Fitton 2008). This low population density decreases the probability of their detection during field surveys. This species requires areas with an accumulated leaf litter under most plants as cover for its preferred arthropod prey; they also feed on seeds, insects, small lizards, and other small vertebrates. LeConte's thrashers were detected during the surveys. They are year-round residents at the ISEGS site and use the site for nesting, foraging, and cover.

Crissal Thrasher (Toxostoma crissale)

Crissal thrashers are non-migratory residents ranging from southern Nevada and southeastern California to western Texas and central Mexico, and they are known to occur in the Mojave Desert in the vicinity of the Clark Mountains (Fitton 2008). This species prefers habitats characterized by dense, low scrubby vegetation, such as desert and foothill scrub and riparian brush including higher elevation arroyos of the Mojave Desert, normally near the upper limit of desert scrub vegetation as it transitions into pinyon-juniper woodland. The nest of this species typically consists of an open cup of twigs, lined with finer vegetation, and placed in the middle of a dense shrub. Loss of

habitat to clearing for agriculture or urban and suburban development threatens some populations. Crissal thrashers were detected during the surveys and are likely to be year-round residents at the ISEGS site, using the site for nesting, foraging, and cover.

Vaux's Swift (Chaetura vauxi)

Most Vaux's swifts observed in the Mojave Desert are passing through, and this species is not known to breed in San Bernardino County or elsewhere in the Mojave Desert (Hunter 2008). Very few nests have been found so their breeding range has been inferred from sightings of birds flying over potential nesting areas during their nesting season, in June and July. Vaux's swifts prefer to nest in the hollows formed naturally inside of large old conifer trees, especially snags, which are entirely lacking from the project area. This species was detected in the project area, but was likely a migrant rather than a resident. The ISEGS project area does not provide nesting habitat for Vaux's swift.

Brewer's Sparrow (Spizella breweri)

This species is a fairly common summer resident and breeder east of the Cascade-Sierra Nevada crest in mountains and higher valleys of the Mojave Desert. In summer, Brewer's sparrow often finds cover in sagebrush in extensive stands with moderate canopy unbroken by trees, while similar shrub habitats, such as bitterbrush, are used to a lesser extent. This species breeds in treeless shrub habitats with moderate canopy, especially in sagebrush. In winter, this species is common in open desert scrub and cropland habitats of the southern Mojave and Colorado deserts, usually in areas with some herbaceous understory. Brewer's sparrows were detected during the surveys and are likely to be year-round residents at the ISEGS site, using the site for nesting, foraging, and cover.

Special-Status Wildlife Species - Mammals

American Badger (Taxidea taxus)

American badgers were once fairly widespread throughout open grassland habitats of California. They are now uncommon, permanent residents throughout most of the state, with the exception of the northern North Coast area. Known to occur in the Mojave Desert, they are most abundant in the drier open stages of most shrub, forest, and herbaceous habitats with friable soils. Badgers are generally associated with treeless regions, prairies, parklands, and cold desert areas. Cultivated lands have been reported to provide little usable habitat for this species. They feed mainly on small mammals, especially ground squirrels, pocket gophers, rats, mice, and chipmunks. This species captures some of its prey above ground foraging on birds, eggs, reptiles, invertebrates, and carrion. Its diet will shift seasonally and yearly depending upon prey availability. This species is somewhat tolerant of human activities. The ISEGS project site provides suitable foraging habitat and denning sites for American badger, and it was detected during the 2007 surveys.

Nelson's Bighorn Sheep (Ovis canadensis nelsoni)

The Nelson's bighorn sheep includes bighorns from the Transverse Ranges through most of the desert mountain ranges of California and adjacent Nevada and northern Arizona to Utah. This species is widely distributed from the White Mountains in Mono County south to the Chocolate Mountains in Imperial County, and is known to occur in the Clark Mountains (CH2M Hill 2008). Essential habitat for bighorn sheep includes steep, rocky slopes of desert mountains, termed "escape terrain". Their agility on steep rocky terrain is an adaptation used to escape predators such as coyotes, eagles, and cougars (Wehausen 1992).

Bighorn sheep graze on grasses and browse shrubs, particularly in fall and winter, and seek minerals at natural salt licks. In the spring, when annual plants are available, bighorn tend to disperse downhill to bajadas and alluvial fans to forage. Bighorn sheep have a large rumen, relative to body size, which allows digestion of grasses, even in a dry state (Hanly 1982). This gives them flexibility to select diets that optimize nutrient content from available forage. Consequently, bighorn sheep feed on a large variety of plant species and diet composition varies seasonally and among locations. While diet quality in the Mojave Desert varies greatly among years, it is most predictably high in late winter and spring (Wehausen 1992), and this period coincides with the peak of lambing. Desert bighorn have a long lambing season that can begin in December and end in June in the Mojave Desert, and a small percentage of births commonly occur in summer as well (Wehausen 1992).

Radio telemetry studies of bighorn sheep in various southwestern deserts, including the Mojave Desert of California, have found considerable movement of these sheep between mountain ranges (Bleich et al. 1990). Consequently, intermountain areas of the desert floor that bighorn traverse between mountain ranges can be as important to the long-term viability of populations as are the mountain ranges themselves (Schwartz et al. 1986, Bleich et al. 1990).

Surface water is another element of desert bighorn habitat considered essential to population health. Male and female bighorn sheep inhabiting desert ecosystems can survive without consuming surface water (Krausman et al. 1985), and males appear to drink infrequently in many situations; however, there are no known large populations of bighorn sheep in the desert region that lack access to surface water. It is common for males and females to segregate and occupy different habitats outside the breeding season (Bleich et al. 1997). Females tend to choose particularly steep, safe areas for bearing and initial rearing of lambs. Areas of steep limestone are commonly preferred lambing areas if available. Males frequently occupy much less precipitous habitat during the lamb-rearing season (Bleich et al. 1997).

The CNDDB records indicate that this species was documented in the vicinity of the ISEGS project in 1986, when approximately 150 sheep were recorded approximately 2.9 miles west and northwest of the project area in the Clark Mountains (BSE 2007a). Jaeger's (1994) studies of bighorn sheep in the Kingston and Clark Mountain ranges provide some more recent information on the demography, habitat use, behavior and movement patterns of the Clark Mountain population of Nelson's bighorn sheep. Jaeger (1994) estimated 58 ewes in the Clark Mountain population in 1991 and 1992, and

calculated the ewe to ram ratio to be approximately 96:100 (Jaeger 1994). Jaeger (1994) found that from 1991 through 1993 the ewe population in the Clark Mountain Range declined due to poor recruitment of lambs combined with mountain lion predation on adults. Jaeger (1994) also studied seasonal movements of big horn sheep, and determined that radio-collared ewes in the Clark Mountain Range moved seasonally between Clark Mountain and the State Line Hills, a part of the Spring Range in Nevada, to the northeast (Jaeger 1994). Bighorn also utilized the Mesquite Range, which lies to the northwest of the Clark Mountains.

No studies are available that would confirm the presence of Nelson's bighorn sheep in the project area. Given the proximity of the Clark Mountains, it is likely that bighorn sheep move down into the upper elevations of the Ivanpah Valley, including the ISEGS project area, to forage (CH2M Hill 2008 p. 3-7). Alluvial fans near steep rocky terrain can provide crucial foraging habitat for big horn sheep (Wehausen 2009). For example, ewes at the end of gestation that need nutrients may come down from steep, rocky terrain looking for higher quality forage. They might use areas like the project site for only three weeks, but those three weeks are critical (Wehausen 2009). The Ivanpah Valley might also provide important movement corridors for deer and bighorn sheep (CH2M Hill 2008 p. 3-7). CDFG has noted that wildlife corridors are present through and adjacent to the ISEGS site, and have expressed concern that the project could adversely affect bighorn sheep (CDFG 2008). However, no studies are available documenting bighorn use of the Ivanpah Valley as a migratory area.

Special-Status Bat Species

Pallid bat (*Antrozous pallidus*) and Townsend's big-eared bat (*Corynorhinus townsendii*) are special-status bat species that have been reported in the project vicinity (Brown 2008, CNDDB 2008). The pallid bat is a locally common species of low elevations in California, occurring throughout the state from Shasta to Kern counties except in the high Sierra. It occupies a wide variety of habitats is occupied, including grasslands, shrublands, woodlands, and forests from sea level up through mixed conifer forests. The species is most common in open, dry habitats with rocky areas for roosting and is a yearlong resident in most of the range. Pallid bats use caves, crevices, and mines for day roosts.

Townsend's big-eared bat is found throughout California in all but subalpine and alpine habitats, and may be found at any season throughout its range. Once considered common, Townsend's big-eared bat now is considered uncommon in California. It is most abundant in mesic habitats, and uses caves, mines, tunnels, buildings, or other human made structures for roosting. The Townsend's big-eared bat captures their prey in flight using echolocation, or by gleaning from foliage, with small moths being the principal food of this species. Extremely sensitive to disturbance of roosting sites, a single visit may result in the abandonment of a maternity roost.

Pallid and Townsend's big-eared bats could use the project area for foraging and might use nearby mine shafts for roosting. The AFC (BSE 2007a) correctly states that no mines exist on site, but staff observed a mine shaft in the limestone hill immediately west of Ivanpah 3. While no direct impacts to the mine would occur from the project, BLM staff assessed the level of bat activity at the mine shaft by conducting a visual

night survey on June 23, 2008. At least five bats were observed from the limestone hill, and one individual flew into and out of the mine shaft (Grant 2008). Species identification was not possible with this type of survey. Although standard acoustic surveys would be able to distinguish most species, they would not be successful in detecting Townsend's big-eared bat (Brown 2008).

Special-Status Wildlife Species - Reptiles

Banded Gila Monster *(Heloderma suspectum cinctum)*

The banded Gila monster is considered rare in California (Lovich and Beaman 2007) with only 26 credible records of the species documented in California within the past 153 years. This large and distinct looking lizard is difficult to observe even in areas where they have been recently recorded. As a result, little is known about this species' distribution, population status, and life history in California.

Most of the historical observations in California occurred in mountainous areas of moderate elevations with rocky, incised topography, in large and relatively high ranges as well as riparian areas (Lovich and Beaman 2007). Despite the widespread localities of potential habitat throughout the California desert, the few documented observations suggest the California populations appear to be confined to the eastern portion of the California desert (Lovich and Beaman 2007), and the current distribution is apparently a function of summer rainfall. As reported by Lovich and Beaman (2007), all California Gila monster observations occurred east of the 116° longitude in areas that received at least 25 percent of their annual precipitation during the summer months. Throughout their range, Gila monsters appear to be most active during or following summer rain events. Gila monsters have been recorded in the adjacent Mojave National Preserve and the Clark Mountains (Lovich and Beaman 2007). The closest confirmed observation of a Gila monster to the project area is likely an animal collected within the Mojave National Preserve in 1962 on the eastern slope of the Clark Mountains near Ivanpah Springs (Persons and Nowak 2007). Another incidental observation from the area includes finding Gila monster remains beneath a red-tail hawk nest near Primm, Nevada (CH2M Hill 2008g).

Like most areas of the desert, rain fall within the Ivanpah Valley is variable but mean annual precipitation is approximately 4 to 7 inches. The distribution of rainfall is also bi-modal with winter peak precipitation typically in February and summer peak rain falls in August. Runoff from the steep surrounding mountains is rapid and flash floods are common events as most of the storm water in the Ivanpah Valley drains across the alluvial fan to Ivanpah and Roach Dry Lakes. Although the Mojave is the driest of the North American deserts, the east Mojave does receive a large percentage of its annual precipitation from summer "monsoon" rains. As reported in Hereford et al. (2001) the relative abundance of cacti, many yuccas, agaves, and agave-like plants tend to be greater where warm-season rainfall is abundant. This is true of the ISEGS project area where cacti are extremely abundant. Although the project area does not receive near the amount of the rainfall as the Sonoran Desert where Gila monsters are more prevalent, the Ivanpah Valley does mimic the climatic conditions that appear to be favorable to Gila monster presence (CH2M Hill 2008g).

Gila monsters have the potential to occur in the ISEGS project area, particularly near the metamorphic hill, immediately adjacent to the southeastern boundary of Ivanpah 3 (CH2M Hill 2008g). They could also occur at the northeastern corner of Ivanpah 2 as well as the utility interconnections south of the base of the Clark Mountains (CH2M Hill 2008g). Gila monsters may venture from those rockier areas adjacent to the project area where they would likely take refuge in small crevices and caves to forage within the spreading arroyo on which the proposed project is located (CH2M Hill 2008g).

Desert Tortoise

The desert tortoise's range includes the Mojave Desert region of Nevada, southern California, and the southwest corner of Utah and the Sonoran Desert region of Arizona and northern Mexico. The desert tortoise range is divided into Mojave and Sonoran populations. The Ivanpah Valley supports the Mojave population, which is primarily found in creosote bush-dominated valleys with adequate annual forbs for forage.

Desert tortoises have been known to live up to 70 years or more but the typical adult likely lives 25 to 35 years (in USFWS 1994). Like many long-lived species, the tortoise has a relatively slow rate of reproduction, and achieves breeding status at 15 to 20 years of age. Egg-laying occurs primarily from April to July (Rostral et al. 1994; USFWS 1994); the female typically lays 2-14 eggs (average 5-6) eggs in an earthen chamber excavated near the mouth of a burrow or under a bush (Woodbury and Hardy 1948; USFWS 1994). The eggs typically hatch 90 to 120 days later, between August and October.

Desert tortoise activity is seasonally variable, and in California peak adult and juvenile activity typically coincides with the greatest annual forage availability during the early spring and summer. However, tortoises will emerge from their burrows at any time of year when the weather is suitable. Hatchling desert tortoises typically become active earlier than adults do and their greatest activity period can be expected between late winter and spring. During active periods, tortoises feed on a wide variety of herbaceous plants, including cactus, grasses, and annual flowers (USFWS 1994).

Annual home ranges have been estimated between 10 and 450 acres and are age, sex, seasonal, and resource density dependent (USFWS 1994). Although adult males can be aggressive toward each other during the breeding season, there can be a great deal of overlap in individual home ranges (USFWS 1994). More than 1.5 square miles of habitat may be required to meet the life history needs of a tortoise and individuals have been known to travel as much or more than 7 miles at a time (BLM 2001). In drought years, tortoises can be expected to wander farther in search of forage. During their active period, desert tortoises retreat to shallow burrows and aboveground shade to escape the heat of the day, and will also retire to burrows at nighttime. Desert tortoises are primarily dormant in winter in underground burrows and sometimes congregate in communal dens.

Desert tortoise populations have declined throughout their range because of loss and degradation of habitat caused by urbanization, agricultural development, military training, recreational use, mining, and livestock grazing. The loss of individual desert tortoises to increased predation by common ravens, collection by humans for pets or

consumption, collisions with vehicles on paved and unpaved roads, and mortality resulting from diseases also contributed to declines.

The proposed ISEGS project would be constructed within the Northeastern Mojave Recovery Unit, one of six designated evolutionarily significant units within the range of the desert tortoise (USFWS 1994). When the 1994 recovery plan was issued, some of the highest known tortoise densities were in southern Ivanpah Valley, with 200 to 250 adults per square mile (USFWS 1994). These 1990s densities were less than estimates for the southern Ivanpah Valley in the 1970s; a decline has been attributed to raven predation (USFWS 1994). Densities for the northern Ivanpah Valley in the 1990s were typically less than 50 adults per square mile (USFWS 1994). According to the 1994 recovery plan, tortoise densities in the Ivanpah Valley Desert Wildlife Management Areas were estimated between 5 and 250 adult tortoises per square mile and the area was given a threat level of 3 out of 5 (5 = extremely high) (USFWS 1994). The Desert Tortoise Recovery Planning Assessment Committee (DTRPAC) recommended revising the threat level for the Ivanpah Valley Desert Wildlife Management Areas to a 4 to reflect 2003 conditions (DTRPAC 2004). Desert tortoises are distributed throughout Ivanpah Valley with the exception of the dry lakes and developed areas. According to the Northern and Eastern Mojave Planning Area EIS (BLM 2002), the non-lakebed portion of Ivanpah Valley area is considered excellent quality tortoise habitat with some of the highest population densities in the East Mojave.

The ISEGS project area provides high quality habitat for this species, with low levels of disturbance and high plant species diversity (CDFG 2008a). The desert tortoise population in this part of the Ivanpah Valley is also unique because it is the highest elevation at which this species is known to reside in the state (CDFG 2008a). The 2007/2008 protocol desert tortoise surveys found 25 live desert tortoises, 97 desert tortoise carcasses, 214 burrows, and 50 other tortoise sign (BSE 2007a). Tortoise sign and density was greatest in Ivanpah 1 at the southern boundary of the project site and was less dense as the survey moved towards the Clark Mountains and Ivanpah 3.

Desert tortoises also occur along the ISEGS linear facilities (BSE 2007a). Surveys of the fiber optic route by EPG, Inc. (2008) (cited in BSE 2007a) confirmed that the entire route is within desert tortoise habitat. Protocol level surveys were not conducted. However, in surveying the fiber optic route EPG found three tortoise burrows and a tortoise shell.

Sensitive Habitats

Critical Habitat Designation and Desert Tortoise Recovery Plan

The USFWS desert tortoise recovery plan is the key strategy for recovery and delisting of this species (USFWS 1994). As part of the recovery strategy, the USFWS designated critical habitat for the desert tortoise in portions of California, Nevada, Arizona, and Utah (USFWS 1994). Critical habitat is a term defined by the federal Endangered Species Act that refers to areas designated by the USFWS that are essential for the conservation of threatened or endangered species and may require special management and protection

(USFWS 2005). The proposed project is not within designated critical habitat for any species, but is located approximately five miles north of the Ivanpah Critical Habitat Unit for desert tortoise, just north of the I-15 and Route 164 (Nipton Road) interchange.

The recovery plan (USFWS 1994) recommends implementation of reserve level protection of desert tortoise populations and habitat within Desert Wildlife Management Areas (DWMAs), while maintaining and protecting other sensitive species and ecosystem functions. DWMAs were developed to provide "reserve level" protection for the tortoise (USFWS 1994). Critical habitat was designated to identify areas containing key biological and physical attributes that are essential to the desert tortoise's survival and conservation, such as space, food, water, nutrition, cover, shelter, and reproductive sites. As part of the actions needed to accomplish the recovery of this species, land management goals within all DWMAs include restriction of human activities that adversely affect desert tortoises (USFWS 1994).

The 1994 and draft 2008 Desert Tortoise Recovery Plans (USFWS 1994, 2008) emphasize aggressive management within "tortoise conservation areas" a term that encompasses critical habitat Desert Wildlife Management Areas, Areas of Critical Environmental Concern, and other conservation areas or easements managed for desert tortoises. While the recovery plans suggest that land managers focus the most aggressive recovery efforts toward tortoise conservation areas, they also emphasize that land managers should strive to limit the loss of desert tortoise habitat outside conservation areas as much as possible (USFWS 2008). The recovery plans recognize that activities occurring on lands beyond the boundaries of existing tortoise conservation areas can affect tortoise populations and the effectiveness of conservation actions occurring within the conservation area boundaries. While recovery efforts may be prioritized within existing desert tortoise conservation areas, populations, habitats, and actions outside of these areas may also contribute to, or hamper, recovery of the species.

CDFG Sensitive Natural Communities

In addition to special-status species, a search of CDFG's California Natural Diversity Database (CNDDB) revealed the presence of a sensitive natural plant community in the project vicinity: mesquite bosque, a type of desert riparian forest dominated by mesquite (*Prosopis pubescens*). While there are several ephemeral washes of considerable size on the site, their associated vegetation is Mojave wash scrub, a common vegetation type. The nearest occurrence of mesquite bosque was recorded encircling Mesquite Lake, which is approximately five and a half miles north of the northern end of the project site (CNDDB 2009).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Methods and Threshold for Determining Significance

The determination of whether a project has a significant effect on biological resources is based on the best scientific and factual data that staff could review for the project. The significance of the activity is in large part dependent on the setting and the existing laws, ordinances, regulations, and standards (LORS) for the particular site. For example, disturbance during construction on a "brownfield" (i.e., developed) site may

not be significant, but this same activity on a “greenfield” (i.e., undeveloped) site may be significant because of the greater likelihood of sensitive biological resources in the area. Significance of impacts is generally determined by compliance with applicable LORS; however, because of the diversity of biological resource impacts, guidelines adopted by resource agencies may also be used.

According to CEQA guidelines, significant impacts to biological resources would occur if special-status species, such as state- or federal-listed species, state fully protected species, candidates for state or federal listing and/or Species of Special Concern, are likely to be impacted from the construction and/or operation of the proposed project. Interruption of species migration; reduction of native fish, wildlife and plant habitat; causing a fish or wildlife population to drop below self-sustaining levels; and disturbance of wetlands, marshes, riparian areas or other wildlife habitat would also be considered significant impacts. Harassment of a protected species, even if it does not result in the loss of habitat or reduction in population numbers, would still be considered a significant impact. Substantial degradation of the quality of the environment or environmental effects that are individually limited, but cumulatively considerable, would also be considered significant.

Direct and Indirect Impacts and Mitigation

The California Environmental Quality Act (CEQA) Guidelines define direct impacts as those impacts that result from the project and occur at the same time and place. Indirect impacts are caused by the project, but can occur later in time or farther removed in distance while still reasonably foreseeable and related to the project. The potential impacts discussed in this analysis are those most likely to be associated with construction and operation of the ISEGS project.

Impact analyses typically characterize effects to plant communities as temporary or permanent, with a permanent impact referring to areas that are paved or otherwise precluded from restoration to a pre-project state. In the Mojave Desert ecosystem the definition of permanent impacts needs to reflect the slow recovery rates of its plant communities. Natural recovery rates from disturbance in these systems depend on the nature and severity of the impact. For example, creosote bushes can resprout a full canopy within five years after damage from heavy vehicle traffic (Gibson et al. 2004), but more severe damage involving vegetation removal and soil disturbance can take from 50 to 300 years; complete ecosystem recovery may require over 3,000 years (Lovich and Bainbridge 1999). In this analysis, an impact is considered temporary only if there is evidence to indicate that pre-disturbance levels of biomass, cover, density, community structure, and soil characteristics could be achieved within five years. Unless otherwise indicated, the acreages provided below for impacts are considered permanent.

Construction Impacts and Mitigation

Biological Resources Table 3 summarizes the acreage of permanent and temporary impacts as a result of the construction of ISEGS project features.

Biological Resources Table 3
Permanent and Temporary Disturbance of BLM Land

Facility	Acres
Permanent Disturbance	
Ivanpah 1	913.5
Ivanpah 2	920.7
Ivanpah 3	1,836.3
Substation	16.1
Administration/warehouse & parking	8.9
Kern River Gas Line Tap Station (100' X 150')	0.3
Southwest Gas Metering Set for Ivanpah 1 & 2 (20' X 40')	0.02
Groundwater Wells [10' x 10' area for 2 supply wells & 1 monitoring well]	0.01
Transmission Towers (8' x 8' area every 750 feet)	0.01
Linear Facilities (Colosseum Road, Gas, Water & Transmission Lines)	16.9
Subtotal – Permanent Disturbance	**3,712.7**
Temporary Disturbance	
Main Construction Laydown Area	260.0
Equipment Laydown and Wash Area	21.5
Contractor Trailers	20.1
Colosseum Road Improvement (100-ft wide construction corridor from Golf Club to Ivanpah 2, less asphalt road)	12.4
Southwest Gas construction laydown	5.0
Gas line (75' wide construction disturbance from tap to Ivanpah 3 for 2,011 feet)	2.9
Kern River Gas Line tap construction area (200' x 200')	0.9
Adjustment for Roads	(1.8)
Subtotal – Temporary Disturbance	**321.0**
Existing Transmission Line Corridor (within Construction Logistics Area)	38.9
Total ISEGS Project Land Use	**4,073**

Source: CH2M Hill 2009f

Additional land disturbance beyond the project site boundaries would be associated with the gas line tap station and its construction (1.26 acres), the gas line and its construction from the tap station to the edge of Ivanpah 3 (2.30 acres), the new dirt road to the mining claim (0.41 acres), and construction and paving of a portion of Colosseum Road from the Primm Valley Golf Club to the project (9.69 acres) (CH2M Hill 2009q).

Impacts to Plant Communities

The revised ISEGS project reflects a Low Impact Development (LID) approach and the applicant has expressed their intent to minimize disturbance of vegetation during construction and operations (CH2M Hill 2009f). However, the applicant has provided only a conceptual scenario of how vegetation would be treated during construction and operation. Clearing and grubbing, where shrubs and roots are removed, would be

performed for permanent access roads in each of the three ISEGS units, in the power blocks, and in common areas where the existing topography requires modification to provide access for installation equipment and materials during construction (CH2M Hill 2009f).

Outside of access roads and maintenance tracks, vegetation would be cut to 12-18 inches to provide clearance for heliostat function, but would leave the root structures intact (CH2M Hill 2009q). The vegetation would be cut with a flail type mower mounted on a low-ground pressure tractor. Vegetation would be maintained at 12-18 inches in the vicinity of heliostats for the duration of the project. The applicant has not provided acreage estimates of what areas would be subject to this vegetation clearing during project construction and operation, but estimated that 412,600 cubic yards of vegetation would be cut and mulched (BSE 2007a, CH2M Hill 2009f).

In an attempt to assess the impacts of mowing the applicant conducted some preliminary studies at the project site (CH2M Hill 2009g). The researchers clipped seven species (burrobush, creosote bush, cheese bush, pencil cactus, silver cholla, Nevada Mormon tea, and Mojave yucca) at the project site in March 2009 and evaluated them for regrowth and vigor in April 2009. The 35 clipped plants showed vigorous resprouting following mowing (CH2M Hill 2009g). The results of this study indicated that mowed plants will initially respond by re-sprouting from the base, but staff does not believe that this preliminary research provides useful information about the long-term effects of mowing on the project area's plant communities. Little research has been done on the effects of mowing on native desert plant species, but extensive studies have been conducted on general plant responses to short- and long-term mowing in weed research. Mowing suppresses vegetation through carbohydrate starvation, reduces its water use (which is likely to give a competitive edge to annual grasses between shrubs) and discourages reproduction by seed. Frequent mowing can stimulate branch development in some species, and eventually depletes the plants' carbohydrate reserve if done often enough (Radosevich et al. 1997). Sprouting is a common morphological response and, when repeated, results in a prostrate, turf-like structure in adapted species. Mowing every few weeks for at least one or two seasons may be all that is required to suppress perennial vegetation (Radosevich et al. 1997).

Mowing is likely to promote the proliferation of non-native invasive weeds, in particular cheat grass and red brome, two species of particular concern at the project site. These plants are of low-stature and suppressing the surrounding taller native vegetation would give these lower-growing weeds a competitive edge. The native perennial shrubs would be weakened and diminished in size, utilizing less moisture and nutrients, and increasing sunlight available to the weeds between shrubs.

In addition to the effects of mowing, mulching of mowed vegetation could change the characteristics of the soils and the plant communities in the vicinity of heliostats. Over time the addition of organic matter such as mulch in the vicinity of the heliostats would likely bring about changes to the composition of the soil (soil texture and chemistry), resulting in a decrease in native species adapted to sandy soils and favoring non-native species better suited to loamy soils.

Cheat grass, red brome, and Mediterranean grass are already present in the project area and are expected to increase as a result of construction- and operation-related disturbance. The proliferation of non-native annual grasses such as these have dramatically increased the fuel load and frequency of fire in many desert ecosystems (Lovich & Bainbridge 1999). Unlike other ecosystems in California, fire was not an important part of the Mojave Desert ecosystems and most perennials are poorly adapted to even low-intensity fires, and the animals that coevolved are not likely to respond favorably to fire either. The potential spread or proliferation of non-native annual grasses, combined with the proximity to ignition sources could potentially increase the risk of fire, and the effects to these poor-adapted desert communities would be harmful, particularly to cacti and most native shrubs species. Burned creosote and other native shrubs are typically replaced by short-lived perennials and non-native grasses (Brown & Minnich 1986).

Vegetation that is not directly impacted by clearing or pruning would be indirectly impacted by shading. Shading from heliostats would reduce the amount of sunlight available for photosynthesis, eliminating longer wavelengths of the visible light spectrum. This would likely have the most dramatic affect on crassulacean acid metabolism (CAM) plants, desert-adapted plants like Mohave yucca, barrel cactus, and cholla. Pollinators that have a mutualistic relationship with CAM plants, like yucca and yucca moths, would also be affected. Habitat fragmentation would also adversely affect pollinator activity and therefore potentially affect gene flow among the plants that remain. Shading would reduce transpiration due to reduced in photosynthetic rates, increasing soil moisture, and resulting in changes to soil nutrient availability and microbial communities.

Other indirect effects on plant communities during operation include soil compaction, changes to the soil structure by use of dust suppressants, and changes in the distribution of precipitation falling on the solar fields. During precipitation events heliostats would be placed in the flat horizontal position. Precipitation runoff would concentrate along the dripline below the heliostats rather than being uniformly distributed, changing the soil water content. Mirror wash water would similarly concentrate along the drip line below the heliostats, causing minor erosion of the soil at the drip line and promoting growth of weeds.

Construction and operation of the ISEGS project would substantially change the structure and species composition of the plant communities over the project lifetime. Conditions at the site would favor more disturbance-tolerant and shade tolerant species, and the site would be vulnerable to invasion by non-native plants such as cheat grass and red brome. Shrubs and cacti that are frequently mowed, shaded, or subject to increased levels of water would eventually die and be replaced by short-lived species like cheesebush and rabbitbrush and invasive weeds.

Energy Commission staff considers the direct and indirect impacts to native plant communities from construction and operation of the ISEGS project to be significant. Staff's proposed Condition of Certification **BIO-13**, the Weed Management Plan, would help prevent the spread of non-native and invasive plant species on the ISEGS site.

Condition of Certification **BIO-14**, the Closure, Revegetation and Rehabilitation Plan, provides guidelines for minimizing impacts to project area plant communities, and for revegetating project area plant communities affected by construction.

Revegetation/Reclamation Plan

The applicant submitted their first draft of a Closure, Revegetation, and Rehabilitation Plan (Plan) in August 2008 (CH2M Hill 2008b). The Plan described procedures and practices for salvage and storage of succulents (cacti and yuccas) and revegetation of sites temporarily affected during construction. The Plan also included conceptual guidance for revegetation and rehabilitation efforts after closure and decommissioning at the end of the 50-year life of the project, or earlier in the event of an unplanned closure.

Staff provided comments and requests for major revisions to that plan (BLM 2009b), and the applicant provided a revised plan on June 30, 2009 (CH2M Hill 2009q). Staff reviewed the revised Plan and concluded that it still does not provide adequate information to successfully guide the salvage, revegetation, and rehabilitation efforts required to satisfy BLM's requirements. **Biological Resources Appendix A** details the issues that need to be addressed, as described in staff's proposed Condition of Certification **BIO-14**.

Impacts to Special-Status Plants

The following impact assessment and recommended conditions of certification represent Energy Commission staff's analysis and conclusions, not those of BLM staff. Energy Commission staff have concluded that construction of the ISEGS project would directly impact eight special-status plant species, and that impacts to five of these — Mojave milkweed, desert pincushion, nine-awned pappus grass, Parish's club-cholla, and Rusby's desert-mallow — would be considered significant under CEQA guidelines. Energy Commission staff considers project impacts to three of the eight special-status —small-flowered androstephium, Utah vine milkweed, and desert portulaca—to be less than significant. In the case of small-flowered androstephium, many new occurrences[1] of this species have been found recently, and it has a larger total number of documented occurrences. Utah vine milkweed, Utah mortonia, and desert portulaca are ranked as "watch list" by CNPS and CDFG's CNDDB and as such generally considered more regionally common than plants on higher priority lists.

[1] An occurrence is defined by CDFG's CNDDB as individuals of a particular species occurring within one-quarter mile of each other. Staff discusses the status of the special-status plants found within the project footprint in terms of occurrences rather than numbers of individual plants. Due to incomplete data, contributors to the CNDDB sometimes do not note the number of individuals when reporting CNDDB occurrences and herbaria records, and the occurrence size in terms of individual plants cannot be ascertained.

Energy Commission staff's conclusion of CEQA significance was based on an analysis of impacts to Mojave milkweed, desert pincushion, nine-awned pappus grass, Parish's club-cholla, and Rusby's desert-mallow in light of the following variables:

- Proportion of occurrences that may be lost and indirectly affected by the project relative to the documented occurrences and distribution of these species in California;
- Occurrence size;
- Habitat quality;
- Cumulative effects and indirect threats to remaining occurrences; and
- Peripheral population status.

Proportion of Occurrences Affected and Occurrence Size:

A substantial portion of the Ivanpah Valley documented occurrences of Mojave milkweed, desert pincushion, nine-awned pappus grass, Parish's club-cholla, and Rusby's desert-mallow would be directly, indirectly, and cumulatively impacted by the project. Plants and other sessile organisms are particularly vulnerable to the effects of habitat fragmentation; small fragments of habitat can only support small populations and are more vulnerable to extinction. Even minor fluctuations in climate can be catastrophic in a small fragmented population. For Mojave milkweed, desert pincushion, nine-awned pappus grass, and Parish's club-cholla, the California populations are already geographically marginal relative to their core populations outside the state. For most of these species, these Ivanpah Valley populations represent a substantial portion of their total documented range regionally and within California. Loss of a substantial portion of these populations makes them more vulnerable to extirpation within the state, especially for Mojave milkweed; its California distribution outside of the Ivanpah Valley is restricted to only two other observations and a handful of historic herbarium collections. **Biological Resources Figure 1** illustrates the restricted range of these species. **Biological Resources Appendix A** summarizes the percentage of statewide documented occurrences for special-status plant species in the ISEGS project area for which impacts are considered significant by Energy Commission staff under CEQA guidelines.

Rusby's desert-mallow is a highly restricted endemic, found only in California, with a range sufficiently small and represented by so few occurrences that the ISEGS impact in the Ivanpah Valley is significant as that term is defined by CEQA. Its total documented global distribution is currently limited to fewer than 30 small occurrences in the Panamint, Clark, and Kingston ranges, including those in the project area (CNDDB 2009). Within its range, Rusby's desert-mallow is restricted to gravelly slopes and sandy washes, typically on carbonate and limestone substrates. **Biological Resources Figure 1** illustrates the restricted range of these species, and their relatively few populations, making them especially vulnerable to extirpation from the state.

A substantial portion of the documented occurrences for the five species of concern (Mojave milkweed, desert pincushion, nine-awned pappus grass, Parish's club-cholla, and Rusby's desert-mallow) is attributed to the project area. Of the remaining documented occurrences, many are threatened by livestock grazing, transmission line

and access road maintenance, and non-native plants (CNDDB 2009). All of these species have a highly restricted range in California, and all are known from fewer than 30 documented occurrences (including those found in the project area). Numerous new occurrences of small-flowered androstephium (also a CNPS List 2 species) have been found in recent years during surveys conducted for other recent development projects. For this reason (combined with a larger total number of documented occurrences), the project effects to this species were not considered significant in a CEQA context.

Energy Commission staff has concluded that adequate information on spring-blooming special-status plants is available to assess the proportion of special-status plant occurrences lost and indirectly affected by the project relative to the total number of documented occurrences in California. However, some summer blooming special-status plants may have been missed by the applicant's surveys (CNPS 2009b, Andre 2009, Sanders 2009) and this concern has been addressed in Energy Commission staff's Condition of Certification **BIO-18**.

Habitat Quality

Staff notes that the habitat in the project area that supports the special-status species is of particularly high quality in terms of species richness and diversity, including rich cactus and succulent diversity, creosote rings, micro-topographic diversity (upon which several of the special-status species depend), and currently contains relatively few non-native plants. Additionally, the project occurrences for some of the affected species (such as the nine-awned pappus grass) are robust in number, relative to the smaller (and potentially less viable or defensible) populations outside of the project area.

Threats

Threats to remaining CNDDB occurrences outside the project area include grazing, transmission projects, ORV use, and non-native plants (CNDDB 2009). Some species have occurrences in the Mojave National Preserve that are not subject to these threats. While the project area contains several power lines and access roads, there appears to have been no vegetation maintenance, very little cross-country ORV damage, and what little grazing has occurred has apparently not noticeably degraded special-status plant habitat quality.

Compounding the overall threats to remaining populations are the cumulative effects of present and reasonably anticipated future energy projects and infrastructure development. In addition to the direct reduction and fragmentation of the Ivanpah Valley populations of these species described above, the project contributes to the cumulative, interactive, and synergistic impacts of multiple indirect threats, including the potential spread of non-native plants and an increased risk of fire. The recent push for renewable energy development on private and public lands in the Mojave Desert region has put many of its special-status plants under far more immediate threat of local extinctions. Accordingly, significant impacts to special-status plant species, particularly Mojave milkweed, could contribute to an increased need for state listing if not adequately mitigated. **Biological Resources Tables 6** and **7** provide a list of projects considered in the cumulative impacts analysis. Given the project's location on a large portion of the Ivanpah Valley, and in particular, the bajada and alluvial fans that support the special-status plants, it is reasonable to conclude that a substantial portion of the suitable

habitat for these plants would be affected, and there is an increased threat of local extinction for the Ivanpah Valley proportion of these species' ranges.

Status as Peripheral Populations

California occupies an important biogeographic location and zone of ecological transition on the Pacific coast of North America, and so its floristic diversity includes many widespread taxa on the edge of their range. This includes all of the CNPS List 2 plants occurring in the project area which represent the western limit of those species' ranges—geographically marginal, peripheral populations on the frontiers of their ranges. Peripheral populations can be completely isolated from their core populations, or they can occur in closer proximity to other marginal populations.

Peripheral plant populations are at greater risk of extirpation because they occur on the edge of a species' range. Relative to core populations, peripheral populations tend to be smaller, more isolated, and more genetically and ecologically divergent than central populations have more variable densities, and are ecologically distinctive and/or occur in marginal habitats (Leppig & White 2006). The biological and intrinsic values of these peripheral populations are well documented; maintenance of genetic variation contributes to long-term species survival and preservation of local genetic diversity (Channel and Lomolino 2000).

CEQA Significance and CNPS Status

Mojave milkweed, desert pincushion, nine-awned pappus grass, Parish's club-cholla, and Rusby's desert-mallow are not listed under the California Endangered Species Act, but that does not diminish the significance of their loss. Plants on the CNPS List 1A, 1B and 2 meet the definitions of Sections 2062 and 2067 (CESA) of the California Fish and Game Code, and are eligible for state listing (CNPS 2001a). Furthermore, even if a species is not a California or federally listed species it still may be considered endangered, rare or threatened, if the species can be shown to meet the criteria in Section 15380 of the CEQA Guidelines. "CEQA Section 15380 provides that a plant or animal species may be treated as 'rare or endangered' even if not on one of the official lists if, for example, it is likely to become endangered in the foreseeable future." Plants appearing on CNPS List 1B or 2 are considered to meet CEQA's Section 15380 criteria, and effects to these species are generally considered "significant." The applicant has acknowledged and cited this same CEQA section in their Application for Certification (BSE 2007a page 5.2-41). This is particularly true for the S1-ranked Mojave milkweed.

CNPS List 4 species are plants of limited distribution or infrequent throughout a broader area of California, and their vulnerability or susceptibility to threat appears low at this time. In the project area, CNPS List 4 plants found on the project site include desert portulaca, Utah vine milkweed, and Utah mortonia. Very few CNPS List 4 plants meet the definition for state listing (CNPS 2001a). Nevertheless, many are significant locally if, for example, they occur at the periphery of a species' range, exhibit unusual morphology, or occur in atypical habitats, and should be evaluated in a CEQA analysis.

The applicant concludes in the AFC (BSE 2007a page 5.2-45) that CNPS List 2 plants found onsite "…meet the definition of a rare plant pursuant to CEQA. Impacts to these special-status plants are significant and mitigation is required." but more recently the

applicant has suggested that impacts to CNPS List 2 plants are not significant because the plants range into Nevada (CH2M Hill 2009a). However, the range of these List 2 taxa extend into California to such a sufficiently small degree that they are considered rare here. CNPS List 2 plants are indeed considered rare, threatened, or endangered in California but more common outside of California (CNPS 2001a).

CEQA Guidelines section 15065 lists certain conditions which are considered to be mandatory findings of significance. One such condition is if the project has the potential to substantially degrade the quality of the environment, and substantially reduce the number or restrict the range of an endangered, rare, or threatened species. Section 15380 of the CEQA Guidelines defines the terms "species," "endangered," "threatened" and "rare". In general, plants appearing on CNPS List 1A, 1B, or 2 are considered to meet CEQA's Section 15380 criteria, and effects to these species are considered "significant." As such, the Energy Commission and other state agencies such as CDFG and the California Department of Water Resources, have a history of requiring mitigation for impacts to these special-status plants.

Article 9 of CEQA (Section 15125 [c]) states: "Knowledge of the regional setting is critical to the assessment of environmental impacts. Special emphasis should be placed on environmental resources that are rare or unique to that region and would be affected by the project."

The joint CNPS Rare Plant Program and CDFG's CNDDB Plant Status Review Process for CNPS List and CDFG Special Plants List status is a rigorous review process that evaluates existing literature, reviews herbarium collections, and communicates with experts before making a recommendation for listing. A summary of information on the candidate is reviewed by a network of over 500 California botanists, representing state and federal agencies, environmental consulting firms, academic institutions, CNPS and other conservation organizations. All of the CNPS List 1B and 2 plants in the project area are also included in the CDFG Special Plants List (CDFG 2009) and are tracked by the CDFG's CNDDB. The *CNPS Inventory* has been a broadly recognized and accepted source of science-based information on the rarity, endangerment, and distribution of California special-status plants since its first edition in 1974. The Energy Commission's regulations reference CNPS Lists in the definition of "species of special concern" (California Code of Regulations, Title 20, section 1702 (q) and (v)), and the BLM has a policy of designating all CNPS List 1B plants, unless specifically excluded by the BLM State Director, as BLM Sensitive (BLM 2009).

Avoidance and Minimization Measures

Energy Commission staff evaluated the potential for minimizing impacts to special-status plant species with by avoiding the highest densities of special-status plant concentrations. The applicant's Low Impact Development (LID) approach has substantially reduced the effects of the solar fields on soil and water resources. However, Energy Commission staff does not consider preservation of special-status plants by maintaining vegetation between the heliostats as a feasible avoidance measure. The following mitigation options were considered but ultimately determined by Energy Commission staff to be infeasible for the reasons described below.

Mitigation Measures Considered but Rejected

Acquisition and Protection of Populations on Private Lands. Energy Commission staff's analysis of mitigation of special-status plant species mitigation through acquisition of private lands indicated few opportunities for acquisition of existing occurrences. Energy Commission staff examined the mapped CNDDB distribution of the special-status plant species and added land ownership and conservation lands map overlays available in CDFG's Biogeographic Information Observation System (BIOS, www.bios.cdfg.ca.gov). Available ownership data in CNDDB text records was also examined. The vast majority of documented occurrences are located on BLM or National Park Service (NPS) land. A few are owned by the State Lands Commission, and several were owned by a combination of these agencies. In addition, several parcels were listed as unknown ownership, and for those, Energy Commission staff contacted the San Bernardino County Assessor's Office to inquire whether they are privately owned, but was unsuccessful in obtaining additional ownership information. Only two occurrences (ranked poor quality) of one species, Rusby's desert-mallow, were listed as partial private ownership; however, it is unlikely that this land would be suitable for acquisition as mitigation because it appears to be a transmission line right-of-way owned by Southern California Edison. Essentially all occupied habitat (i.e., habitat containing special-status plants) occurs on federal land, primarily BLM and NPS land, and no suitable private parcels were found that could be placed under a conservation easement or other deed restrictions to prevent future development.

Protection and Enhancement of Populations on Public Lands. Special-status plant occurrences on NPS lands are considered to be adequately protected and thus offer no potential for offsetting project losses. In recognition that some of the occurrences on BLM land are subject to the effects of grazing, ORV, transmission projects, mining (CNDDB 2009), and more currently, by potential future energy projects, Energy Commission staff investigated the possibility of off-setting project losses by placing land use restrictions on or enhancing BLM lands which contained one or more of these special-status plants and which were not currently protected as part of the Mojave Preserve or within a Desert Wildlife Management Area (DWMA). However, such a proposed action (land use changes potentially affecting other uses of the land) would trigger a requirement for a separate NEPA analysis. Consequently, this mitigation option would not be timely for this project as it would take considerable time and effort before it was even determined whether such an option was feasible. As summarized in the discussion of enhancements for desert tortoise mitigation: BLM cannot make pre-decisional firm commitments to implement specific actions such as fencing, altering grazing allotments, burro removal, or habitat restoration without conducting a NEPA analysis and providing full public disclosure on the effects of those actions. However, Energy Commission staff and CDFG cannot defer mitigation requirements for compliance with the California Endangered Species Act to a "yet to be completed" NEPA document. A CEQA review might also be needed for some of these enhancement measures.

Transplantation. The general consensus in the scientific community is that transplantation is not a viable strategy for special-status plant mitigation (Howald 1996). A study by CDFG (Fiedler 1991) found that, even under optimum conditions, transplantation was not effective in 85 percent of cases studied. CNPS has an official

policy opposing transplantation (CNPS 1998) as well as one on the appropriate use of ex-situ conservation techniques (CNPS 1992), which summarize numerous reasons why these techniques fail as a mitigation method. Successful transplantation requires information about micro-habitat requirements, reproductive biology, essential pollinators, soil conditions and soil organisms, community relationships, and other critical biological characteristics. This information is typically lacking for most species, and is not available for the special-status plant species impacted by the project. Re-establishment attempts are therefore generally considered experimental in nature rather than an acceptable mitigation practice based on scientific principles and tested methods. Sometimes efforts show early promise but lose viability or decline after the first few years due to one or more of the many factors listed above. For example, although reseeding of Rusby's desert-mallow has been conducted as part of past mitigation efforts and succeed in the short-term, long-term viability of re-established occurrences has yet to be demonstrated (Hiatt et al. 1995, Smith, 2008). Additionally, establishment in the wild of plant material stored ex-situ could result in genetic contamination of existing wild populations of the same or related taxa.

Energy Commission Staff's Recommended Conceptual Avoidance Approach

Energy Commission staff has concluded that reconfiguration of the project footprint within areas that support the highest density and diversity of special-status plants could substantially reduce impacts to special-status plant species. Energy Commission staff has made no recommendations as to the specific reconfiguration that might occur within these areas, but has assumed that some flexibility is available in the alignment of the gas pipeline and in the location of project features such as staging areas within the Construction Logistics Area. Energy Commission staff has also assumed that approximately 365 acres within the 4073-acre footprint is potentially available to establish special-status plant protection areas. As discussed earlier in the Project Description subsection, the project footprint has expanded twice since the ISEGS project application was submitted. The most recent expansion was 365 acres, from 3,700 to 4,065 acres, a result of the applicant proposing the addition of stormwater detention ponds. These ponds have since been eliminated from the applicant's proposal without any adjustment downward in the project area. Energy Commission staff has therefore assumed that the 365 acres gained when the ponds were eliminated could be applied to protecting special-status plants rather than expanding the number of heliostats in the northernmost portion of ISEGS 3 and ISEGS 1, areas that support many special-status plants.

Biological Resources Figure 2 highlights the areas where a diversity of special-status plants occur at particularly high densities, and where avoidance would achieve the greatest possible benefit while minimizing the area of impacts to project operations. In delineating these high density special-status plant areas particular attention was given to protecting Rusby's desert-mallow, desert pincushion, and Mojave milkweed because these species are the rarest and most restricted in their occurrence. These occurrences are shown in **Biological Resources Figure 2**

Biological Resources Figure 2 is color-coded by species, and the point size reflects the size of the locality in terms of the numbers of individual plants. Areas A, B, and C on this figure include:

- Area A: Northernmost Portion of ISEGS 3 and ISEGS 1:
- Area B: Construction Logistics Area
- Area C: Gas Pipeline

Staff's recommended mitigation approach is to protect at least 75% of the individuals of each of the five special-status plant species within the project area (as mapped in Figure 5-3 of the applicant's final botanical survey report [CH2M Hill 2008x]). Staff has concluded that this goal is feasible for desert pincushion, nine-awned pappus grass, and Parish's club cholla by maximizing impact avoidance within the areas of high plant density and diversity as shown in **Biological Resources Figure 2**. This level of protection may not be possible for Rusby's desert-mallow and Mojave milkweed because of the scattered distribution of these species in the project area.

Energy Commission staff's proposed Condition of Certification **BIO-18** (Special-Status Plant Impact Avoidance and Minimization) requires the applicant to minimize disturbance to the extent feasible as described above. This condition also requires development of a special-status plant protection and monitoring plan to be implemented for the life of the project and other measures to minimize impacts to protected special-status plant populations.

Requiring special protection and management of special-status plant occurrences on BLM lands is not a feasible mitigation measure for the ISEGS project, as discussed above. However, Energy Commission staff considers survey efforts and mapping of special-status plant occurrences on acquisition lands to have some value for conservation planning and management purposes. Most of the 3.3 million acres within the NEMO boundaries have not been surveyed for special-status plant species, including those on other public lands. Having information about the location and numbers of special-status plant species would provide useful data for planning actions on all BLM lands within the NEMO, and could also inform management actions for special-status plants occurring within the Mojave National Preserve, DWMAs, or other public lands. Energy Commission staff's proposed Condition of Certification **BIO-18** requires surveys for Rusby's desert-mallow and Mojave milkweed on all lands that will be acquired as part of the desert tortoise compensatory mitigation requirements (Condition of Certification **BIO-17**). Similar surveys would be required desert pincushion, nine-awned pappus grass, and Parish's club-cholla for each of those species that did not meet the 75 percent on-site avoidance goal. The goal of the surveys would be to identify at least the number of occurrences on off-site lands as were impacted by the ISEGS project. If this goal is not met by surveys on proposed acquisition lands, Condition of Certification **BIO-18** requires additional surveys on suitable habitat on BLM lands within the Mojave National Preserve and DWMAs or other public lands until the same number of occurrences of each species that were impacted are identified. This requirement does not serve to reduce the impacts of the ISEGS project to less-than-significant levels, but provides information that might help inform

future siting to avoid additional impacts from other development, and could thus help offset the cumulative impacts of the ISEGS project.

Indirect Effects

Staff has only limited information to assess indirect impacts to special-status plants adjacent to the project boundary because there are no survey data available for this area. Floristic surveys were originally conducted in 2007 to cover the 250-foot buffer zone outside the project footprint, but in 2008 the applicant proposed substantial changes to the ISEGS project and expanded the project into this 250-foot buffer zone. Given the distribution of special-status plants within the project footprint and adjacent habitat characteristics staff is assuming that these same species are likely to occur within the buffer zone, although the specific location and number of these plants is unknown. The discussion below is therefore a conceptual overview of potential indirect impacts to special-status plants.

Indirect effects to special-status plants outside the project boundary include erosion/sedimentation of plants or their seed bank (particularly downslope any disturbed soils); the spread of noxious weeds from the solar fields into the surrounding habitat; changes in the hydrology from alterations in the drainage patterns of the site (several special-status plant species are associated with desert washes); greater than normal dust levels, the effects of herbicide drift on special-status plants and their pollinators; and an increased risk of fire. Even activities as seemingly harmless as dumping or spreading clippings from mowing areas infested by weeds is likely to result in the inadvertent introduction and spread of invasive plants into rare plant populations.

These indirect impacts could extend beyond the immediate vicinity of the project area. Disturbance of the soil's surface caused by construction traffic and other activities would result in increased wind erosion of the soil. Aeolian (wind-borne) transport of dust and sand can result in the degradation of soil and vegetation over a wide area (Okin et al. 2001). Aeolian transport and dust, sand, and litter are the primary mechanisms of degradation, killing plants by burial and abrasion, interrupting natural processes of nutrient accumulation, and allowing the loss of soil resources.

Non-native forms may be introduced or existing weeds spread due to construction and operation of ISEGS. Many invasive non-native species are adapted to and promoted by soil disturbance, and seeds are commonly transported on vehicles and by wind and water. Exotics can out-compete native species because of minimal water requirements, high germination potential and high seed production (Beatley 1966) and can become locally dominant, representing a serious threat to native desert ecosystems (Abella et al. 2008). The ISEGS project could adversely affect special-status plant occurrences near the project area by the increase and spread of non-native plant species. Soil disturbance from construction activity often renders habitat vulnerable to invasion by non-native species (Lathrop & Archibald 1980). Construction activities have the potential to indirectly affect botanical resources through the spread of weeds already present in the construction footprint to currently uninfested areas, and by the accidental introduction of new weed species from contaminated equipment and straw (used for erosion control). The spread of invasive plants is a major threat to biological resources

in the Mojave Desert because non-native plants can displace native plants (and the wildlife that depend on them), increase the threat of wildfire (particularly cheat grass), alter the habitat structure and ecological function of wetland, riparian, and desert wash communities, and invade threaten special-status plant occurrences and habitat (Zouhar et al 2008; Lovich 1998; Lovich et al 1997, Lovich et al 1996).

Implementation of Energy Commission staff's proposed Conditions of Certification **BIO-11** (Impact Avoidance and Best Management Practices) and BIO-13 (Weed Management Plan) could potentially avoid, minimize and compensate for these indirect impacts to special-status plant species on/near the ISEGS site. Energy Commission staff's proposed Condition of Certification **BIO-18** requires pre-construction surveys within the 250-foot buffer beyond the project fenceline, and requires monitoring and protection measures for protected special-status plant populations to minimize indirect impacts.

Conclusion

Uncertainty remains as to what level of avoidance could be achieved to protect special-status plants. The applicant stated at the July 31, 2009 staff workshop that they cannot yet commit to specific avoidance areas because site-specific heliostat layouts have not yet been developed. During that workshop the applicant also indicated a willingness to work with staff to discuss specific avoidance areas and reduce impacts to the extent feasible.

Given the uncertainties as to extent of special-status plant protection that might be feasible, Energy Commission staff has concluded that implementation of proposed Condition of Certification **BIO-18** would reduce impacts to desert pincushion, nine-awned pappus grass, and Parish's club-cholla to less-than-significant levels if the protection goals described above were achieved. The impacts to Mojave milkweed cannot be sufficiently reduced by avoidance in the three areas described above because it is so widely distributed throughout the site. The impacts to Rusby's desert-mallow would also remain significant in a CEQA context because construction would still eliminate a substantial portion of its global population even if the majority of individuals are protected on site.

Staff has also anticipated that the use of polymer-based chemicals for fugitive dust control will require product selection and application methods that will not adversely impact these sensitive plant species within the avoidance areas or impact site vegetation overall. Staff believes it is impractical to use water for dust control after site grading is completed over such a broad area, considering the rapid evaporation rate in the desert environment and limitations in water supply. Therefore, Air Quality Conditions of Certification **AQ-SC3 and AQ-SC-7** and **Soil and Water-1** would require selection and application of chemical dust suppressants that would not adversely affect vegetation.

Impacts/Mitigation to Wildlife - Overview

Vegetation clearing and grading associated with ISEGS construction would directly affect wildlife by removal and crushing of shrubs and herbaceous vegetation, resulting in loss and fragmentation of cover, breeding and foraging habitat. Construction and

operation of ISEGS could also result in wildlife being crushed, entombed in dens or burrows, and colliding with vehicles and power line conductors or towers. In addition, wildlife could experience increased predation levels from ravens and other predators attracted to the project site and could be disturbed by increased levels of noise and activity. These impacts can be reduced with avoidance and minimization measures described in staff's proposed Conditions of Certification **BIO-1** through **BIO-7** and in other conditions of certification. Impacts and mitigation measures for special-status wildlife species are discussed below.

Migratory/Special-Status Bird Species

Mojave creosote bush scrub at the power plant site provides foraging, cover, and/or breeding habitat for migratory birds, including a number of special-status bird species confirmed to be present at the site (golden eagle, burrowing owl, loggerhead shrike, Crissal thrasher and Brewer's sparrow). Power plant construction would eliminate nesting habitat and result in direct and cumulative impacts to these species due to habitat loss or injury/fatality of individuals. Potential cumulative impacts to these species are discussed in more detail later in this section.

The loss of active bird nests or young is regulated by the federal Migratory Bird Treaty Act and Fish and Game Code section 3503. The applicant has proposed mitigation measures to avoid and minimize impacts to nesting birds that have been incorporated into staff's Conditions of Certification **BIO-11** (Impact Avoidance and Best Management Practices), **BIO-15** (Pre-construction Nest Surveys) and **BIO-16** (Burrowing Owl Avoidance and Impact Minimization Measures). Implementation of staff's recommended conditions of certification would avoid direct impacts to nests, eggs, or young of migratory birds, and would minimize the impacts of construction disturbance to nesting birds to less-than-significant levels.

Loss of nesting and foraging habitat for these special-status bird species would adversely affect populations of these species within the Ivanpah Valley. As discussed in the cumulative impact subsection, staff considers the ISEGS project to be a substantial contributor to the cumulative loss of Ivanpah Valley's biological resources, including these special-status bird species. Staff's proposed Condition of Certification **BIO-17**, the compensatory mitigation plan, could offset the loss of habitat for these species and reduce the impact to less-than-significant.

Impacts to Special-Status Mammals

American Badger (Taxidea taxus)

American badgers were detected on the ISEGS site, and the site includes suitable foraging and denning habitat for this species. The American badger is protected under Title 14, California Code of Regulations (sections 670.2 and 670.5), and potential impacts to individuals of this species must be mitigated to less-than-significant levels. Construction of the ISEGS project could kill or injure American badgers by crushing with heavy equipment, or could entomb them within a den. Construction activities could also result in disturbance or harassment of individuals. Condition of Certification **BIO-11** requires that concurrent with the desert tortoise clearance survey, a qualified biologist would perform a preconstruction survey for badger dens in the project area, including

areas within 250 feet of all project facilities, utility corridors, and access roads. If badgers are detected within the fenced ISEGS project site during desert tortoise clearance surveys, the applicant shall develop and implement trapping and relocation plan in consultation with staff and CDFG.

The ISEGS project would permanently remove approximately 4,073 acres of foraging and denning habitat for American badgers and would fragment and reduce the value of foraging and denning habitat adjacent to the project site. This habitat loss and degradation could adversely affect American badger populations within the Ivanpah Valley. As discussed in the cumulative impact subsection, staff considers the ISEGS project to be a substantial contributor to the cumulative loss of Ivanpah Valley's biological resources, including American badgers. Staff's proposed Condition of Certification **BIO-17**, the compensatory mitigation plan, could offset the loss of habitat for this species and reduce the impact to less-than-significant.

Nelson's Bighorn Sheep (Ovis canadensis nelsoni)

Nelson's bighorn sheep are known to occur in the nearby Clark Mountains, and could use the ISEGS project site as foraging habitat and possibly as a migratory corridor (CDFG 2008). The project could reduce the availability of seasonal forage for Nelson's bighorn sheep. The proposed ISEGS project boundaries and security fencing were shifted approximately 130 to 340 feet away from adjacent hills to provide a wildlife corridor (BSE 2007a p. 5.2-54). The applicant acknowledges that Nelson's bighorn sheep could occur in the project area (CH2M Hill 2008a). However, the AFC (BSE 2007a) does not provide sufficient project-specific information on use of the site by Nelson's bighorn sheep to identify specific areas that might provide foraging habitat or movement corridors, nor are studies available detailing use of the Ivanpah Valley by bighorn sheep.

Based on consultation with experts and review of the literature (Wehausen 2009, Jaeger 2009, Jaeger 1994) staff has concluded that construction and operation of the ISEGS project could reduce foraging opportunities for bighorn on the bajada. The project could also narrow the width of movement corridors between Clark Mountain and the Stateline Hills for this species. These direct and indirect impacts would contribute to the cumulative impacts to bighorn sheep in the eastern Mojave Desert. Throughout their range bighorn sheep have suffered considerable population declines in the past 140 years, and metapopulations have been fragmented by roads and other barriers, with a resulting decline in genetic diversity (Bleich et al. 1996, Epps et al. 2005). Disease, sometimes brought about by contacts with domestic sheep, drought and predation interacting with other anthropogenic factors may also have contributed to declines in bighorn sheep populations (Wehausen 2005). Loss of surface water sources may also diminish the viability of existing populations (Wehausen 2005).

Implementation of staff's proposed Condition of Certification **BIO-19** would compensate for the project's contributions to cumulative impacts to bighorn sheep by creation of a new water source in the eastern part of the Clark Mountain range or in the State Line Hills outside of designated wilderness. This artificial water source would attract bighorn sheep and expand foraging opportunities in the lower elevations of the mountains to replace areas of the bajada lost to ISEGS facilities and the zone of disturbance on the

north. This water source would also serve to attract the bighorn during seasonal movements and keep them in the mountainous portion of the wildlife corridor.

The CDFG (CDFG 2008) and others (SCBHS 2009, DOW 2008, 2009a) expressed concerns regarding potential impacts of the ISEGS wells and groundwater pumping on springs used by bighorn sheep. The proposed project includes the installation of two groundwater wells east of Ivanpah 2. Water consumption for all three phases of all three projects is estimated at less than 100 acre-feet/year for the 50-year life of the project (BSE 2007a p. 5.5-17). This level of pumping, combined with all other projects, is not expected to substantially affect overall groundwater recharge in the Ivanpah Valley (BSE 2007a p. 5.15-20). The **Soil & Water** section provides an analysis of this issue, and concludes that the seeps and springs located in the Clark Mountain are ephemeral and located upgradient and over three miles away from the project's proposed pumping wells. The seeps and springs derive their water from precipitation further upgradient in the Clark Mountains and beyond the potential reach of any cone of depression that would result from the project's proposed groundwater pumping. Staff has therefore concluded that the project is unlikely to affect springs and big horn sheep that use these water sources.

Impacts to Special-Status Reptiles

Banded Gila Monster (Heloderma suspectum cinctum)

Gila monsters were not detected during the 2007/2008 surveys, but this species is difficult to detect and cannot be assumed to be absent based on the absence of observations. If Gila monsters are present in the ISEGS project area they may be harmed during clearing, grading and trenching activities or may become entrapped within open trenches and pipes. Construction activities could also result in direct mortality, injury, or harassment of individuals as a result of encounters with vehicles or heavy equipment. Condition of Certification **BIO-11** requires that concurrent with the desert tortoise clearance survey, a biologist perform a preconstruction survey for Gila monsters in the project area, and implement appropriate impact avoidance and minimization measures if detected.

Construction of the ISEGS project would eliminate 4,073 acres that might provide cover, foraging, and breeding habitat for Gila monsters. Condition of Certification **BIO-17**, the compensatory mitigation plan, could offset the loss of habitat for this species and reduce the impact to less-than-significant.

Desert Tortoise (Gopherus agassizii)

Direct Impacts

During construction of the ISEGS project desert tortoises may be harmed during clearing, grading, and trenching activities or may become entrapped within open trenches and pipes. Construction activities could also result in direct mortality, injury, or harassment of individuals as a result of encounters with vehicles or heavy equipment. Other direct effects could include individual tortoises being crushed or entombed in their burrows, collection or vandalism, disruption of tortoise behavior during construction or operation of facilities, disturbance by noise or vibrations from the heavy equipment, and

injury or mortality from encounters with workers' or visitors' pets. Desert tortoises may also be attracted to the construction area by application of water to control dust, placing them at higher risk of injury or mortality. Increased human activity and vehicle travel would occur from the construction and improvement of access roads, which could disturb, injure, or kill individual tortoises. Also, tortoises may take shelter under parked vehicles and be killed, injured, or harassed when the vehicle is moved.

The applicant has recommended impact avoidance and minimization measures to reduce these direct impacts to desert tortoise, including installation of exclusion fencing to keep desert tortoise out of construction areas, relocating/ translocating the resident desert tortoise from the ISEGS site, reducing construction traffic and speed limits to reduce the incidence of road kills and worker training programs.

Staff has incorporated these recommendations into conditions of certification. These include Conditions of Certification **BIO-1** through **BIO-6**, which apply to protection of desert tortoise and other biological resources in and near the ISEGS project area, and Conditions of Certification **BIO-8** through **11**, which are specific to desert tortoise.

Staff's proposed Condition of Certification **BIO-8** would involve installation of security and desert tortoise exclusionary fencing around the entire project site and along access roads, and **BIO-9** recommends the development and implementation of a desert tortoise translocation plan to move the tortoises currently living in the ISEGS project area to the identified translocation sites (CH2M Hill 2009d). Staff's proposed **BIO-10** requires verification that all desert tortoise impact avoidance, minimization, and compensation measures have been implemented. Staff's proposed **BIO-11** recommends a variety of additional impact avoidance and minimization measures to reduce the risk of injury and death to desert tortoise as well as other sensitive species.

Implementation of staff's proposed Conditions of Certification **BIO-8** and **BIO-9** have inherent risks and could themselves result in direct effects such as mortality, injury, or harassment of desert tortoises due to equipment operation, fence installation activities, removal of tortoise burrows, and tortoise translocation. Installation of exclusionary fencing at the perimeter of the project area would also fragment habitat for desert tortoise and home ranges of individual tortoises.

Translocation/Relocation

Capturing, handling, and relocating desert tortoises from the proposed site after the installation of exclusion fencing could result in harassment and possibly death or injury. Tortoises may die or become injured by capture and relocation if these methods are performed improperly, particularly during extreme temperatures, or if they void their bladders. Averill-Murray (2001) determined that tortoises that voided their bladders during handling had significantly lower overall survival rates (0.81-0.88) than those that did not void (0.96). If multiple desert tortoises are handled by biologists without the use of appropriate protective measures, pathogens may be spread among the tortoises, both resident and translocated animals. For those tortoise near but not within the ISEGS site, removal of habitat within a tortoise's home range or segregating individuals from their home range with a fence would likely result in displacement stress that could result

in loss of health, exposure, increased risk of predation, increased intraspecific competition, and death. Tortoises moved outside their home ranges would likely attempt to return to the area from which they were moved, therefore making it difficult to isolate them from the potential adverse effects associated with project construction. Mortality for translocated desert tortoise has been estimated at approximately 15 percent (Sullivan 2008).

The risks and uncertainties of translocation to desert tortoise are well recognized in the desert tortoise scientific community. The Desert Tortoise Recovery Office (DTRO) Science Advisory Committee (SAC) has made the following observation regarding desert tortoise translocations (DTRO 2009, p. 2):

> "As such, consensus (if not unanimity) exists among the SAC and other meeting participants that translocation is fraught with long-term uncertainties, notwithstanding recent research showing short-term successes, and should not be considered lightly as a management option. When considered, translocation should be part of a strategic population augmentation program, targeted toward depleted populations in areas containing "good" habitat. The SAC recognizes that quantitative measures of habitat quality relative to desert tortoise demographics or population status currently do not exist, and a specific measure of "depleted" (e.g., ratio of dead to live tortoises in surveys of the potential translocation area) was not identified. Augmentations may also be useful to increase less depleted populations if the goal is to obtain a better demographic structure for long-term population persistence. Therefore, any translocations should be accompanied by specific monitoring or research to study the effectiveness or success of the translocation relative to changes in land use, management, or environmental condition."

Given the dangers to desert tortoises associated with their translocation, the CDFG, USFWS and other parties (CBD 2009a, DOW 2009b, SC 2009b) have expressed their concerns about the outcome of proposed desert tortoise translocations for the ISEGS project, and have requested that those concerns be addressed in any relocation/ translocation plans approved for the ISEGS project.

To provide guidance for the applicant in addressing these concerns and developing an adequate relocation/translocation plan, on December 12, 2008 the USFWS prepared specific guidelines for clearance and translocation of desert tortoises from the ISEGS project site (USFWS 2008b). The applicant submitted their first Draft Desert Tortoise Relocation/Translocation Plan on March 19, 2009, identifying an area west of the ISEGS project site as a relocation area and lands southwest of the project site, adjacent to I-15, as a translocation area[2]. Staff and USFWS and CDFG provided comments on that submittal (CEC 2009b), requesting considerably more detail on the habitat quality and suitability of the proposed relocation and translocation sites, as well as specific details on the how the translocation would be conducted. The applicant submitted a revised Draft Desert Tortoise Relocation/Translocation Plan on May 27, 2009 in their

[2] *Translocation is required when a desert tortoise must be moved more than 1000 meters to clear it from a project site, while relocation requires a movement of less than 1000 meters (USFWS 20008b).*

Supplemental Data Response Set 2D, Attachment BR5-1B, as part of their Incidental Take Permit application (CH2M Hill 2009i). In this second submittal the applicant identified the area west of the ISEGS site as both potential translocation and relocation areas.

On July 14, 2009 staff, USFWS and CDFG commented on that second relocation/ translocation plan and once again requested additional information on the habitat quality and suitability of the proposed relocation/translocation sites (CEC 2009d). In response to those comments, in July 2009 the applicant conducted surveys for desert tortoise in four potential translocation areas to the west of the Ivanpah SEGS project site (CH2M Hill 2009d). They also undertook field surveys to make a vegetation assessment of areas to the west of the Ivanpah SEGS project and to the southwest of the project, near I-15 (CH2M Hill 2009v). Because the vegetation data were collected during summer and well after the flowering period of most winter and spring annuals the focus of the study was on perennial shrubs and succulents alone.

Four live tortoises and numerous tortoise burrows and carcasses were observed during surveys at four proposed relocation/translocation areas (CH2M Hill 2009d). The applicant's consultants concluded that the density of desert tortoises in the proposed translocation area was low and translocation of animals from the ISEGS site to this area would not overburden the resident population (CH2M Hill 2009d). Based on their vegetation assessment (CH2M Hill 2009v) the applicant also asserted that the relocation areas to the west of the project area had higher shrub and succulent diversity and richness than the ISEGS site itself. Based on the desert tortoise survey result, the applicant concluded that the relocation/translocation sites west of the project site would provide suitable habitat for desert tortoises removed from the ISEGS project area.

Staff and the USFWS have reviewed the applicant's desert tortoise and vegetation survey results for the proposed relocation/translocation sites. The CDFG has not yet provided their assessment of the applicant's recent submittals on desert tortoise survey results and vegetation studies. Staff has determined that the survey and vegetation results are satisfactory, and fulfill expectations regarding assessment of habitat quality at the relocation/translocation site west of the project area (BLM 2009). However, due to the season of these vegetation studies, there was no measure of annuals, the main diet of tortoises, or evaluation of the soils (BLM 2009). BLM staff requested that the applicant provide a habitat assessment based on the USGS desert tortoise habitat model (Nussear et al. 2009). That assessment showed that three of the four proposed translocations sites, as well as all three of the ISEGS units, have excellent desert tortoise habitat potential, ranking as 0.9 on a scale of 1.0 (CH2M Hill 2009u). This ranking is based on the USGS model of desert tortoise habitat potential which incorporates variables encompassing: soil (soil depth, rockiness, bulk density); landscape (surface roughness, slope, aspect, elevation); climate (winter and summer precipitation, variance of precipitation); and biotic (annual plant potential and perennial plant cover) (Nussear et al. 2009).

Staff at the Ventura USFWS office also reviewed the applicant's submittals and considered the desert tortoise surveys and vegetation data adequate to evaluate the effects of the relocation of desert tortoises to the applicant's proposed

translocation/relocation sites (USFWS 2009). The USFWS also expressed the opinion that highway fencing along I-15 was needed prior to translocation because of the potential for long-distance movements by tortoise following release (USFWS 2009).

Staff's proposed Condition of Certification **BIO-9** requires development of a final Desert Tortoise Translocation Plan in consultation with staff, CDFG and USFWS to address outstanding concerns that these agencies have regarding the specifics of the plan. Now that a satisfactory translocation site has been identified, staff concludes that implementation of this condition would minimize harm to desert tortoise during relocation and translocation activities associated with construction of the ISEGS project.

Habitat Loss and Compensatory Mitigation

One of the most substantial direct effects of the ISEGS project on desert tortoise is loss of approximately 4,073 acres of occupied habitat and fragmentation and disturbance to adjacent habitat. Compensatory mitigation is required to offset this significant impact and to fully mitigate for desert tortoise. Compensatory mitigation for desert tortoise typically involves balancing the acreage of habitat loss with acquisition of lands that would be permanently protected and enhanced to support healthy populations of desert tortoise. The compensation comes about by improving the carrying capacity of the acquired property so that more desert tortoise will survive and reproduce on these lands, thus offsetting over time the decrease in numbers of tortoise resulting from the habitat loss.

For the acquisition of mitigation lands to truly compensate for the habitat loss and to make up for the numbers of desert tortoise that would otherwise have been supported by that habitat, the acquisition must be accompanied by: (1) permanent protection and management of the lands for desert tortoise, and (2) enhancement actions. The permanent protection is essential because that allows the lands to be managed in a way that excludes multiple threats and incompatible uses (grazing, off-highway vehicle use, roads and trails, utility corridors, military operations, construction, mining, grazing by livestock and burros, invasive species, fire, and environmental contaminants). Without this protection and management the desert tortoise populations on the acquired lands would be subject to the same threats that led to its population declines and threatened status. An equally important component is the implementation of enhancement actions to improve desert tortoise survival and reproduction. These actions might include habitat restoration, weed control, road closures or road fencing, reducing livestock and burro grazing, and controlling ravens and other predators. Without permanent protection and enhancement actions on lands acquired for mitigation, the result would be a net loss for desert tortoise populations.

To adequately offset habitat loss CDFG usually requires a mitigation ratio greater than 1:1 for compensation lands (i.e., acquisition of one acre of compensation lands for every acre lost), and typically uses a 3:1 ratio for good quality habitat such as that found at the ISEGS project site. The higher ratio reflects the limits to increases in carrying capacity that can be achieved on the acquired lands, even with implementation of all possible protection and enhancement measures. Depending on the quality of the habitat that is lost and the habitat conditions of the land that is acquired, it is difficult to sufficiently increase the carrying capacity of the acquisition lands to completely offset habitat loss without relying on additional acreage to boost the numbers of desert tortoise that can be

supported on the mitigation lands. The BLM applies a 1:1 compensation ratio because they pursue desert tortoise recovery goals not through parcel by parcel acquisitions and management, but rather through implementation of region-wide management plans and land use planning as described in the NEMO, the California Desert Conservation Act plan, and the Desert Tortoise Recovery Plan (USFWS 1994).

Energy Commission staff proposes habitat compensation at a 3:1 ratio for loss of desert tortoise habitat through land acquisitions or an assessed financial contribution based on the final construction footprint. This mitigation ratio is consistent with past Energy Commission mitigation requirements for projects with impacts to desert tortoise (for example, High Desert Power Plant Project and the Victorville 2 Hybrid Power Project), staff's recommended mitigation as stated in the Final Staff Assessment for the Beacon Solar Energy Project, and with Incidental Take Permits issued by CDFG for other non-Energy Commission jurisdiction projects in the region. The 3:1 ratio has also been proposed by the applicant (Ellison, Schneider & Harris LLP 2009).

State Desert Tortoise Mitigation Requirements

To satisfy CDFG's full mitigation standard and to comply with requirements of a state Incidental Take Permit for desert tortoise, the proposed mitigation must meet certain criteria described in Title 14 CCR, Sections 783.4(a) and (b). These criteria include requirements that the proposed mitigation would be capable of successful implementation and that adequate funding is provided to implement the required mitigation measures and to monitor compliance effectiveness of the measures. In meeting these requirements the CDFG typically requires and the Energy Commission would require that lands acquired for mitigation purposes for a listed species be managed and protected in perpetuity for the benefit of that species. The CDFG has not yet provided their recommendation on appropriate compensatory mitigation for desert tortoise habitat loss, therefore staff is relying on CDFG guidance from past Energy Commission projects to develop a compensatory mitigation approach that fulfills the state's full mitigation standard while integrating the applicant's proposed mitigation contributions.

BLM Desert Tortoise Mitigation Requirements

This desert tortoise mitigation approach for the ISEGS project must satisfy BLM's policies for lands within the Northern and Eastern Mojave Planning Area (BLM 2002). No law, regulation, policy or plan would permit BLM to require assessing more than a 1:1 compensation ratio for habitat that lies outside of Desert Wildlife Management Areas (DWMA) such as the ISEGS site. BLM's mitigation requirements for desert tortoise are described in *Appendix A: Desert Tortoise Conservation Strategy: Section A.7. Management Actions in Desert Tortoise Habitat Outside ACECS* (BLM 2001, p. A-16), which specify:

> "Compensation shall be required by BLM for disturbances of desert tortoise habitat at the rate of 1 acre for each acre disturbed; this is the same as the current requirement in BLM's Desert Tortoise Statewide Management Policy. Funds collected from project proponents shall be directed to habitat enhancement, rehabilitation or acquisition in the Eastern Mojave Recovery Unit. Proponents may also implement enhancement or rehabilitation projects or donate lands directly, at BLM discretion."

Integrating State and BLM Desert Tortoise Mitigation

The ISEGS project is the first to be processed under a joint, coordinated review by the Energy Commission and BLM; integrating desert tortoise mitigation requirements that would satisfy policies and requirements of both agencies is a complex undertaking that is not yet complete. The CDFG and BLM have made substantial progress toward developing a mitigation framework that would work for both state and federal agencies, as described in a July 23, 2009 letter from BLM California Acting State Director James Abbot to CDFG Deputy Director Kevin Hunting (BLM 2009). This letter indicates that the BLM mitigation ratio of 1:1 would be applied within the mitigation ratio required by CDFG. The following issues must be addressed in developing the final desert tortoise compensatory mitigation package that jointly satisfies both the state and BLM policies and requirements:

1. Security and Per Acre Mitigation Fee

Energy Commission staff's proposed Condition of Certification **BIO-17** specifies compensatory mitigation for desert tortoise habitat loss at a 3:1 ratio, and BLM has proposed nesting their 1:1 mitigation requirement within this framework. The Energy Commission staff's condition of certification requires a security for funding two-thirds of their mitigation requirement. BLM would likely require the project owner to provide a deposit to be held in a BLM-managed contributed funds account based on the area of ground disturbance as determined by the final project footprint.

To satisfy section 2081 of the California Endangered Species Act the applicant must provide financial assurances to guarantee that an adequate level of funding is available to implement all impact avoidance, minimization, and compensation measures described in the desert tortoise conditions of certification. These financial assurances are generally provided in the form of an irrevocable letter of credit, a pledged savings account or another form of security prior to initiating ground-disturbing project activities. For the BLM, a cash payment (proffer) is made prior to initiating ground-disturbing activities. The Energy Commission staff's conditions of certification typically specify the dollar amount of the security. This security amount is calculated by multiplying the acreage of the impact area by the total per acre costs, a figure which represents the sum of the costs required for: (1) land acquisition, (2) initial habitat improvements, and (3) an endowment to support long-term management of the acquired lands.

The latter cost for the long-term management endowment is typically the largest component of the mitigation fee. Interest from the endowment creates a funding source that provides enough income to cover annual stewardship costs on the acquired lands and includes a buffer to offset inflation. The amount for the endowment is established by a Property Analysis Record (PAR), a computerized database methodology developed by the Center for Natural Lands Management (<www.cnlm.org/cms>) which calculates the costs of land management activities for a particular parcel. These activities include development of a desert tortoise management plan tailored for each parcel of mitigation land to assess habitat status, identify desired conditions, and develop plans to achieve conditions that would best support desert tortoise. Once the management plan is developed and approved by the appropriate resource agencies, implementation of enhancement actions such as fencing, road closure, weed control, habitat restoration as

well as monitoring can begin. The goal of these activities is to increase the carrying capacity of the acquired lands for desert tortoise and increase their population numbers by enhancing survivorship and reproduction.

Funding for the initial habitat improvements supports those actions needed immediately upon acquisition of the property to secure it and remove hazards. These activities might include fencing or debris clean-up, or other urgent remedial action identified prior to when the parcels were acquired. When the management plan is completed for the acquired parcel activities like these are thereafter funded from the interest produced by the long-term management endowment described above.

In contrast to CDFG's mitigation approach, BLM does not require an endowment fee or creation of a management plan to undertake habitat improvements on the acquired mitigation lands. However, guidelines for BLM stewardship and enhancement actions to protect and enhance habitat for desert tortoise are provided by the NEMO and the CDCA Plan. The BLM also undertakes all feasible management actions recommended by the Desert Tortoise Recovery Plan (USFWS 1994) on their lands. Similarly, the National Park Service utilizes its General Management Plan for the Mojave National Preserve (2001) to guide management of acquired lands.

Energy Commission staff's proposed Condition of Certification **BIO-17** specifies acquisition of 8,146 acres and provides an estimate of associated costs. These costs include acquisition fees of $910 per acre, a figure that reflects land sale costs over the past three years for parcels in unincorporated San Bernardino County (CDFG 2009a). In addition, based on guidance from CDFG on past power plant siting projects, initial habitat improvement costs (for example, fencing, debris removal) are estimated at $250/acre. The long-term management endowment is estimated at $1,350/acre based on a Property Analysis Records from past Energy Commission projects. The estimated composite mitigation cost to meet Energy Commission staff's recommendation for establishing the security would be $2,510/acre. Energy Commission staff has recommended in proposed Condition of Certification **BIO-17** that the applicant's financial responsibility for the actual cost of mitigation shall not increase by more than 25 percent of the Security Amount.

BLM proposes compensatory mitigation at a 1:1 ratio, consistent with their guidance from NEMO. BLM has indicated that the current per acre mitigation fee established by the BLM California State Director should be updated to reflect current land value and recent purchase prices (BLM 2009). BLM will work with CDFG and the applicant to establish an updated value (BLM 2009). Until a land value is re-evaluated, BLM would likely continue to use $500/acre for acquisition of lands in the Eastern Mojave Recovery Unit, and this per acre fee is consistent with prices for land sales in the Eastern Mojave (CDFG 2009a). Other per acre costs would include an additional 15 percent acquisition cost, a 17.1 percent indirect cost rate (2009 rate), as well as funding for appraisals, environmental site assessments, property cleanup, and an inflation contingency. The BLM's first priority for land acquisition would be private lands outside of the Mojave Preserve that are within the Desert Wildlife Management Area (DWMA) portion of the Eastern Mojave Recovery Unit. Remaining funds would be spent acquiring private lands within the Mojave National Preserve and on additional management and enhancement projects that would benefit the desert tortoise. BLM staff will develop the specifics of

desert tortoise acquisition and enhancement actions in collaboration with Energy Commission staff, CDFG and USFWS in accordance with guidance in the Desert Tortoise Recovery Plans (USFWS 1994, 2008a).

Energy Commission staff have concluded that the combination of the 2:1 compensatory mitigation, as described in staff's proposed Condition of Certification **BIO-17**, and the BLM 1:1 mitigation described conceptually above, would meet CESA's full mitigation standard and would mitigate CEQA impacts to desert tortoise to less-than-significant levels. Staff considers the combination of these two mitigation approaches to be a complementary and complete mitigation package that would achieve 3:1 mitigation and would satisfy state and federal requirements for mitigating impacts to desert tortoise.

CDFG has not yet provided formal guidance describing their requirements for satisfying CESA other than to convey verbally to staff that they would concur with a combined 3:1 mitigation package for desert tortoise. Staff is not making any assumptions as to whether CDFG would concur with the Energy Commission staff's calculation of security costs (acquisition costs, initial habitat improvement, and long-term management endowment), or whether CDFG would concur with including BLM's proposed mitigation approach as part of the complementary mitigation package to satisfy CESA's full mitigation standard. However, the calculations for security are consistent with past CDFG guidance on Energy Commission projects that included an Incidental Take Permit, and staff believes that CDFG would find this approach acceptable.

2. "In Perpetuity" Protection for Acquired Mitigation Lands

Historically, the Energy Commission staff and CDFG typically do not accept land acquisition as adequate mitigation for impacts to endangered species unless the lands can be maintained and protected in perpetuity for the benefit of those species. For most BLM lands their multiple use mandate restricts their ability to designate land solely for conservation purposes and to exclude potentially incompatible development and activities. That in-perpetuity protection requirement for BLM mitigation lands is likely to be satisfied by buying private in-holdings within BLM's Desert Wildlife Management Areas (DWMAs) or Mojave National Preserve, so that the surrounding protective land management would prevail. For the Energy Commission mitigation lands, CDFG or an appropriate conservation organization would own, protect and manage the lands to ensure permanent protection.

If other lands were acquired that were not within such protected areas, BLM would need to provide some sort of assurances as to the long-term protection of those lands for desert tortoise if these lands are to be counted as fulfilling part of CESA's full mitigation standard. To address this issue BLM has recently indicated that deed restriction language approved by the Department of Justice could possibly be included in the deeds for lands acquired for project mitigation and donated to BLM for long-term management to meet BLM mitigation requirements (BLM 2009). BLM has also indicated that for any land enhancement actions or recovery actions implemented on existing BLM-owned lands as part of mitigation for ISEGS, BLM would develop a Memorandum of Understanding (MOU) with CDFG containing provisions for notification of any proposed projects affecting those lands (BLM 2009). The BLM agreed that future projects authorized on these mitigation lands that might degrade or diminish the desert tortoise recovery value of this mitigation would be compensated at a higher rate (BLM

2009). More specific information would be needed on how this deed restriction for acquired lands and MOU for existing public lands might work before Energy Commission staff could conclude that such restrictions would provide sufficient assurances for long-term protection of mitigation lands.

3. Location of Acquired Mitigation Lands

CDFG and BLM differ in the regional scope of areas that they could consider for potential acquisition lands. While both agencies agree that the mitigation lands should be as close to the ISEGS site as possible, ideally in the Ivanpah, Shadow, and/or Piute Valley areas, CDFG is willing to consider acquisition of mitigation lands that occur in the West Mojave Desert area. BLM can only acquire lands within the Eastern Mojave Recovery Unit as described in BLM's Northern and Eastern Mojave Desert Management Plan (BLM 2001). BLM has expressed concern that limited private in-holdings are available in this area and that they would be unable to secure 4,073 acres to meet their requirement. BLM could not consider acreage acquired outside of the Eastern Mojave Recovery Unit as contributing to fulfillment of their mitigation requirement.

BLM will target acquisition of private inholdings within the DWMA portions of the Eastern Mojave Recovery Unit and the Mojave National Preserve. The balance of the mitigation funds remaining after land acquisition would primarily fund implementation of recovery actions jointly recommended by BLM, CDFG and the USFWS (BLM 2009), as described below.

4. Enhancement Actions Other Than Land Acquisition

The USFWS recovery plans for desert tortoise (USFWS 1994, USFWS 2008a) describe actions in addition to land acquisition that could reduce threats to desert tortoise populations. Some of these actions include habitat restoration and weed control, eliminating livestock and burro grazing, fencing to exclude livestock and vehicles or reduce the incidence of roadkill, controlling tortoise predators such as ravens, feral dogs and coyotes, as well as increased law enforcement, signage and education. Staff agrees that fencing, retirement of grazing allotments, removal of burros, and habitat restoration show considerable promise as actions that could increase desert tortoise survivorship and reproduction on the remaining habitat in the Ivanpah Valley. The control of ravens shown to be predators on juvenile desert tortoises is also a particularly effective recovery action.

Despite concurrence among staff as to the benefits of these recovery actions, there are formidable challenges to requiring enhancement actions like these in staff's conditions of certification. BLM cannot make pre-decisional firm commitments to implement specific actions such as fencing, altering grazing allotments, burro removal, or habitat restoration without conducting a NEPA analysis and providing full public disclosure on the effects of those actions. BLM can contribute funds to the Fish and Wildlife Service program of raven control without additional review. However, Energy Commission staff and CDFG cannot defer mitigation requirements for compliance with the California Endangered Species Act to a "yet to be completed" NEPA document.

The specifics of the enhancement actions would be consistent with direction from the NEMO, CDCA plan, and the Desert Tortoise Recovery Plans (USFWS 1994, 2008a). BLM and USFWS will collaborate with Energy Commission staff and CDFG in the development of desert tortoise enhancement actions.

5. Mitigation Compliance Monitoring

Mitigation measures in staff's recommended conditions of certification must be specific and enforceable with a process in place to monitor mitigation compliance and take action to remedy non-compliance. For land acquisitions, BLM, CDFG and the Energy Commission have well developed and transparent procedures to track expenditures and acquisitions. However, a mechanism is needed to verify fulfillment of enhancement actions such as fencing or habitat restoration on BLM lands, and provide a process for compliance monitoring to determine if the actions are being implemented as required by the conditions of certification. For mitigation other than land acquisition, BLM and Energy Commission staff will work together to develop a process that allows tracking and verification of enhancement actions for desert tortoise.

Staff anticipates resolution of all of these issues in the near future, and will work closely and cooperatively with USFWS, CDFG, and the applicant to finalize a mitigation and enhancement plan that would offset the significant habitat loss and indirect impacts to desert tortoises associated with construction and operation of the ISEGS project.

Indirect Effects

The indirect effects of the ISEGS project include loss of forage, nesting sites, and cover sites, the potential replacement of native with non-native plant species, loss of dispersal areas and connectivity to other areas, contracted home ranges, and increased risk of predation by predators attracted to the area by increased human activity. Each of these impacts is discussed in more detail below.

Ravens, Coyotes, and Other Predators

Human activities in the ISEGS project area potentially provide food or other attractants in the form of trash, litter, or water, which draw unnaturally high numbers of tortoise predators such as the common raven, kit fox, and coyote. Common raven populations in some areas of the Mojave Desert have increased 1,500 percent from 1968 to 1988 in response to expanding human use of the desert (Boarman 2002). Since ravens were scarce in this area prior to 1940, the current level of raven predation on juvenile desert tortoises is considered to be an unnatural occurrence (BLM 1990, USFWS 2008a).

In addition to ravens, feral dogs have emerged as major predators of the tortoise. Dogs may range several miles into the desert and have been found digging up and killing desert tortoises (USFWS 1994; Evans 2001). Dogs brought to the project site with visitors may harass, injure, or kill desert tortoises, particularly if allowed off leash to roam freely in occupied desert tortoise habitat. The worker environmental awareness training (**BIO-6**) and restrictions on pets being brought to the site required of all personnel (**BIO-11**) would reduce or eliminate the potential for these impacts.

Construction and operation of the ISEGS project would increase raven and coyote presence in the project area. Ravens depend on human encroachment to expand into areas where they were previously absent or in low abundance. Ravens habituate to human activities and are subsidized by the food and water, as well as roosting and nesting resources that are introduced or augmented by human encroachment. The Ivanpah Valley currently includes several unauthorized public and open community dumps (BLM 2001), and the casinos at Primm (4.5 miles from ISEGS) and the Primm Valley Golf Club (0.5 miles from ISEGS) provide food, water features, and roosting/nesting substrates (buildings, signs, lamps, and utility poles) that otherwise would be unavailable. This development adjacent to the proposed ISEGS provides year-round water and trash subsidies for the raven as well as nesting opportunities.

Small mammal, fox, coyote, rabbit, lizard, snake, and tortoise road kill along I-15, Nipton Road, Yates Well Road, Colosseum Road, and other local roads provides an additional attractant and subsidy for opportunistic predators/scavengers such as ravens. Road kills would mount with increased ISEGS construction and operations traffic, further exacerbating the raven/predator attractions and increasing desert tortoise predation levels.

The ISEGS area is already subject to elevated raven predation pressure and any cumulative loss of juvenile tortoise due to the further addition of raven subsidies could have a long-term effect on the Ivanpah tortoise population by reducing the recruitment of juvenile tortoises into the adult life stages (Boarman 2003). The effects of this shortage may not be apparent for years because tortoises do not typically reach sexual maturity until approximately 15 to 20 years of age.

To reduce the impacts of increased raven presence at the ISEGS project site, the applicant has prepared a draft Raven Management Plan (CH2M Hill 2008f) and has recommended additional avoidance and minimization measures. Staff has incorporated these recommendations with proposed Conditions of Certification **BIO-11** and **BIO-12,** which would minimize the effects of increased predation on the Ivanpah Valley population of desert tortoise. The USFWS is currently developing a raven management plan that would address some of these potential impacts on a regional basis (Croft 2008) and which would implement recommendations in the USFWS *Environmental Assessment to Implement a Desert Tortoise Recovery Plan Task: Reduce Common Raven Predation on the Desert Tortoise* (USFWS 2008). This USFWS regional raven management plan will be integrated with staff's conditions of certification if that plan is completed in time.

Increased Risk from Roads/Traffic

Vehicle traffic would increase as a result of construction and improvement of access roads, increasing the risk of injuring or killing desert tortoise. During the month-long time period in which the ISEGS workforce is at its largest, an estimate of the average daily traffic would include 39 transport buses and 192 personal vehicles (BSE 2007a). Likewise during this time period, the average total of construction truck traffic would be approximately 145 vehicles per day. For all other periods during construction (and to a much greater extent during operations and maintenance activities) daily average vehicle activity would be far less.

The potential for increased traffic-related tortoise mortality is greatest along paved roads where vehicle frequency and speed is greatest though tortoises on dirt roads may also be affected depending on vehicle frequency and speed. Census data indicate that desert tortoise numbers decline as vehicle use increases (Bury et al. 1977) and that tortoise sign increases with increased distance from roads (Nicholson 1978). Additional unauthorized impacts that may occur from casual use of the access roads in the project area include unauthorized trail creation.

To minimize the risks of increased traffic fatality and other hazards associated with roads at the ISEGS project site, the applicant has proposed a variety of minimization measures which staff has incorporated into Condition of Certification **BIO-11**. These measures include confining vehicular traffic to and from the project site to existing routes of travel, prohibiting cross country vehicle and equipment use outside designated work areas, and imposing a speed limit of 20 miles per hour on Colosseum Road and other dirt access routes within desert tortoise habitat.

Dust

Disturbance of the soil's surface caused by construction traffic and other activities would result in increased wind erosion of the soil. Aeolian transport of dust and sand can result in the degradation of soil and vegetation over a widening area (Okin et al. 2001). Dust can have deleterious physiological effects on plants and may affect their productivity and nutritional qualities. The destruction of plants and soil crusts by windblown sand and dust exacerbates the erodibility of the soil and accelerates the loss of nutrients (Okin et al. 2001). Soil erosion from construction activities and vehicle activity, which affects vegetation and soil properties, could have an adverse effect on both tortoise foraging and burrowing potential to lands outside of the ISEGS boundaries. The impacts of increased dust and other construction impacts can be minimized with implementation of Condition of Certification **BIO-11**, and with Air Quality Conditions of Certification **AQ-SC3 and AQ-SC-7** and **Soil and Water-1** that would require selection and application of chemical dust suppressants that would not adversely affect vegetation.

Impacts to Waters of the State/United States

The many ephemeral drainages in the project area provide beneficial functions and values such as groundwater recharge, flood peak attenuation and floodwater storage, and wildlife habitat. As discussed in the **Soil & Water** section most of these functions would remain relatively unimpaired by construction and operation of the ISEGS project because of the Low Impact Development approach (CH2M Hill 2009l). Solar field development would maintain sheet flow where possible with water exiting the site in existing natural contours and flows. The majority of the project site would maintain the original grades and natural drainage features (CH2M Hill 2009l). Existing small to moderate ephemeral washes would remain intact at locations capable of being traversed by installation equipment. Large ephemeral washes would be graded at road crossings to the extent necessary to provide equipment access (CH2M Hill 2009l). In areas such as the power blocks and substation, administrative areas a storm drainage system would be designed using diversions channels, by-pass channels, or swales to direct run-on flow from up-slope areas, and run-off flow through and around each facility (CH2M Hill 2009l).

Stormwater would be allowed to sheet flow across roads. An “Irish Bridge” or low-water crossing would be constructed where permanent asphalt paved access roads cross major ephemeral washes on the site (CH2M Hill 2009l). These bridges would be constructed of reinforced concrete or gabion baskets, would generally conform to the cross-sectional dimensions of the channel, and are being designed to prevent the scour and washout of major asphalt access roads during storm events (CH2M Hill 2009l). When necessary, offsite stormwater drainage would be collected using a system of swales, berms, and existing ephemeral washes to control and direct stormwater through and around the ISEGS site (CH2M Hill 2009l).

The applicant estimated the extent of temporary and permanent impacts to project area ephemeral drainages by multiplying the average width of the five size categories of ephemeral drainages by the length of the estimated impact for all project features (CH2M Hill 2009l). The permanent impacts to the drainage crossings were assumed to be the width of the road or path that crosses it. To estimate temporary impacts of roads the applicant assumed a total of 20 feet of upstream and 20 feet of downstream impact for a maximum temporary construction area of 40 feet. Areas that could not be revegetated within one year, such as those in the Construction Logistics Area, were considered permanent impacts (CH2M Hill 2009l).

Heliostats would be installed throughout the ISEGS solar fields, including in ephemeral drainages. Staff requested estimates of the extent of impacts to ephemeral drainages for heliostats placed within desert washes; the applicant noted that the project was still in the preliminary design phase and plans for heliostat installation were still conceptual, but that they assumed that the pile driver and cranes used to install the mirrors would use the same 10-foot-wide maintenance path as the mirror washing machines (CH2M Hill 2009l).

Based on the assumptions described above, staff has summarized the extent of direct impacts to ephemeral drainages in **Biological Resources Table 4**

Biological Resources Table 4
Impacts to Ephemeral Drainages from Project Features

Project Feature	Amount	Linear Impacts[4] (feet):	Impact Area (acres)
30-foot-wide asphalt roads (including 3-foot shoulder)	**Amount**	**11,639**	**---**
	Temporary[1]		**0.995**
	Long-term[2]		**0.5**
	Permanent[3]		**1.346**
24-foot-wide asphalt roads	**Amount**	**4,433**	**---**
	Temporary		**0.13**
	Long-term		**0.31**
	Permanent		**0.059**
15-foot-wide dirt roads	**Amount**	**2,022**	**---**
	Temporary		**0**
	Long-term		**0.192**
	Permanent		**0**
12-foot-wide dirt roads	**Amount**	**16,171**	**---**
	Temporary		**0.154**
	Long-term		**2.19**
	Permanent		**0.113**
12-foot-wide rerouted trails	**Amount**	**1,194**	**---**
	Temporary		**0**
	Long-term		**0.061**
	Permanent		**0.188**
12-foot-wide gravel road	**Amount**	**487**	**---**
	Temporary		**0**
	Long-term		**0**
	Permanent		**0.028**
10-foot-wide heliostat maintenance paths	**Amount**	**154,800**	**---**
	Temporary		**0**
	Long-term		**21.57**
	Permanent		**0**
10-foot-wide heliostat arrays	**Amount**	**158,285**	**---**
	Temporary		**21.8**
	Long-term		**0.031**
	Permanent		**0**
Natural gas line corridor	**Amount**	**7,380**	**---**
	Temporary		**0.939**
	Long-term		**0**
	Permanent		**0**
Gas and water utility lines	**Amount**	**1,126**	**---**

Project Feature	Amount	Linear Impacts[4] (feet):	Impact Area (acres)
	Temporary		**0.215**
	Long-term		**0.19**
	Permanent		**0**
Metering sets	**Amount**	**80**	**---**
	Temporary		**0**
	Long-term		**0.005**
	Permanent		**0**
Power blocks, diversion channels and berms	**Amount**	**17,177**	**---**
	Temporary		**0**
	Long-term		**1.284**
	Permanent		**0.15**
Gen-tie lines and towers	**Amount**	**0**	**---**
	Temporary		**0**
	Long-term		**0**
	Permanent		**0**
Administration/Maintenance Building	**Amount**	**3,618**	**---**
	Temporary		**0**
	Long-term		**0.444**
	Permanent		**0**
Substation	**Amount**	**4,670**	**---**
	Temporary		**0**
	Long-term		**0**
	Permanent		**0.572**
Construction laydown, staging and stockpiling	**Amount**		**---**
	Temporary		**2.674**
	Long-term		**0**
	Permanent		**0**
Perimeter fence installation	**Amount**	**0**	**---**
	Temporary		**76**
	Long-term		**0**
	Permanent		**0**
TOTAL DREDGE AND FILL IMPACTS	Amount	383,082	
	Temporary		26.91
	Long-term		26.78
	Permanent		2.46

Source: CH2M Hill 2009w, Table 5

NOTES:

[1] Temporary impacts are associated with construction activities, and these areas will be restored upon completion of construction.

[2] Long-term impacts continue for the duration of Project operations, which is estimated at approximately 50 years. At Project decommissioning, these areas will be rehabilitated and revegetated.

[3] Permanent impacts are associated with roads and structures that will remain following Project closure.

[4] Note that linear distances are likely overestimated since there is redundancy among values for temporary, long-term, and permanent impacts.

The applicant estimates that 37.66 acres would be the total extent of impacts to the project site's ephemeral drainages. Staff considers this to be a substantial underestimate of the impacts that are likely to occur to drainages during construction and operation. Staff believes it is unlikely that disturbance associated with heliostat installation could be feasibly limited to the footprint of a 10-foot wide maintenance path. In addition, mowing of vegetation to a 12 – 18 inch height beneath the heliostats within drainages during construction and operations would add considerably to the extent of impacts. Staff further considers any drainage that is accessible to construction vehicles to be potentially vulnerable to disturbance, unless the applicant is able to establish fencing at all the proposed road crossings on all the ephemeral drainages and ensure that construction traffic is limited to those crossings. After major storm events many of the road crossings would be likely to require reconstruction, particularly on the stream banks where soil has been disturbed as a result of grading to make ingress and egress more level. As maintenance paths and roads develop washouts, and maintenance workers are likely to seek wider routes to avoid rough spots, enlarging the original footprint of the roads. Considering the vast network of paths and roads proposed in the solar fields even small incremental widenings would amount to an ongoing degradation of ephemeral streams.

Staff concludes that all 198 acres of the ephemeral drainages on the ISEGS project area are potentially vulnerable to soil and vegetation disturbance as a result of road building, installation of heliostats, construction of power blocks and other project features, prolonged use of the construction logistics area, construction of linear facilities, as well as ongoing vegetation maintenance, weed control, and other maintenance activities associated with project operation. These drainages currently support undisturbed native plant communities that help stabilize stream banks and provide valuable wildlife habitat and wildlife movement corridors. Energy Commission staff considers impacts to the project area drainages to be significant because the ISEGS project would fragment and degrade the beneficial functions and values that these state waters provide to wildlife.

Staff's proposed Condition of Certification **BIO-20** specifies that, in addition to minimizing impacts to drainages where feasible, the applicant acquire and enhance property that includes 198 acres of ephemeral drainages similar to those on the ISEGS site. This mitigation could be integrated with the desert tortoise mitigation requirement for acquisition and enhancement of suitable desert tortoise habitat. With implementation of this proposed condition of certification impacts to the project area's ephemeral drainages would be reduced to less-than-significant levels.

Spread of Noxious Weeds

Construction activities and soil disturbance could introduce new noxious weeds to the ISEGS site and linear facilities, and could further spread weeds already present in the project vicinity. The spread of invasive plants is a major threat to biological resources in the Mojave Desert because non-native plants can displace native plants, increase the thread of wildfire, and supplant wildlife foods that are important to desert tortoise and other herbivorous species. The weeds of highest concern in the general area include

Sahara mustard and salt cedar (CH2M Hill 2008). Red brome and other ubiquitous weeds are also present; however, because of the widespread nature of these weeds, control is considered impracticable.

To avoid and minimize the spread of existing weeds and the introduction of new ones, an active weed management strategy and control methods must be implemented. The applicant has provided a detailed Weed Management Plan (CH2M Hill 2008e) to avoid and minimize the adverse effects of noxious weeds. Staff concurs with the recommendations in the applicant's weed management plan, and has incorporated it into staff's proposed Condition of Certification **BIO-13**. The Weed Management Plan includes a discussion of weed eradication and control methods, preventative measures to be implemented during construction (for example, limiting the size of disturbance, establishing wash stations for construction vehicles, using only weed-free products for erosion control) and long-term reporting requirements.

Noise

Noise from construction activities could temporarily discourage wildlife from foraging and nesting immediately adjacent to the project area. Many bird species rely on vocalization during the breeding season to attract a mate within their territory. Noise levels from certain construction, operations, and demolition activities could reduce the reproductive success of nesting birds. The expected loudest composite noise levels are approximately 89 dBA at 50 feet from the activity, which results in noise levels of approximately 77 and 61 dBA at distances of 200 and 400 feet from the activity, respectively (BSE 2007a). The construction period is relatively short, about 20 months per phase, and wildlife usually becomes habituated to ongoing general construction noise. Weisenberger et al. (1996) found that bighorn sheep responded to aircraft over-flights with increased heart rates and altered behavior; however, animal response decreased with increased exposure. In general, nearly all equipment would be specified to have near-field maximum noise levels that do not exceed 90 dBA at 3 feet from the activity (or 85 dBA at 3 feet where available as a vendor standard) to limit the noise exposure of plant personnel to acceptable levels. As a result of these design features, the temporary nature of these activities, and the adherence to noise reducing mitigation measures, the noise levels at the project fence line are not expected to have any substantial impact on nearby wildlife resources.

Operation Impacts and Mitigation

Potential operation impacts include impacts to birds due to collision with structures, risk of burns to birds that fly into the reflected sunlight between the heliostats and the power towers, and effects of disturbance and lighting. Operational impacts to desert tortoise impacts and other special-status wildlife species from increased road traffic, noise, and disturbance, and impacts to vegetation including special-status plants from dust and spread of noxious weeds, was addressed above in the subsection on special-status species.

Lighting, Collisions and Electrocution

Birds are known to collide with communications towers, transmission lines and other elevated structures. The ISEGS project design would result in the construction of 7 power towers 312 feet in height, 5 power towers 459 feet in height, and 3 boiler stacks

131 feet in height. Numerous other project-related structures lower in height would also be constructed. The heliostat array at Ivanpah 1 and 2 would be arranged around a single centralized solar power tower, and for Ivanpah 3 arranged around five power towers, each 459 feet high. These towers would include FAA required lighting and a lightening pole that would extend above the top of the towers approximately 5 to 10 feet. Lighting plays a substantial role in collision risk because lights can attract nocturnal migrant songbirds, and major bird kill events have been reported at lighted communications towers (Manville 2001) with most kills from towers higher than 300 to 500 feet (Kerlinger 2004). Many of the avian fatalities at communications towers and other tall structures have been associated with steady-burning, red incandescent L-810 lights used at communications towers seem to attract birds (Gehring et al. 2006). Longcore et al. (2008) concluded that use of strobe or flashing lights on towers resulted in less bird aggregation, and, by extension, lower bird mortality, than use of steady-burning lights. Bright night lighting close to the ground at the ISEGS project site could also attract bats and disturb wildlife that occurs adjacent to the project site (e.g., nesting birds, foraging mammals, and flying insects).

To minimize this risk of collision and disturbance to wildlife from lights, staff recommends implementation of staff's proposed Condition of Certification **BIO-11**, which includes specifications that the lighting atop the towers use flashing strobe lights rather than steady burning, and recommendations for lighting to be shielded downward and turned off when not needed.

Diurnal birds could also collide with tall structures, and could also be at risk of injury and fatality from burns if they flew into the reflected sunlight between the heliostats and the power towers. Staff has concluded that the risk of such impacts is low. Bird fatality studies at the Solar One facility near Daggett, San Bernardino County found that bird mortality observed on the site was associated with the large evaporation ponds at this solar plant rather than collisions or burns (McCrary 1986). Furthermore, most diurnal bird collisions with tall structures are associated with guyed towers in poor visibility conditions such as fog or inclement weather (Manville 2001). The ISEGS project does not include evaporation ponds or guyed structures, and rarely is subject to weather that reduces visibility.

Large raptors like golden eagles can be electrocuted by transmission lines when a bird's wings simultaneously contact two conductors of different phases, or a conductor and a ground. This happens most frequently when a bird attempts to perch on a structure with insufficient clearance between these elements. The presence of distribution lines 69 kV or less represents more of a danger to raptors than transmission lines greater than 69 kV, because the spacing between elements in distribution lines is much less than that of transmission lines (APLIC, 1996). The proposed transmission lines would be 115 kV. To minimize risk of electrocution, the applicant has proposed a "raptor-friendly" construction design for the transmission line with conductor wire spacing greater than the wingspans of large birds to help prevent electrocution as described in Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006 (APLIC 2006). BLM will not approve a transmission line that is not raptor safe. With the proposed mitigation addressed in Condition of Certification **BIO-11**, staff concludes that the proposed transmission lines would not pose a substantial threat to birds.

Noise

Operational noise, anticipated to be less than 30 dBA, would be more consistent and at a much lower level than during construction. The power plant would operate an average of about 10 hours a day, 7 days a week throughout the year, with the exception of a scheduled shutdown in late December for maintenance (BSE 2007a). The solar field and power generation equipment would be started up each morning after sunrise and insolation build-up, and shut down in the evening when insolation drops below the level required for generating power. In addition, the solar nature of the facility limits its primary operations and noise generating activities to the daylight hours when ambient levels (such as from I-15, which is located 0.8 mile southeast of proposed Ivanpah 1) are typically highest. Therefore, with the implementation of noise-reducing measures described in the AFC (BSE 2007a), the impact on operational noise on surrounding wildlife is expected to be less-than significant. These measures include requiring construction equipment to maintain maximum noise levels at 90 dBA or less three feet from the construction activity.

NO PROJECT / NO ACTION ALTERNATIVE

The No Project / No Action Alternative is a proposed action that would not be undertaken. Under this alternative, the BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality in conformance with applicable statutes, regulations, policy and land use plan.

The results of the No Project / No Action Alternative would be the following:

The impacts of the proposed project to biological resources, including desert tortoise and special status plant and wildlife species, and ephemeral drainages would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project.

The benefits of the proposed project in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

If this project is not approved, renewable projects would likely be developed on this and other sites in the Mojave Desert, or in adjacent states, as developers strive to provide renewable power that complies with utility requirements and state/federal mandates. For example, there are three large solar projects proposed on BLM land in Nevada within a few miles of the proposed ISEGS site. In addition, as of August 2009 there were 66 applications for solar projects covering 611,692 acres pending with BLM in the California Desert District. The No Project/No Action Alternative would not cause any significant impacts to biological resources.

CUMULATIVE IMPACTS

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects

of past projects, the effects of other current projects, and the effects of probable future projects (Cal. Code Regs, tit. 14, § 15130). Cumulative impacts must be addressed if the incremental effect of a project, combined with the effects of other projects is "cumulatively considerable" (14 Cal Code Regs §15130(a)). Such incremental effects are to be "viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects" (14 Cal Code Regs §15164(b)(1)).

This cumulative impact analysis makes a broad, regional evaluation of the impacts of past projects that threaten plant and animal communities within California's southern deserts, and also discusses in a general fashion future foreseeable threats. This overview of regional impacts is followed by a more detailed discussion of the effects of past, present, and future projects to biological resources of the Ivanpah Valley, in particular to its desert tortoise population.

Regional Overview

Over the past two hundred years California southern deserts have been subject to major human-induced changes that have threatened native plant and animal communities by habitat loss, fragmentation, and degradation. Some of the most conspicuous threats are those activities that have resulted in large scale habitat loss due to urbanization, agricultural uses, landfills, military operations, mining activities, as well as activities that fragment and degrade habitats such as roads, off-highway vehicle activity, recreational use, and grazing (Berry et al. 1996; Boarman and Sazaki 2006; Avery 1997; Jennings 1997). The introduction of non-native plant species and increases in predators such as ravens has also contributed to population declines and range contractions for many special-status plant and animal species (Boarman 2002a).

Against this backdrop of past projects within California's deserts, proposed wind and solar energy projects have the potential to further reduce and degrade native plant and animal populations, in particular sensitive species such as desert tortoise. BLM has received solar and wind applications for use of BLM land for approximately one million acres of the California Desert Conservation Area (see the **Cumulative Impacts** section). Nearby in the Nevada desert applications have been submitted for solar power facility right-of-ways on over 133,000 acres of desert landscape (USFWS 2008). In the context of this large scale habitat loss, the ISEGS project would contribute to the cumulative loss and degradation of habitat for desert plants and wildlife, including desert tortoise, within southern California's deserts.

Ivanpah Valley Past and Present Projects

The Ivanpah Valley has followed trends similar to the rest of the California desert in terms of habitat loss and degradation. **Biological Resources Table 5** lists the past and present projects within the Ivanpah Valley. The map ID numbers in this table correspond to the numbers shown on **Cumulative Impacts Figure 3.**

Biological Resources Table 5
Past and Present Projects in the Ivanpah Valley

Map ID	Project Name/Ownership	Project Description
1	Bighorn Electric Generating Station/ Reliant Energy Wholesale Generation, LLC	Operating natural gas power plant, uses dry cooling system
2	Primm Casinos: Buffalo Bill's, Primm Valley, Whiskey Pete's/ Terrible's Primm Valley Casino Resorts (MGM Mirage)	Two existing Resort and Casinos and one existing Hotel and Casino; undergoing renovation
3	Primm Valley Golf Course/ Terrible's Primm Valley Casino Resorts (MGM Mirage)	Existing golf course located south of the California/Nevada border along I-15, opened in 1997.
4	Primm Outlet Mall/ Fashion Outlets (MGM Mirage)	Existing shopping outlet with over 100 stores. Connected to the Primm Casinos by monorail.
5	Recreation Activities/ BLM	Approximately 12 permitted and organized events (championship racing, archery, kite buggying, land sailing) occur on the Dry Lake annually; approximately 5000 annual visitors/year
6	Molycorp Minerals LLC	Existing mining operation on Mountain Pass, acquired by Molycorp in 1950 and mined ever since.
7	Colosseum Mine	Inactive mining facilities occupying 284 acres on a 3,316 acre private parcel.
8	Clark Mountain and Crescent Peak Allotment	Ongoing 10-year grazing lease
9	Molycorp Evaporation Pond/Chevron	Active evaporation pond southeast of Ivanpah Dry Lake
10	AT&T Fiber-optic replacement of cables	Existing direct buried fiber-optic cable replaced from Nevada border to the Halloran Summit within existing right-of-way; project complete.
11	Existing 115-kV transmission line from El Dorado substation/SCE	Existing line passing through ISEGS site
12	Molycorp (Now Chevron-Texaco) pipeline	Runs from Molycorp south of I-15, through the Mojave National Desert Preserve to the Evaporation Pond

Biological resources of the Ivanpah Valley have been adversely affected by the projects listed above, as well as construction and continued use of major highways such as I-15 and secondary roads, unimproved roads and trails, pipelines, the Union Pacific Railroad, casinos and retail businesses, recreational developments, and electrical transmission lines and substations. Development-related habitat loss continues around the Nevada communities of Jean and Primm as well as the California community of Nipton. These activities in the Ivanpah Valley have resulted in direct loss and fragmentation of habitat, introduction of non-native species, and increased disturbance to wildlife. Urbanization, grazing, vandalism, illegal dumping, mining, off-road recreation, and construction of utility corridors, facilities and roads have contributed to the cumulative degradation of biological resources in the region. In general, actions on private lands within and adjacent to desert communities in Nevada including Las Vegas, Jean and Primm, and Barstow in California, are expected to continue to increase in proportion to increases in the human populations and access in these areas. Planned future actions, such as those that may occur as a result of the development of the Ivanpah Valley Airport, completion of rail lines, and others would continue this trend. All of these past activities have contributed to the loss of Ivanpah Valley vegetation communities, wildlife habitat, and special-status species.

Ivanpah Valley Future Projects

The Ivanpah Valley has followed trends similar to the rest of the California desert in terms of habitat loss and degradation. **Biological Resources Table 6** lists the future foreseeable projects within the Ivanpah Valley. The map ID letters in this table correspond to the numbers shown in **Cumulative Impacts Figure 3.**

Biological Resources Table 6
Future Foreseeable Projects in the Ivanpah Valley

Map ID	Project Name/Owner or Proponent	Project Description/Status
A	GEN 3 Solar, Inc/FirstSolar	A 300 MW photovoltaic development on 4,160 acres/Status: Plan of Development Letter sent 7/08
B	Ivanpah Airport (Southern Nevada Supplemental Airport)/Clark County Dept. of Aviation	The Ivanpah Valley Airport project is planned on 9.4 square miles (~6,000 acres) along I-15; Draft EIS in progress, possible construction start date of 2010, operation in 2017
C	Victorville-Las Vegas High Speed Train/ DesertXpress Enterprises	High speed train would run from Victorville to Las Vegas/Status: Scoping report completed 7/06; project proponents anticipate train operational by 2012. Proposed route is immediately northwest of the ISEGS site.
D	Pipeline Restoration/ Mojave Pipeline	Pipeline restoration adjacent to ISEGS project, similar footprint to original pipeline/ Status: meetings in Jan/Feb 2008 to discuss right-of-way

Map ID	Project Name/Owner or Proponent	Project Description/Status
E	Joint Port of Entry/Caltrans, CA Dept Food & Ag	Highway construction planned between Barstow and the Nevada state line includes: 1) a proposed point-of-entry inspection station near the Nevada border with construction likely to start in 2009 and continue for 2 years; 2) a 12-mile-long northbound truck descending lane and pavement rehabilitation (expected to be completed in the summer of 2010); and 3) regrading of median slopes, has been completed
F	Temporary Batch plant/Caltrans	Construction occurring now on widening of I-15
G	Mixed-use Development/ MGM Mirage and Jeanco Realty Development, LLC	166 acres proposed for housing, commercial businesses, new hotel-casino; includes demolition of two casinos MGM Mirage currently owns in Jean/ Status: On hold
H	Clark Mountain and Crescent Peak Allotment/ BLM	10 Year Lease grazing lease/Status: ongoing
I	Ivanpah Energy Center/ Diamond Generating Corporation	Status: On hold
J	Wind energy power plant/PPM Energy	75 MW wind energy project on 2,330 acres/Status: applications received 10/02, 10/06
K	Wind energy power plant/Clipper Wind CACA 44236	50 MW wind energy project on 3,360 acres/Status: applications received 3/02, 5/06
L	I-15 Mountain Pass Truck Lane/Caltrans	Now under construction from 8/08 to 2010
N	Upgrade to existing 115-kV transmission line from El Dorado Substation (SCE)	Construct a new Ivanpah Substation sized to accommodate 220 / 115 kV facilities, removal approximately 36 miles of a portion of existing line, construct a double circuit 220 kV line/Status: Project filing date early 2009, projected on line 2013
O	Mixed Use -Recreation	Approximately 200 Casual Use permits are issued annually (cover between 1 to 6 individuals); Status anticipate approximately 12 permitted and organized events per year l
P	Karnama Fast Food New fast food restaurant in Primm	Fast food restaurant to be built adjacent to the Primm Outlet Mall/Status: in permitting, application received 2/07
Q	Primm Solar Generating Plant/ NextLight Renewable Power, LLC	250 MW solar trough project on approximately 2,500 acres/ Status: application submitted to Las Vegas BLM Field Office

Past and current actions have significantly reduced and degraded the plant communities and wildlife habitat within the Ivanpah Valley, and the proposed project would substantially contribute to the loss of biological resources and genetic diversity of special-status species within the valley. Given the project's location on a large portion of the Ivanpah Valley, and in particular, the bajada and alluvial fans that support special-status plant species, it is reasonable to conclude that a substantial portion of the suitable habitat for these plants would be affected by construction of the ISEGS project, increasing the threat of local extirpation of the Ivanpah Valley proportion of these species' ranges. The project, combined with future proposed projects, would also significantly affect a genetically distinct subpopulation of desert tortoise within the Northeastern Mojave Recovery Unit that occurs in the Ivanpah Valley (Murphy et al. 2007, USFWS 2008).

While no precise estimate can be made of the future habitat loss associated with the proposed projects listed above, collectively these projects would remove and fragment tens of thousands of acres of additional habitat. The ISEGS project, combined with the proposed 4,000-acre First Solar development immediately to the east, would eliminate a large swath of the better desert tortoise habitat found on the west side of I-15 within the Ivanpah Valley. All of these past, present, and future proposed activities contribute to the significant loss of Ivanpah Valley vegetation communities, wildlife habitat, and special-status species. Staff considers the 4,073 -acre ISEGS project to be a substantial contributor to the cumulative loss of Ivanpah Valley's native Mojave Desert plant and wildlife communities, including the threatened desert tortoise and other special-status species. With the exception of special-status plant species, this significant cumulative impact may be reduced to less-than-significant levels with appropriate levels of compensatory mitigation, as discussed in staff's proposed Condition of Certification **BIO-17**.

IMPACT SUMMARY

Biological Resources Table 7 summarizes the impacts to biological resources resulting from ISEGS construction and operation.

Biological Resources Table 7
Summary of Impacts/Mitigation

Biological Resource	Impact/Mitigation
Mojave Desert Plant Communities & Wildlife Habitat	**Impacts:** Permanent loss of 4,073+ acres of Mojave creosote scrub and other native plant communities, including approximately 6,400 barrel cacti; permanent loss of cover, foraging, breeding habitat for wildlife; habitat fragmentation and loss of connectivity for terrestrial wildlife; disturbance/dust to nearby vegetation and wildlife; increased predation due to increased raven/predator presence; spread of non-native invasive weeds. **Mitigation**: Off-site habitat acquisition and enhancement of (**BIO-17**); implement Best Management Practices **(BIO-11)**
Waters of the State	**Impacts:** Impacts to biological functions and values of 198 acres of project area ephemeral; **Mitigation**: Acquisition and enhancement of 198 acres off-site waters (**BIO-17**);
Special-Status Plant Species	**Impact:** Direct, indirect, and cumulative impacts to eight special-status plant species. **Mitigation**: Avoid, protect, and minimize impacts to occurrences (**BIO-18**); implement weed management plan (**BIO-13**); implement Best Management Practices (**BIO-11**).
Special-Status Wildlife	
Desert tortoise *Gopherus agassizii*	**Impact:** Loss of 4,073+ acres of occupied habitat; translocation of an estimated minimum of 25 desert tortoise, resulting in reduced survivorship and reproduction for translocated individuals; fragmentation and loss of connectivity with surrounding habitat; increased risk from ravens and other predators; increased road kill hazard from construction and operations traffic; cumulative impacts to Ivanpah Valley population. Impact would be to a threatened species, and would likely be highly controversial, resulting in a significant impact with respect to NEPA significance criteria in 40 CFR 1508.27 **Mitigation**: Off-site habitat acquisition, endowment, and enhancement of suitable desert tortoise habitat (**BIO-17**); conduct desert tortoise clearance surveys and establish exclusionary fencing (**BIO-8**); develop and implement desert tortoise translocation plan (**BIO-9**); implement avoidance measures and Best Management Practices (**BIO-11**); implement raven and weed management plant (**BIO-12** and **BIO-13**)
Banded Gila monster *Heloderma suspectum cinctum*	**Impact:** Presence in project area unconfirmed; if present, potential for direct impacts, habitat loss; **Mitigation**: Compensatory mitigation for desert tortoise may also offset impacts to Gila monsters (**BIO-17**); implement Best Management Practices to avoid direct impacts (**BIO-11**).
Burrowing owl *Athene cunicularia*	**Impact**: Potential loss of nest, eggs, or young; loss of breeding and foraging habitat; disturbance of nesting activities; **Mitigation**: Implement burrowing owl impact avoidance and mitigation measures (**BIO 16**); off-site habitat acquisition and enhancement (**BIO-17**)
Golden eagle *Aquila chrysaetos*	**Impact**: Loss of foraging habitat. **Mitigation**: Off-site habitat acquisition and enhancement (**BIO-17**); implement Best Management Practices (**BIO-11**)

Loggerhead shrike *Lanius ludovicianus*	**Impact**: Potential loss of nest, eggs, or young; loss of breeding and foraging habitat; disturbance of nesting activities. **Mitigation**: Conduct pre-construction nesting surveys, implement avoidance measures (**BIO-15**); off-site habitat acquisition and enhancement (**BIO-17**)
Brewer's sparrow *Spizella breweri*	**Impact**: Potential loss of nest, eggs, or young; loss of breeding and foraging habitat; disturbance of nesting activities. **Mitigation**: Conduct pre-construction nesting surveys, implement avoidance measures (**BIO-15**); off-site habitat acquisition and enhancement (**BIO-17**)
Crissal thrasher *Toxostoma crissale*	**Impact**: Potential loss of nest, eggs, or young; loss of breeding and foraging habitat; disturbance of nesting activities. **Mitigation**: Conduct pre-construction nesting surveys, implement avoidance measures (**BIO-15**); off-site habitat acquisition and enhancement (**BIO-17**)
Le Conte's thrasher *Toxostoma lecontei*	**Impact**: Potential loss of nest, eggs, or young; loss of breeding and foraging habitat; disturbance of nesting activities. **Mitigation**: Conduct pre-construction nesting surveys, implement avoidance measures (**BIO-15**); off-site habitat acquisition and enhancement (**BIO-17**)
Nelson's bighorn sheep *Ovis canadensis nelsoni*	**Impact:** Potential loss of seasonal foraging habitat and impacts to movement corridors; **Mitigation**: Implement avoidance measures and Best Management Practices (**BIO-11**); develop water source for bighorn in the eastern part of the Clark Mountain range or in the State Line Hills (**BIO-19**).
American badger *Taxidea taxus*	**Impact:** Loss and fragmentation of habitat, loss of foraging grounds, crushing or entombing of animals during construction **Mitigation**: Conduct pre-construction surveys and implement avoidance measures (**BIO-11**); off-site habitat acquisition and enhancement (**BIO-17**)
Special-Status Plants	
Mojave milkweed *Asclepias nyctaginifolia*	**Impact:** Potential direct or indirect impacts to 16 occurrences. **Mitigation**: Implement weed management plan (**BIO-13**); Best Management Practices (**BIO-11**); special-status plant avoidance and minimization measures (**BIO-18**).
Desert pincushion *Coryphantha chlorantha*	**Impact**: Potential direct or indirect impacts 8 occurrences. **Mitigation**: Implement weed management plan (**BIO-13**); Best Management Practices (**BIO-11**); special-status plant avoidance and minimization measures (**BIO-18**).
Nine-awned pappus grass *Enneapogon desvauxii*	**Impact**: Potential direct or indirect impacts to 3 occurrences. **Mitigation**: Implement weed management plan (**BIO-13**); Best Management Practices (**BIO-11**); special-status plant avoidance and minimization measures (**BIO-18**).
Parish's club-cholla *Grusonia parishii*	**Impact**: Potential direct or indirect impacts to 5 occurrences. **Mitigation**: Implement weed management plan (**BIO-13**); Best Management Practices (**BIO-11**); special-status plant avoidance and minimization measures (**BIO-18**).
Rusby's desert-mallow *Sphaeralcea rusbyi var. eremicola*	**Impacts**: Potential direct or indirect impacts to 7 occurrences. **Mitigation**: Implement weed management plan (**BIO-13**); Best Management Practices (**BIO-11**); special-status plant avoidance and minimization measures (**BIO-18**).

COMPLIANCE WITH LORS

The proposed project must comply with state and federal laws, ordinances, regulations, and standards that address state and federally listed species, as well as other sensitive species and their habitats.

STATE LORS:

The Energy Commission has a one-stop permitting process for all thermal power plants rated 50 MW or more under the Warren-Alquist Act (Pub. Resources Code § 25500). Under the act, the Energy Commission's certificate is "in lieu of" other state, local, and regional permits (*ibid*.) The Commission's streamlined permitting process accomplishes a primary objective of the Renewable Energy Action Team, as identified in the Governor's Executive Order S-14-08 — to create a "one stop" process for permitting renewable energy generation facilities under California law. Staff has incorporated all required terms and conditions that might otherwise be included in state permits into the Energy Commission's certification process. When conditions of certification are finalized they would satisfy the following state LORS and take the place of terms and conditions that, but for the Commission's exclusive authority, would have been included in the following state permits:

Incidental Take Permit: California Endangered Species Act (Fish and Game Code §§ 2050 et seq.) The California Endangered Species Act (CESA) prohibits the "take" (defined as "to hunt, pursue, catch, capture, or kill") of state-listed species except as otherwise provided in state law. Construction and operation of the ISEGS project could result in the take of desert tortoise, listed as threatened under CESA. Energy Commission staff's proposed Condition of Certification **BIO-17** specifies compensatory mitigation for desert tortoise habitat loss at a 3:1 ratio, with BLM nesting their 1:1 mitigation requirement within this framework. Energy Commission staff have concluded that this funding and mitigation approach would likely be sufficient to provide full mitigation for desert tortoise, pending resolution of the issues discussed earlier in this section. However, CDFG has not yet provided concurrence that this proposed approach and level of mitigation funding would be adequate to fulfill their full mitigation standard.

Streambed Alteration Agreement: California Fish and Game Code §§ 1600 1607. Pursuant to these sections, CDFG typically regulates all changes to the natural flow, bed, or bank, of any river, stream, or lake that supports fish or wildlife resources. Construction and operation of the ISEGS would result in direct or indirect impacts to up to 198 acres of waters of the state. Staff has reviewed information supplied by the applicant (DB 2008e, CH2M Hill 2008d, CH2M Hill 2009, CH2M Hill 2009s, CH2M Hill 2009f) and has developed staff's proposed Conditions of Certification **BIO-19**. CDFG has not reviewed this condition of certification and provided only general guidance during its development. Implementation of this condition would minimize and offset impacts to state waters and would assure compliance with CDFG codes that provide protection to state waters.

FEDERAL LORS

The ISEGS project is located on federal land under BLM's jurisdiction and is therefore subject to the provisions of BLM's California Desert Conservation Area (CDCA) Plan

(Revised 1999). As an amendment to the CDCA Plan, BLM produced the Northern and Eastern Mojave (NEMO) Coordinated Management Plan (BLM 2002). This document consists of proposed management actions and alternatives for public lands in the NEMO Planning Area. The ISEGS project is located in the southeastern portion of the NEMO Planning Area Boundary.

The BLM has worked with the USFWS to develop a variety of land designations as tools to protect sensitive biological resources, including the desert tortoise. The siting of the ISEGS project considered the management direction of these designations, as described below:

- **Desert Wildlife Management Areas** (DWMA) are general areas recommended by the Desert Tortoise Recovery Plan (USFWS 1994) within which recovery efforts for the desert tortoise would be concentrated. DWMAs had no specific legal boundaries in the 1994 Recovery Plan. The BLM formalized the general DWMAs from the 1994 Recovery Plan through its planning process and administers them as Areas of Critical Environmental Concern (see below). The ISEGS project does not fall within any DWMA.
- **Area of Critical Environmental Concern** (ACEC) are specific, legally defined, BLM designations where special management is needed to protect and prevent irreparable damage to important historical, cultural, scenic values, fish and wildlife, and natural resources or to protect life and safety from natural hazards. The ISEGS project is not included within any designated ACEC.
- **Critical Habitat** consists of specific areas defined by the USFWS as areas essential for the conservation of the listed species, which support physical and biological features essential for survival and that may require special management considerations or protection. Critical habitat for the desert tortoise was designated in 1994, largely based on proposed DWMAs in the draft Recovery Plan. The ISEGS project is approximately 5 miles from the nearest desert tortoise critical habitat.

BLM provides management direction for species such as desert tortoise within the NEMO, which include five geographical areas of tortoise habitat in the planning area. These areas include an Ivanpah Valley and a North Ivanpah Valley area (BLM 2002), with the ISEGS project located within the Ivanpah Valley habitat area. Current designations for both Ivanpah areas are as Category III desert tortoise habitat (BLM 2002). Category III management goals are to limit tortoise habitat and population declines to the extent possible by mitigating impacts.

Potential take of the desert tortoise, listed as threatened by the USFWS, requires compliance with the federal Endangered Species Act (ESA) (16 USC §§ 1531 et seq.). “Take” of a federally-listed species is prohibited without an Incidental Take Permit, which would be obtained through a Section 7 consultation between BLM and the USFWS. The applicant submitted a Draft Biological Assessment for the Ivanpah Solar Electric Generating System (Ivanpah SEGS) Project (CH2M Hill 2008) in September 2008. The draft BA is currently under revision to address BLM comments and to incorporate substantial changes in the project description; a final BA will soon be available for submittal to USFWS (Meckfessel 2009) so that the formal Section 7 consultation process can be initiated.

CLOSURE AND DECOMMISSIONING IMPACTS AND MITIGATION

In the future, ISEGS would experience either a planned closure or be unexpectedly (either temporarily or permanently) closed. When facility closure occurs, it must be done in such a way as to protect the environment and public health and safety. A closure plan would be prepared by the project owner prior to any planned closure (BSE 2007a). To address unanticipated facility closure, an "on-site contingency plan" would be developed by the project owner, and approved by the Energy Commission Compliance Project Manager (CPM). Facility closure requirements are discussed in more detail in the **General Conditions** section of this preliminary staff assessment. Facility closure mitigation measures would also be included in BRMIMP prepared by the project owner and described in staff's Condition of Certification **BIO-7.**

The facility closure plan should address habitat restoration measures to be implemented in the event of a planned or an unexpected permanent closure, and must also include a funding mechanism to ensure sufficient funds are available for decommissioning and habitat restoration as required in Condition of Certification **LAND-1**. After the end of the project's useful life, it would be decommissioned in accordance with a Closure, Revegetation, and Rehabilitation Plan as recommended in Condition of Certification **BIO-14** and a Special-Status Plant Protection and Monitoring Plan and Special-Status Plant Remedial Action Plan as recommended in Condition of Certification **BIO-18**. Planned or unexpected permanent facility closure should address the removal of the transmission conductors since birds are known to collide with transmission line ground wires.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Staff received comments on the Biological Resources section of the Preliminary Staff Assessment (PSA) from the following parties

- Basin Range and Watch
- California Native Plant Society
- Center for Biological Diversity
- Davis, Lynn
- Defenders of Wildlife
- Deutsche, Craig
- La Doux, Tasha
- National Parks Conservation Association
- Sierra Club, San Gorgonio Chapter
- Society for the Conservation of Big Horn Sheep
- Wilder, Jenny

Energy Commission staff has summarized these comments and provided responses below. All references to "staff" below indicate Energy Commission staff.

California Native Plant Society letter dated February 6, 2009 (CNPS 2009b)

CNPS Comment #1: The CNPS listed a series of major points of concern, including the following biological resource issues: (1)significant sensitive plant populations occur on site, and there are no known feasible mitigation techniques for rare desert plant species; (2) the site supports high cactus diversity and density; (3) summer surveys were not conducted in a known summer rainfall region; (4) the project will result in an invasion of weedy species, and (5) the cumulative impacts to sensitive desert habitats and rare plants were not adequately evaluated.

Response: (1) Staff has concluded that there are significant populations of sensitive plant species on the ISEGS site, and that avoidance is the preferred mitigation approach to reduce project impacts to special-status plant species. Staff has suggested some avoidance strategies in the subsection discussing plant impacts and mitigation and in proposed Condition of Certification **BIO-18**. (2) Staff agrees that the site supports high cactus diversity and density; that fact contributed to staff's conclusion that project impacts to plant communities were significant according to CEQA guidelines. (3) Staff notes that the botanists conducting plant surveys for the ISEGS project include a number of recognized experts on desert plants. Energy Commission staff consulted a regional botanical experts and confirmed that the applicant's surveys could have missed summer blooming special-status plants and staff has proposed pre-construction summer surveys in **BIO-18** to address this concern (Andre 2009, Sanders 2009). (4) Staff agrees that the project would increase potential for the introduction and spread of weeds, and has therefore proposed Condition of Certification **BIO-13**, the Weed Management Plan, which includes a discussion of weed eradication and control methods. (5) Staff does not agree that cumulative impacts to sensitive desert habitats and rare plants were not adequately evaluated; staff concluded that the cumulative impacts to special-status plants species of ISEGS and other proposed projects in the area would be significant in a CEQA context.

CNPS Comment #2: CNPS notes that at least 10 CNPS-listed species are known to occur on the project site. This data was generated only because partial site surveys were conducted on site (see #5). The use of existing data base information prior to the field work would have been misleading as to the diversity and productivity of the site. The very reason field surveys are required is to discover what is on a proposed project location. It is the intent of public law to provide for the avoidance of effects to discovered sensitive resources.

Response: As discussed in the subsection on special-status plants, staff is satisfied that the list of CNPS-listed plant species known to occur at the site is accurate and includes all special-status species potentially occurring at the ISEGS site.

CNPS Comment #3. CNPS comments that the proposed project would eliminate several square miles of occupied rare plant habitat. There are no known techniques to mitigate for the loss of rare plants and their habitat in desert environments. Avoidance is the only mitigation that is appropriate for this site. There is no known method to compensate for the loss of this rare plant habitat. Simple habitat acquisition for the

desert tortoise cannot provide adequate compensation for the loss of this high quality rare plant habitat. To be able to find comparable compensation habitat for the rare plants will require an enormous amount of fieldwork to survey private lands that might be occupied. Simple translocation of the adult plants does not perpetuate population structures for long term productivity and is an unproven mitigation for habitat destruction. The scale of destruction of subsurface ecosystem components and seed banks is impossible to mitigate.

Response: Staff agrees that avoidance is the preferred mitigation approach to reduce project impacts to special-status plant species; that transplanting these special-status plants is not a viable mitigation option; and that the fieldwork required to find these particular species on private parcels that might be available for sale is infeasible. Staff has suggested some impact avoidance strategies in the subsection discussing plant impacts and mitigation and in staff's proposed Condition of Certification **BIO-18**.

CNPS Comment #4: CNPS concurs with the PSA's conclusion that the applicant's proposed mitigation for rare plants, animals and habitats is inadequate and that the project will have major significant adverse, permanent effects to biological resources if this project is approved at this location. Currently, there are no known mitigation actions that are successful for desert plants and habitats. The only legitimate option is, no approval at this location. If approved for this location, a land compensation ratio should be at least 5:1, especially in light of the massive push for energy development in the desert and the projected cumulative effect generated from similar projects. A compensation ration of 1:1 is absolutely inadequate because the proposed action would permanently destroy irreplaceable high quality rare plant habitat. If a compensation plan is approved it must account for a fluctuating real estate market. The value of land at this time cannot be used if it takes ten years to acquire all necessary land. The acreage must be guaranteed as compensation, not just the current value.

Response: Staff agrees that avoidance is the preferred mitigation approach to reduce project impacts to special-status plant species, and that a 1:1 ratio would not adequately mitigate for project impacts to desert tortoise. Staff has recommended a 3:1 mitigation ratio for desert tortoise. Staff agrees that in acquiring lands at a 3:1 ratio there must be provisions for increases in land valuation increases, and assurances that the funding would be available to secure the needed acreage. The latter requirement, assurance that sufficient funding is available to fund the proposed mitigation, is a requirement to fulfill Section 2081 of the California Endangered Species Act, and would be included in the Energy Commission's final condition for desert tortoise compensation.

CNPS Comment #5: CNPS states that the Supplemental Data Response Set 1D [Botanical Survey Report] for 2007 and 2008 surveys were inadequate. Protocol development for botanical surveys neglected to include critical seasonal coverage in a region well known for its bimodal precipitation [read, summer rainfall] and known to the consultants for the project proponents. There is only a short mention of one individual cataloging a single element from the site during the late summer. This is a critical failure for the complete analysis of effects to the environment from the proposed action. The region is poorly known botanically and therefore the failure to conduct summer/fall

surveys prevents the ability to conduct a valid and complete analysis of effects of the proposed action. The revelation of the number of sensitive plants on site is an example of the poor understanding of the distribution of the flora for that region. *Oenothera cavernae* [not on the pre-survey list] was only recently discovered to occur in eastern California and there are most likely several other species yet to be documented. The presumption that a complete species account can be accomplished from previous years 'skeletal' remains fails to comprehend the ecological properties of native annual plants. The vast majority of native annual plant species disarticulate from the growing location after seed set and blow away and thus would be undetectable using the survey method used with this project. All of the surveys for annual plants were conducted in April 2008 subsequent to summer 2007 precipitation. [spring 2007 survey dates were not easily detected in the technical document].

Response: As mentioned above, staff has proposed pre-construction summer surveys in **BIO-18** to address special-status plants, which could have been missed by the applicant's botanical surveys.

CNPS Comment #6: The species lists and site evaluation clearly highlights the proposed project location as pristine and ecologically rich. The number of rare plant species and abundances as well as several rare animal species identifies this site as warranting protection not destruction. This site is not degraded. Only a very few non-native troublesome weeds at low densities from the location, and the vast size of the disturbance from the proposed project will undoubtedly cause a serious invasion problem for the area. If the project is approved there must be a guaranteed bond of a sufficient amount to pay for the ongoing [life of the project and beyond] weed management the project will create.

Response: Staff agrees with CNPS in their characterization of the site, as described in detail in this section. Staff also agrees that the project would increase potential for the introduction and spread of weeds, and has therefore proposed Condition of Certification **BIO-13**, preparation of a Weed Management Plan, which will include a discussion of weed eradication and control methods during construction and during the life of the project.

Society for the Conservation of Big Horn Sheep – letter dated January 14, 2009 (SCBHS 2009)

SCBHS Comment #1: The SCBHS notes that a pre-construction baseline of big-horn sheep use should be established, followed by intensive monitoring during construction and follow-up post construction. These baseline surveys and monitoring should include at least air and ground surveys of the desert sheep in the surrounding mountain ranges with perhaps some discussions regarding the bordering sheep with Nevada. The SCBHS also recommended capture work, collaring and monitoring the movement of a sampling of the local bighorns before, during and after would be crucial information needed by CDFG for proper management.

Response: Staff notes that baseline data on big-horn sheep use of the project area would have been useful in making an assessment of the extent of impact. Instead, the applicant made the assumption that the bighorn sheep are likely to move down

into upper elevations of the Ivanpah Valley, including the ISEGS project area, to forage (CH2M Hill 2008 p. 3-7). Staff agrees that the level of survey effort suggested by SCBHS would provide useful information on this population, but would not be appropriate mitigation for potential impacts of the ISEGS project. Unless research is connected to some management action that would provide mitigation for the project impact, it cannot be required as mitigation to satisfy CEQA.

SCBHS Comment #2: The SCBHS advocated that staff consider requiring a one to one and a half mile buffer zone from the project border to the toe of the sloping mountain areas, asserting that this would help connectivity of the local population and maintain the metapopulation dynamic at work with this sheep population. SCBHS asserts this wildlife corridor is absolutely essential for a healthy and viable population and for a healthy gene pool exchange, and that the buffer zone would establish a guideline or benchmark for any future development and additional loss of habitat.

Response: The applicant shifted the proposed ISEGS project boundaries and security fencing approximately 130 to 340 feet away from adjacent hills to provide a wildlife corridor (BSE 2007a p. 5.2-54). Staff has proposed Condition of Certification **BIO-19** as mitigation for project impacts to bighorn sheep.

SCBHS Comment #3 The SCBHS comments that they are not convinced that ISEGS project water will not have an adverse effect on the surrounding springs and seeps that are so precious to the resident wildlife population. SCBHS emphasized the need for habitat improvement through additional water sources to safeguard any potential depletion and/or lack thereof.

Response: The **Soils & Water** section analyzed this issue, and concluded that the seeps and springs located in the Clark Mountain are ephemeral and located up gradient and over three miles away from the project's proposed pumping wells. The seeps and springs derive their water from precipitation further up gradient in the Clark Mountains and beyond the potential reach of any cone of depression that would result from the project's proposed groundwater pumping. Staff has therefore concluded that the project is unlikely to affect springs used by big horn sheep.

SCBHS Comment #4: The SCBHS believes in the importance of an agreement or a memorandum of understanding from all government agencies (Department of Fish & Game, Bureau of Land Management, National Park Service, etc.) to assure that habitat improvements can and will take place in and around surrounding areas controlled by these authorities. Habitat work such as water hole improvements, replacement water, new wildlife drinkers, existing spring improvements, or spring development will help offset the negative impact on this and/or other future projects.

Response: Interagency efforts are currently underway to develop regional habitat improvements such as those suggested by the SCBHS as part of the Desert Renewable Energy Conservation Plan. That effort is a more appropriate forum for discussing this kind of interagency undertakings than the ISEGS project.

SCBHS Comment #5: The SCBHS emphasizes the importance of decommissioning and full and complete reclamation of the ISEGS project site, similar to what mining companies are obliged to do after production and/or usefulness has been achieved.

Response: Staff's proposed Condition of Certification **BIO-14** addresses the reclamation of the project site at the end of the project.

SCBHS Comment #6: The SCBHS expressed concern about the disruption to plant life associated with this project, requesting that full use of plant material be made, including restoration of peripheral impacted area, for future reclamation needs.

Response: Staff's proposed Condition of Certification **BIO-14** addresses the salvage and disposition of plant material, and the reclamation of the project site at the end of the project.

SCBHS Comment #7: The SCBHS suggests exploration of a land bridge over SR I-15 to alleviate the fragmentation and loss of wildlife connectivity resulting from past highway construction and future energy development; they note that the financial burden for this undertaking should not be place totally upon Bright Source Corporation, and encourages the Energy Commission should explore this possible mitigation measure in depth.

Response: A land bridge over I-15 would not be appropriate mitigation for the ISEGS project because it would be mitigating for impacts resulting from highway construction rather than from this project. This suggestion could, however, be appropriately considered in a more regional forum such as the Desert Renewable Energy Conservation Plan (http://www.energy.ca.gov/33by2020/index.html) or the BLM Solar Programmatic Solar Environmental Impact Statement.

Craig Deutsche letter dated January 14, 2009 (PUB 2009a)

Deutsche Comment #1: Mr. Deutsche expressed concern about impacts of ISEGS on habitat, plants, and wildlife, noting that the site provides outstanding desert tortoise habitat. He also noted serious concerns about the translocating desert tortoise, with a reminder of the disastrous experience with the translocation Fort Irwin military complex expansion. Mr. Deutsche commented that there must be assurances that the ISEGS translocation will not have similar results.

Response: Staff agrees that the ISEGS project would have significant impacts on habitat, plants, and wildlife, including desert tortoise, and staff shares Mr. Deutsche's concerns about the risks of translocation to desert tortoise. Staff's proposed Condition of Certification **BIO-9** describes the requirements for preparation of a detailed draft Translocation Plan that would be reviewed and approved by staff and would need to meet the standards of the USFWS and CDFG.

Deutsche Comment #2: Mr. Deutsche notes that if impacts to the biological resources at the site cannot be suitably mitigated, and if permits for the project are nevertheless granted, then the applicant, Bright Source, must be required to provide substantial compensation for the negative impacts that result.

Response: Staff agrees that the applicant must mitigate for significant CEQA impacts and must provide compensatory mitigation to satisfy other state and federal laws such as the state and federal endangered species acts. Staff's proposed conditions of certifications describe the elements of this compensatory mitigation.

Sierra Club – San Gorgonio Chapter letter dated January 22, 2009 (SC 2009a)

SC Comment #1: The Sierra Club urged rejection of the applicant's proposed habitat acquisition ratio of 1:1, and requested that the applicant be required to provide substantial compensation for the direct, indirect, and cumulative impacts to the biological resources of the Ivanpah Basin. The Sierra Club also requested that a thorough plan for the required compensation be completed prior to any California Energy Commission (CEC) decision on the merits of the application, and that the Private Land Alternative be given full consideration by the Energy Commission.

Response: Staff has rejected the applicant's 1:1 proposal for mitigation, and agrees that substantial compensation would be required for the impacts of the ISEGS project on biological resources. Staff also agrees that a complete and thorough compensation plan should be finalized before the Energy Commission makes a decision on the project. As described in the Alternatives section, the Private Land Alternative was considered, and was found to be a site with fewer biological resources, including desert tortoise.

SC Comment #2: The Sierra Club expressed concerns that the ISEGS project would: permanently impact over 4,000 acres of occupied desert tortoise habitat and fragment and degrade adjacent habitat; result in loss of breeding and foraging habitat for special-status wildlife; impact ten special-status plant species; disrupt the foraging areas and movement corridors of mule deer and desert bighorn sheep as they travel from the Clark Mountains.

Response: Staff has proposed numerous conditions of certification to avoid, minimize, and compensate for these significant impacts to biological resources.

SC Comment #3: The Sierra Club finds Applicant's proposed compensation for desert tortoise through habitat acquisition (or an assessed financial contribution) at a 1:1 ratio to be unacceptable. The Applicant's argument for a habitat acquisition ratio of 1:1 that the Ivanpah SEGS site is not "critical habitat" ignores the long-term and continued destruction of Mojave desert tortoise habitat.

Response: Staff has recommended a mitigation ratio of 3:1, as described in staff's proposed Condition of Certification **BIO-17**.

SC Comment #4: The Sierra Club notes that ten plant species listed by the California Native Plant Society would be directly impacted by construction of Ivanpah SEGS. Of even greater concern is the fact that the project would eliminate a substantial portion of the known occurrences within California of Rusby's desert-mallow, cave evening-primrose, Mojave milkweed, and desert pincushion.

Response: Staff agrees that project impacts to these species of plants are significant according to CEQA guidelines, and has proposed Condition of Certification BIO-18 with recommended avoidance measures. The cave evening-primrose would not be affected by the proposed project.

SC Comment #5: Sierra Club contends that the applicant must be required to provide substantial compensation for the direct, indirect, and cumulative impacts to the biological resources of the Ivanpah Basin. Habitat acquisition at a ratio of 5:1 and habitat enhancement to ensure that those lands are managed and maintained for wildlife and plants in perpetuity must be the central features of this compensation. Sierra Club readily agree with Staff's conclusions regarding impacts, but cannot endorse the "compensatory mitigation approach" that staff proposes. That approach is too nebulous given the level of compensation required of the Applicant. Simplicity is a virtue here -- acquisition of habitat at a ratio of 5:1 and enhancement of that habitat should be the foundation of the required compensation.

Response: Staff has recommended a mitigation ratio of 3:1, as described in the subsection on desert tortoise impacts and mitigation in this FSA/DEIS and in staff's proposed Condition of Certification **BIO-17**. This mitigation recommendation is consistent with CDFG and Energy Commission mitigation recommendations on other recent solar projects.

Jenny Wilder letter dated January 14, 2009 (PUB 2009b)

Wilder Comment: Ms. Wilder notes that there will be significant negative impact of the ISEGS project to the natural habitat and wildlife in the area.

Response: Staff agrees with Ms. Wilder's conclusion, as described in the subsection on impacts. Staff has provided mitigation measures in the conditions of certification to reduce these impacts to less-than-significant levels.

National Parks Conservation Association letter dated January 21, 2009 (NPCA 2009a)

NPCA Comment #1: NPCA recommends that all recommendations brought forth by the Biological Opinion of the USFWS be utilized if tortoises are to be relocated to ensure compliance with section 9 of the Endangered Species Act.

Response: This FSA/DEIS includes language in the discussion of LORS compliance requiring that the terms and conditions in the USFWS Biological Opinion be included in measures to protect desert tortoise during and after project construction.

NPCA Comment #2: NPCA urges that equitable mitigation ratio (5:1) be required for mitigation of any destruction of desert tortoise habitat. According to the California Department of Fish and Game (CDFG) a ratio of 5: 1 is offered for quality tortoise habitat. NPCA recommends that analysis based on the parameters set forth by CDFG be made and a just ratio be offered based on this assessment.

Response: Staff has recommended a mitigation ratio of 3:1, as described in the subsection on desert tortoise impacts and mitigation in this FSA/DEIS and in staff's proposed Condition of Certification **BIO-17**. The CDFG has not yet provided their recommendations to staff regarding needed mitigation ratios to fulfill their full mitigation standard.

NPCA Comment #3: NPCA urges the Joint-Lead Association (JLA) to utilize the Mojave Desert Land Trust to ensure that available mitigation properties that exist as in holdings within Mojave National Preserve be given first priority for acquisition. Mojave National Preserve is one of the few remaining refugia for healthy, high density population of the desert tortoise, based on its level of protection and high quality habitat. The purchase of in-holdings within Mojave National Preserve would bolster the acreage and protection of habitat available for this thriving population of desert tortoises.

Response: Staff agrees that these properties would provide suitable compensation lands.

Lynn Davis – email dated January 21, 2009 (PUB 2009c)

Davis Comment #1: Ms. Davis states that the development of the ISEGS project by Bright Source Energy, on over one million acres in our southwestern deserts will endanger or destroy many special-status plant species, degrade desert tortoise habitat to near extinction, accelerate water loss in a state desperately in need of a sustainable, long range water conservation strategy, eliminate thousands of acres of forage for Big Horn Sheep, mule deer, the endangered Golden Eagle and many other bird, animal and plant species. Immediate and cumulative affects will be catastrophic. I strongly urge, as a citizen of California, that Bright Source Energy be required to provide a FULL compensatory mitigation package. Mitigation must include like for like, acre for acre. It must meet the California Department of Fish and Game's FULL MITIGATION STANDARD.

Response: Staff agrees that the ISEGS project would result in significant impacts to desert tortoise and special-status plant species, and would contribute to significant cumulative impacts to biological resources in the Mojave Desert region, but does not agree with the other characterizations of impacts to resources such as big horn sheep and golden eagle. Staff has described the measures needed to fulfill CDFG's full mitigation standard in the subsection on desert tortoise impacts and mitigation.

Defenders of Wildlife letter dated January 23, 2009 (DOW 2009a)

DW Comment #1: Defenders of Wildlife strongly recommends that the project proponent do all it can to avoid impacts to tortoises first, then minimize those impacts that cannot be avoided, and finally, if all else fails, adequately mitigate for those impacts. To that end, Defenders strongly urges that the project follow the recommendations found in the current Desert Tortoise Recovery Plan for avoidance and minimization measures.

Response: Staff agrees that recommendations found in the current Desert Tortoise Recovery Plan (USFWS 2008a) provide appropriate guidance for avoidance and

minimization, and consulted this reference in the course of developing mitigation measures described in the section.

DW Comment #2: Defenders of Wildlife strongly opposes the 1:1 mitigation ratio proposed by the applicant; the recommended ratio for good quality tortoise habitat is 5:1. DFG determines mitigation ratios for desert tortoise based on: (1) presence of the species; (2) habitat quality; (3) disturbance level of habitat; (4) adjacent land uses; (5) connectivity; and (6) projected growth. Defenders of Wildlife would like to see an analysis of mitigation ratios addressing the above 6 parameters.

Response: Staff agrees that the applicant's proposed mitigation would not be adequate to fully mitigate for project impacts to desert tortoise. Staff also notes that the six parameters listed for development of mitigation ratios for impacts to desert tortoise were considered in staff's mitigation recommendations.

DW Comment #3: Staff should also consider the risks posed by the translocation program in structuring the compensatory mitigation program. The U.S. Army suspended its Desert Tortoise translocation program when at least 15% of the translocated tortoises died, mostly due to predation (see http://www.pe.com/localnews/inland/stories/PE_News_Local_S_tortoises10.450e731.html). The tremendous risks involved with translocation militate towards a higher compensatory mitigation ratio.

Response: Staff agrees that translocation poses a significant risk to desert tortoise. Staff's proposed Condition of Certification **BIO-9** would require preparation of a draft and final Translocation Plan, to be reviewed and approved by the staff in consultation with USWFS and CDFG. The Translocation Plan would include all possible measures to minimize harm to translocated and resident tortoise in the translocation area. The desert tortoise impact assessment and mitigation recommendations in this FSA/DEIS take into account the potential impacts associated with translocation.

DW Comment #4: Defenders of Wildlife requests that other impacts to tortoise be fully analyzed and addressed, such as new water sources that attract predators, impacts to tortoise water sources from proposed groundwater pumping, impacts from roads, and impacts from vegetation management. For example, if additional water sources will be placed on site, it could increase raven populations within the surrounding area. A raven monitoring plan would need to be included, as ravens can have a very detrimental impact on tortoises. In addition, while the project will obviously involve roads and a great deal of traffic (particularly during construction), the project application fails to consider the use of fencing to avoid impacts to the tortoise.

Response: Staff has addressed the issues raised by Defenders of Wildlife in the FSA/DEIS subsection discussing desert tortoise impacts and mitigation. Staff's proposed Condition of Certification **BIO-12** requires preparation of a Raven Management Plan. The USFWS is currently developing a raven management plan that would address some of these potential impacts on a regional basis and which would implement recommendations in the USFWS Environmental Assessment to

Implement a Desert Tortoise Recovery Plan Task: Reduce Common Raven Predation on the Desert Tortoise (USFWS 2008).

DW Comment #5: Defenders of Wildlife notes that the PSA mentions the use of translocation of desert tortoises as a part of the mitigation strategy. At this time Defenders is reviewing the new USFWS Guidelines for Clearance and Translocation of Desert Tortoises from the ISEGS project. We do not believe that translocation, in and of itself, provides adequate mitigation. Instead, any translocation must be in conjunction with the preservation of habitat. Further, the Translocation Plan will need to comply with the recommendations of the FWS 1994 Desert Tortoise Recovery Plan.

Response: Staff agrees that translocation is considered an avoidance measure rather than compensatory mitigation. Staff's proposed Condition of Certification BIO-9, the Translocation Plan, will be reviewed by USFWS and CDFG and will comply with the recommendations of the 1994 Desert Tortoise Recovery Plan.

DW Comment #6: Defenders urges that the Banded Gila Monster be included on the list of species to be analyzed and addressed. Recent scientific research has found that Gila monsters appear to use two overwintering sites (rocky hills and surrounding bajadas). D.F. DeNardo, et al., 2007 Desert Tortoise Council Symposium Abstract). Thus, this project could be important habitat for the Gila monster.

Response: Staff addressed potential impacts to banded Gila monsters in the PSA and FSA/DEIS. Staff's proposed Condition of Certification **BIO-11** requires that concurrent with the desert tortoise clearance survey, a biologist perform a preconstruction survey for Gila monsters in the project area, and implement appropriate impact avoidance and minimization measures if detected.

DW Comment #7: Defenders urges that the EIS/FSA assess the impacts to bighorn sheep. While the California Natural Diversity Database ("CNDDB") reports the last occurrence of bighorn sheep in this area to be in 1986, we understand that the Society for Bighorn Sheep possesses updated information showing that this project area is a wildlife corridor for bighorn sheep. Therefore, we strongly urge that this project analyze and address impact to bighorn sheep and their ability to move across the Ivanpah Valley. Furthermore, given the proposed pumping of groundwater, we strongly urge that the impacts of this pumping be analyzed and addressed with respect to potential impacts on the desert seeps and springs used by bighorn sheep.

Response: Staff is assuming in their analysis in the FSA/DEIS that the ISEGS project site is used occasionally by big horn sheep as foraging habitat. Regarding the impact of the project on seeps and springs used by big horn sheep, the **Soil & Water** section analyzed this issue, and concluded that the seeps and springs located in the Clark Mountain are ephemeral and located up gradient and over three miles away from the project's proposed pumping wells. The seeps and springs derive their water from precipitation further up gradient in the Clark Mountains and beyond the potential reach of any cone of depression that would result from the project's proposed groundwater pumping. Staff has therefore concluded that the project is unlikely to affect springs used by big horn sheep.

DW Comment #8: The project fails to acknowledge and address any impacts to the burrowing owl. In addition to being a Species of Special Concern, the burrowing owl is also protected under Fish and Game Code Section 3503.5 and the Migratory Bird Treaty Act. Impacts to burrowing owls must be assessed in the EIS/FSA. If impacts are found to exist, then the measures found in the DFG's Burrowing Owl Survey Protocol and Mitigation Guidelines should be adhered to.

Response: Staff has addressed the potential impacts of the project on burrowing owl, and has proposed Condition of Certification BIO-16 to avoid and minimize impacts to this species. This condition incorporates the CDFG guidance referred to by the commenter (CDFG guidelines (California Burrowing Owl Consortium 1993).

DW Comment #9: The project application details impacts to some plant species, particularly the barrel cactus and Mojave yucca. However, since the original plant surveys were admittedly conducted during a dry year, we strongly urge that additional surveying be conducted this spring in order to better assess impacts to a number of special-status plants and to prescribe adequate mitigation. We do not support deferring this analysis to pre-construction surveys. Indeed, given the biodiversity found on the project site during a dry year survey, we believe that this site contains a large number and extent of rare plants. With respect to mitigation as currently proposed in the application, we also strongly urge that the environmental documents do a much more thorough job of describing adequate mitigation should a rare plant show up on the project. Right now, the project application sets forth a list of potential mitigation strategies, but commits to none and analyzes none.

Response: Staff notes that the applicant conducted additional special-status plant surveys in 2008 in part because the 2007 surveys occurred during a dry year. This FSA/DEIS provides a detailed assessment of impacts to plants, and recommends avoidance measures to minimize these impacts in staff's proposed Condition of Certification **BIO-18**.

DW Comment #10: Defenders of Wildlife are very concerned about the extent of the impact of the proposed project on the Creosote Bush-White Bursage Barrel Cactus Community Type. With 10,000 acres of this plant community existing in 20 to 30 locations, the project appears to impact more than 1/3 of the community type. Such an impact appears to be very significant and must be fully analyzed and addressed in the EIS/FSA.

Response: The applicant supplied information from Dr. Todd Keeler-Wolf indicating that the density of barrel cacti on the ISEGS site was too low to meet the criteria for Creosote Bush-White Bursage Barrel Cactus Community Type (CH2M Hill 2008h). Staff does not consider this plant community type to be present at the ISEGS project site.

DW Comment #11: The proposed project will reroute and fill in a number of existing ephemeral washes that flow into the Ivanpah Dry Lake. The EIS/FSA must analyze and address impacts to the Dry Lake and fairy shrimp.

Response: The applicant proposes a Low Impact Development approach on the ISEGS site and relatively little grading would occur on the site or within drainages. The applicant estimates permanent and temporary Impacts to the ephemeral drainages to be 37.66 acres from roads, construction of the power block, substations, linear facilities and other project features. Staff considers this estimate an underestimate, and considers all 198 acres of state waters potentially vulnerable to disturbance from the project.

DW Comment #12: The EIS/FSA must analyze and address the impacts of the groundwater pumping on desert species and habitat.

Response: Staff analyzed the effects of ISEGS groundwater use, which would be no more than 100 acre-feet per year, in the **Soil & Water** section of this FSA/DEIS. Staff concluded effects on groundwater would be less than significant, and that the seeps and springs located in the Clark Mountain would not be affected by pumping because they are ephemeral and located upgradient and over three miles away from the project's proposed pumping wells. The seeps and springs derive their water from precipitation further upgradient in the Clark Mountains and beyond the potential reach of any cone of depression that would result from the project's proposed groundwater pumping. Staff has therefore concluded that the project's use of 100 acre-feet/year is not likely to affect desert wildlife.

DW Comment #13: The EIS/FSA must analyze and address impacts to migratory birds from this project, including any potential impacts from the evaporation ponds.

Response: Staff has addressed potential direct and indirect impacts to migratory birds in the proposed Condition of Certification BIO-15, which requires pre-construction nest surveys and avoidance if nests are detected. No evaporation ponds are proposed as part of the ISEGS project.

Tasha La Doux letter dated January 30, 2009 (PUB 2009d)

La Doux Comment #1: Ms. La Doux stated that the negative impacts of the project to desert tortoise are significant. If the project is approved the mitigation ratio should be based on the BLM/USFWS standard mitigation requirement of 5:1. The suggestion that desert tortoise can be moved as a mitigation measure is not taking into account the high death rate (>20%) experienced by Ft. Irwin when employing a similar method. Moving tortoises has proven to be a failed mitigation measure. In addition, the long-term and cumulative negative impacts to the desert tortoise population were not addressed.

Response: BLM and USFWS do not have a standard 5:1 mitigation ratio. Staff has recommended a mitigation ratio of 3:1, as described in the subsection on desert tortoise impacts and mitigation in this FSA/DEIS and in staff's proposed Condition of Certification **BIO-17**. The CDFG has not yet provided their recommendations to staff regarding needed mitigation ratios to fulfill their full mitigation standard. Staff does not agree that cumulative impacts to desert tortoise were not adequately evaluated; in the PSA and the FSA/DEIS staff concluded that the project would contribute to the significant cumulative impact to this species.

La Doux Comment #2: The PSA fails to address the significant negative impacts of this project to the movement of Desert Bighorn Sheep and Mule Deer between mountain ranges. The PSA states that these animals are "likely" to use the Ivanpah Valley as migration corridors, when the fact is these animals undoubtedly use each and every desert valley in the process of migrating from one mountain range to the next. The long-term and cumulative negative impacts to the native ungulate populations were not addressed in the PSA.

Response: Staff's contacts with experts (Jaeger 2009, Wehausen 2009) and review of the literature on this subject indicates there is little information available on use of the Ivanpah Valley by big horn sheep. The evidence suggests that seasonal intermountain migrations between the Clark Mountains and the State Line Hills occur through the mountains rather than valleys. Based on the available information, staff has concluded that the ISEGS site could be used for foraging by bighorn sheep, but is not a likely pathway for sheep moving between mountain ranges; sheep moving to ranges in Nevada would move northeast rather than due east toward the project site. Sheep would be unlikely to move due east because I-15 and the Ivanpah Dry Lake would be in their path.

Basin Range and Watch letter dated January 31, 2009 (BRW 2009a)

BRW Comment #1: Basin and Range Watch questioned whether few if any mitigation practices would be available to compensate for such a great loss of biological diversity. What are these mitigation practices? Will these plants be propagated from seed? If so where would they be planted? What will happen to succulents, yuccas and Joshua trees that are displaced? Will they be moved, sold for landscaping or destroyed? What habitats would be suitable for transplanting? What locations?

Response: Staff's proposed Condition of Certification **BIO-14** requires the applicant to prepare a final Closure, Revegetation and Rehabilitation Plan that would describe the disposition of the salvaged succulents, yuccas and Joshua trees. Staff does not consider this salvage operation to be mitigation for impacts to the project site's native plant communities, but rather as a contribution to the reclamation effort to revegetate areas temporarily disturbed by construction.

BRW Comment #2: Basin and Range Watch asked what mitigation would be taken to prevent the spread of noxious weeds. Would herbicides be used? If so, which ones? What risks would this have on native species and groundwater?

Response: Staff's proposed Condition of Certification **BIO-13** requires preparation of a Weed Management Plan, which would be based on the draft Weed Management Plan submitted by the applicant (CH2M Hill 2008e). This plan provides a discussion of weed eradication and control methods, including herbicides, and notes that all herbicide application shall be in accordance with Herbicide Treatment Standard Operating Procedures (Appendix B of the Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement).

BRW Comment #3: Basin and Range Watch asked if the site would be surveyed for banded Gila monster, and if so, what methods would be used?

Response: Staff addressed potential impacts to banded Gila monsters in the PSA and FSA/DEIS. Staff's proposed Condition of Certification BIO-11 requires that concurrent with the desert tortoise clearance survey, a qualified biologist experienced with Gila monster survey and capture techniques shall perform a preconstruction survey for Gila monsters in the project area, and relocate the animal in consultation with CDFG and USFWS.

BRW Comment #4: Basin and Range Watch commented that the finding of 97 desert tortoise carcasses may indicate a problem with respiratory disease or possible some other impact. How can a project that destroys so much habitat for this species be considered when such a die off is noted? A line distance sampling survey should be conducted during activity seasons for the next couple of years before approval of this project is considered.

Response: Carcasses of desert tortoise are routinely found during surveys in suitable desert tortoise habitat; staff does not believe the number of carcasses found during the surveys at the ISEGS site indicate a die off. Staff does not believe that line distance sampling surveys for two additional years would provide new information that would change the analysis, conclusions or mitigation measures in this FSA/DEIS; staff is already assuming that the ISEGS site is good quality desert tortoise habitat, and developing a more accurate estimate of the number of tortoise inhabiting the site would not change the proposed compensatory mitigation.

BRW Comment #5: Basin and Range Watch had the following questions regarding the desert tortoise clearance surveys and translocation: (1) Will total clearance be done where all tortoises be found and removed, including digging out burrows? Please specify this. (2) Where will mitigation land be bought? (3) Will all tortoises be placed on the same mitigation land? What will be the location? Will follow-up studies be carried out to determine the success of translocation and survival? How will coyote and other predation be prevented on translocated tortoises?

Response: (1) Staff's proposed Condition of Certification **BIO-8** provides specific guidance on the conduct of desert tortoise clearance surveys, which would include excavation of potential burrows in accordance with USFWS guidelines. (2) The location of the compensatory mitigation lands for desert tortoise has not yet been specified, but staff's proposed Condition of Certification **BIO-17** would provide criteria for the location and characteristics of these lands. (3) Staff's proposed Condition of Certification **BIO-9** requires preparation of a desert tortoise Translocation Plan, which would include measures to monitor the survival of the translocated tortoise and to address potential predation on these animals.

BRW Comment #6: What kind of reduction measures would be taken to minimize raven predation on tortoises? If native predators are to be exterminated, the EIS needs to explain how this will take place. Will the same measures apply to coyotes on the translocation site? The EIS should be able to describe and admit the unattractive details that will need to be implemented for predator reduction.

Response: Staff agrees that predator control for ravens and coyotes should be thoroughly addressed in the Translocation Plan that would need to be developed to comply with staff's proposed Condition of Certification **BIO-9**.

BRW Comment #7: Basin and Range Watch asks if there will be pre-construction nesting bird surveys and if avoidance measures will be implemented. If construction takes place during the nesting season, will protection be given to nesting birds on the construction site, such as taping off the nesting area until nesting is complete for Brewer's sparrow, Le Conte's thrasher?

Response: Staff's proposed Condition of Certification **BIO-15** requires preconstruction bird surveys to be conducted prior to any construction activities occurring February 1 through August 31. If nests of any species are detected this condition requires establishment of a buffer zone (protected area surrounding the nest, the size of which is to be determined by the Designated Biologist in consultation with CDFG) and development of a monitoring plan to ensure the nest is protected.

BRW Comment #8: Where would burrowing owls be relocated to?

Response: Staff's proposed Condition of Certification **BIO-16** requires pre-construction nest surveys and protection of any nests found on the project site.

BRW Comment #9: "The applicant acknowledges that Nelson's big horn sheep could occur in the project area (CH2M Hill 2008a). However, the AFC (BSG 2007a) does not provide sufficient project-specific information on use of the site by Nelson's big-horn sheep to identify areas that might provide foraging habitat and movement corridors, to assess potential impacts, or to develop appropriate mitigation measures. It may be possible to offset potential project impacts to Nelson's bighorn sheep with implementation of Condition of Certification **BIO-17**, the compensatory mitigation plan, if the plan included enhancement measures that would benefit bighorn." The PSA seems to recognize this problem of foraging habitat, but provides no solution to the problem. The project should be delayed until more attention is given to this issue.

Response: No site-specific information exists on use of the site by big-horn sheep, but based on consultation with big horn sheep experts, staff assumes that portions of the ISEGS site are occasionally used for foraging. Staff's proposed Condition of Certification **BIO-19** would mitigate for project impacts to bighorn sheep by requiring the applicant to acquire and construct an artificial water source in the eastern part of the Clark Mountain range or in the State Line Hills outside of designated Wilderness.

BRW Comment #10: Transporting dangerous chemicals poses a threat to native plants and wildlife as well as people in local areas and nearby communities. This proposes an unneeded public health risk. Please make a list of potential impacts hazardous material may have on specific flora and fauna including desert tortoise, bighorn sheep, rare plants and other wildlife.

Response: The **Hazardous Materials Management** section of this FSA/DEIS provides a comprehensive assessment of the hazardous materials that would be handled, stored or transported during construction and operation of the ISEGS project. Staff has concluded after reviewing this section that, with implementation of mitigation measures recommended in that section, hazardous materials would not pose a significant risk to native plant communities or wildlife at and near the ISEGS project site.

BRW Comment #11: Will tortoise monitoring and exclusion fences be placed along all new pipelines constructed in both California and Nevada?

Response: Staff cannot speak to the mitigation measures that would be implemented on pipeline projects in California and Nevada except to say that any projects that would be permitted by the Energy Commission or BLM would need to comply with LORS, including protection of desert tortoise and other special-status plant and wildlife species.

BRW Comment #12: Will tortoise exclusion fences and biological monitors be present during all phases of upgrading and construction of transmission lines? Will new lines be insulated to prevent bird electrocution?

Response: Staff's proposed Condition of Certification **BIO-11** requires a biological monitor to be present for any activities that have potential to impact desert tortoise, which would include upgrading and construction of transmission lines. This condition also requires that the project owner design, install, and maintain transmission lines and all electrical components in accordance with the Avian Power Line Interaction Committee's *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* to reduce the likelihood of electrocutions of large birds.

BRW Comment #13: (1) Will tortoise exclusion fences and biological monitors be present during grading of new roads in desert habitat? (2) Will tortoises encountered in burrows be removed and placed away from construction? (3)How will any Gila monsters encountered underground be dealt with to protect them? (4) Will cacti and yuccas be moved or discarded in new roads? (5) Will mitigation habitat equal to the amount of desert habitat destroyed for new roads be purchased by the applicant?

Response: (1) Staff's proposed Condition of Certification **BIO-11** requires a biological monitor to be present for any activities that have potential to impact desert tortoise, which would include new road construction. (2) Staff's proposed Condition of Certification **BIO-9** requires tortoise encountered during construction to be relocated as described in the Translocation Plan. (3) Staff's proposed Condition of Certification **BIO-11** requires that concurrent with the desert tortoise clearance survey, a biologist perform a preconstruction survey for Gila monsters in the project area, and implement appropriate impact avoidance and minimization measures if detected. (4) Staff's proposed Condition of Certification **BIO-14** addresses the salvage and disposition of plant material, including cacti or yuccas impacted by new roads. (5) Habitat impacted by new roads has been included in the calculations of acreage that would require compensatory mitigation.

BRW Comment #14: Would detention basin maintenance affect tortoises, and how will this be mitigated? Will tortoise exclusion fences be maintained? Will tortoises be allowed to access the detention basins?

Response: Detention basins are no longer included as part of the ISEGS project. Desert tortoise fences would be maintained for the life of the project as described in staff's proposed Condition of Certification **BIO-8**.

> BRW Comment #15: An herbicide would be used to eradicate noxious weeds and nonnative species." How will herbicide spraying be controlled so that toxins do not blow into adjacent deserts or accumulate in dust that blows into desert habitats nearby during windstorms?

Response: Staff's proposed Condition of Certification **BIO-13** requires preparation of a Weed Management Plan, which would be based on the draft Weed Management Plan submitted by the applicant (CH2M Hill 2008e). This plan provides a discussion of weed eradication and control methods, including herbicides, and notes that all herbicide application shall be in accordance with Herbicide Treatment Standard Operating Procedures (Appendix B of the Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement).

Center for Biological Diversity letter dated July 8, 2009 (CBD 2009a)

CBD Comment #1: With the majority of the site comprised of heliostat mirrors, which only reflect and focus the sun's ray on the power tower and do not contain any superheated liquids, there may be opportunities to conserve some of the existing on-site vegetation and habitat, which would avoid and minimize the impacts to the existing biological resources. In fact, solar farms are including habitat features into their project design http://www.optisolarfarms.ca/sarnia.htm. This same type of solar technology already installed and producing solar energy in Spain includes vegetation between the mirrors. Despite the problems of habitat fragmentation, vegetation islands provide stepping stones for wildlife across the site and are an improvement over complete vegetation removal.

> Response: Staff agrees that there may be opportunities for preservation of habitat within the solar fields with the applicant's low impact development approach, and has discussed this in the subsection on impacts to special-status plant species.

CBD Comment #2: Potential Minimization by Preservation of Vegetation: One of the maintenance issues with the heliostat mirrors is dust deposition resulting in decreased efficiency. Maintaining native vegetation will help to keep the fragile soils in place on the project site, reducing the amount of soil particles that could get airborne and be deposited on the mirrors. This will in turn reduce the need for groundwater pumping to provide water to wash the mirrors. Leaving vegetation in place provides the additional benefit of not increasing the particulate matter (PM) in the already compromised Mojave Desert Air Quality Management District. We urge CEC staff to more fully explore the benefits of maintaining vegetation and habitat on site for this proposed project in the Final Staff Assessment.

Response: Staff agrees that maintaining as much vegetation as possible would help minimize soil erosion and dust, and has incorporated recommendations to preserve vegetation and revegetate where appropriate into staff's proposed Conditions of Certification **BIO-11**, **BIO-14**, and **BIO-20.**

CBD Comment #3: Desert Tortoise: Analysis of Impacts is Inadequate and the Translocation Plan is Unsupportable. The desert tortoise is continuing to decline throughout its range (USFWS 2008) despite being under federal and state Endangered Species Acts protection as threatened. Prior to 2002, the project area was designated by BLM as Category 1 habitat for desert tortoise – the best desert tortoise habitat. The Northern and Eastern Mojave Plan (BLM 2002) changed that designation, not based on any site specific science, but on the establishment of Desert Wildlife Management Areas (DWMA's) elsewhere.

Response: Staff does not agree that the analysis of impacts to desert tortoise is inadequate, and believes that the conclusion of significant impacts to this species is well supported by the analysis in this section. Staff notes that the revised Translocation Plan and subsequent submittals from the applicant, which were provided after this letter was received, have supplied much of the information that was missing from the earlier Translocation Plan. Staff is aware of the former and current BLM habitat classifications for the ISEGS project site, and based conclusions about impacts to desert tortoise on the site specific surveys and information provided by the applicant on the existing habitat conditions at the ISEGS project area.

CBD Comment #4: New science has become available since our scoping comments for the federal process (CBD scoping comment letter dated November 30, 2007). Murphy et al. (2007) undertook extensive genetic analysis across the range of the desert tortoise and identified genetically unique populations within the larger listed population. The desert tortoises located on the Ivanpah site represent a unique genetic group – the northeastern Mojave group. This localized area around the Ivanpah area is the only location of this unique genotype in California. Because these animals represent such a unique occurrence in California, adequate avoidance, minimization and mitigation must be applied to this project. The uniqueness of this population is also recognized both in the 1994 Desert Tortoise Recovery Plan (USFWS 1994) and the draft Revised Recovery Plan (USFWS 2008) as the North Eastern Mojave Recovery Unit and the Murphy et al. paper only confirms the uniqueness of this population.

Response: Staff is aware of the studies by Murphy et al. (2007) and the recommendations in the USFWS recovery plans and relied in part on these references to arrive at the conclusions described in the cumulative impact subsection.

CONCLUSIONS

The Ivanpah Solar Electric Generating System (ISEGS) project would have major impacts to the biological resources of the Ivanpah Valley, affecting many sensitive plant and wildlife species and eliminating a broad expanse of relatively undisturbed Mojave

Desert habitat. Approximately 4,073 acres of occupied desert tortoise habitat would be permanently lost and a minimum of 25 desert tortoises would need to be translocated west of the ISEGS project site. These actions require state and federal endangered species "take" authorization. In addition to direct loss of habitat, the project would fragment and degrade adjacent habitat, and could promote the spread of invasive non-native plants and desert tortoise predators such as ravens. These impacts would directly and adversely affect habitat for a threatened species (the desert tortoise), and would likely be highly controversial. Based on these factors, the proposed project would result in impacts that would be significant with respect to NEPA significance criteria in 40 CFR 1508.27.

Other special-status wildlife species potentially impacted by the project because of loss of breeding and/or foraging habitat include burrowing owl, loggerhead shrike, Crissal thrasher, golden eagle, and American badger. The project would also affect segments of approximately 2,000 ephemeral drainages on the ISEGS site, potentially resulting in direct or indirect impacts to the wildlife functions and values provided by 198 acres of waters of the state.

The ISEGS project site supports a diverse flora including numerous special-status plant species. Eight special-status plant species, only one of which is considered sensitive by BLM, would be directly impacted by construction of ISEGS. Energy Commission staff consider impacts to five of these (Mojave milkweed, desert pincushion, nine-awned pappus grass, Parish's club-cholla, and Rusby's desert-mallow) to be significant according to California Environmental Quality Act guidelines because the project would eliminate a substantial portion of their documented occurrences in the state. Depending on the degree of avoidance that the applicant can achieve, staff's proposed avoidance and minimization measures may reduce impacts to three of these species (desert pincushion, nine-awned pappus grass, and Parish's club-cholla) to less-than-significant levels. However, impacts to Mojave milkweed and Rusby's desert mallow would remain significant even after implementation of the special-status plant avoidance and minimization measures described in Energy Commission staff's proposed conditions of certification.

Staff have concluded that without mitigation the ISEGS project would be a substantial contributor to the cumulatively significant loss of Ivanpah Valley's biological resources, including the threatened desert tortoise and other special-status species. For most project impacts to biological resources staff has developed impact avoidance, minimization and mitigation measures that would reduce impacts to less-than-significant levels. **Biological Resources Table 8** provides a summary of these conditions.

BIOLOGICAL RESOURCES TABLE 8
Summary of Conditions of Certification

#	Condition of Certification
BIO-1	Designated Biologist Selection and Qualifications
BIO-2	Designated Biologist Duties
BIO-3	Biological Monitor Selection and Qualifications
BIO-4	Designated Biologist Duties
BIO-5	Designated Biologist and Biological Monitor Authority
BIO-6	Worker Environmental Awareness Program
BIO-7	Biological Resources Mitigation Implementation & Monitoring Plan
BIO-8	Desert Tortoise Clearance Surveys and Fencing
BIO-9	Desert Tortoise Translocation Plan
BIO-10	Desert Tortoise Compliance Verification
BIO-11	Impact Avoidance and Minimization Measures
BIO-12	Raven Management Plan
BIO-13	Weed Management Plan
BIO-14	Closure, Revegetation and Rehabilitation Plan
BIO-15	Pre-Construction Nest Surveys
BIO-16	Burrowing Owl Impact Avoidance and Minimization Measures
BIO-17	Desert Tortoise Compensatory Mitigation
BIO-18	Special-Status Plant Mitigation
BIO-19	Desert Tortoise Sheep Mitigation
BIO-20	Streambed Impact Avoidance and Compensation Measures

Energy Commission staff have concluded that the 2:1 compensatory mitigation, as described in staff's proposed Condition of Certification **BIO-17**, combined with the BLM 1:1 mitigation, would meet CESA's full mitigation standard pending resolution of the few issues described below. Staff considers the combination of these two mitigation approaches to be a complementary and complete mitigation package that would achieve 3:1 mitigation and would satisfy federal and state requirements for mitigating impacts to desert tortoise. However, a few issues need to be resolved before finalizing this complementary BLM-Energy Commission mitigation package:

- In Perpetuity Protection: Mitigation lands must be protected in perpetuity to satisfy CDFG requirements. For BLM mitigation, acquisition of private lands within the DWMAs and the Mojave National Preserve would satisfy this requirement because the surrounding protective land uses would prevail. If other lands were acquired that were not within such protected areas, BLM would need to provide some sort of assurances for long-term protection if these lands are to be counted as fulfilling part of CESA's full mitigation standard. To address this issue BLM has recently proposed development of deed restriction language and a Memorandum of Understanding between BLM and CDFG to offer protection to BLM-managed mitigation lands.
- Enhancement Actions: Staff has yet to develop a specific program of enhancement actions other than land acquisition that would fulfill BLM's 1:1 mitigation requirements and CESA's full mitigation standard. Proposed enhancement actions on BLM lands such as fencing and habitat restoration would need to be fully analyzed and disclosed to satisfy NEPA requirements. BLM and will collaborate with

Energy Commission staff, CDFG and the USFWS in the development of specific desert tortoise enhancement actions.

- Process for Mitigation Compliance: Staff needs to integrate CDFG and BLM mitigation processes and develop a mechanism that provides compliance monitoring of enhancement actions on BLM lands. For land acquisitions, BLM, CDFG and the Energy Commission have well developed and transparent procedures to track expenditures and acquisitions. However, a similar mechanism is needed to verify fulfillment of enhancement actions such as fencing or habitat restoration on BLM lands, and provide a process for compliance monitoring. BLM and Energy Commission staff will work together to develop a process that allows tracking and verification of enhancement actions for desert tortoise.

Energy Commission staff has determined that if these issues are resolved, the proposed land acquisitions and enhancement activities would satisfy requirements of the California Endangered Species Act. Except for the special-status plant impacts described above, this mitigation would also reduce CEQA impacts to less-than-significant levels.

The CDFG has not yet provided concurrence with this mitigation approach for desert tortoise compensation, or with staff's proposed Conditions of Certification, **BIO-9** (desert tortoise translocation plan) and **BIO-20** (streambed impact avoidance and compensation measures). These two conditions of certification serve to satisfy terms and conditions that, but for the Energy Commission's exclusive authority under the Warren Alquist Act, would have been included in the states Incidental Take Permit (California Endangered Species Act (Fish and Game Code §§ 2050 et seq.) and the Lake and Streambed Alteration Agreement (California Fish and Game Code §§ 1600 1607).

Energy Commission staff has determined that if these issues are resolved, the proposed land acquisitions and enhancement activities would satisfy requirements of the California Endangered Species Act. Except for the special-status plant impacts described above, this mitigation would also reduce CEQA impacts to less-than-significant levels.

Staff anticipates resolution of the outstanding issues by working closely and cooperatively with USFWS, CDFG, and the applicant to finalize a mitigation and enhancement plan for desert tortoise.

MITIGATION MEASURES/PROPOSED CONDITIONS OF CERTIFICATION

DESIGNATED BIOLOGIST SELECTION AND QUALIFICATIONS[3]

BIO-1 The project owner shall assign at least one Designated Biologist to the project. The project owner shall submit the resume of the proposed Designated Biologist(s), with at least three references and contact information, to the Energy Commission Compliance Project Manager (CPM) and BLM's Authorized Officer for approval in consultation with CDFG and USFWS.

The Designated Biologist must meet the following minimum qualifications:

1. Bachelor's degree in biological sciences, zoology, botany, ecology, or a closely related field;

2. Three years of experience in field biology or current certification of a nationally recognized biological society, such as The Ecological Society of America or The Wildlife Society;

3. Have at least one year of field experience with biological resources found in or near the project area;

4. Meet the current USFWS Authorized Biologist qualifications criteria (USFWS 2008), demonstrate familiarity with protocols and guidelines for the desert tortoise, and be approved by the USFWS; and

5. Possess a California ESA Memorandum of Understanding pursuant to Section 2081(a) for desert tortoise.

In lieu of the above requirements, the resume shall demonstrate to the satisfaction of BLM's Authorized Officer and the CPM, in consultation with CDFG and USFWS, that the proposed Designated Biologist or alternate has the appropriate training and background to effectively implement the conditions of certification.

Verification: The project owner shall submit the specified information at least 90 days prior to the start of any project-related site disturbance activities. No site or related facility activities shall commence until an approved Designated Biologist is available to be on site.

[3] USFWS <www.fws.gov/ventura/speciesinfo/protocols_guidelines/docs/dt> designates biologists who are approved to handle tortoises as "Authorized Biologists." Such biologists have demonstrated to USFWS that they possess sufficient desert tortoise knowledge and experience to handle and move tortoises appropriately, and have received USFWS approval. Authorized Biologists are permitted to then approve specific monitors to handle tortoises, at their discretion. The California Department of Fish and Game (CDFG) must also approve such biologists, potentially including individual approvals for monitors approved by the Authorized Biologist. Designated Biologists are the equivalent of Authorized Biologists. Only Designated Biologists and certain Biological Monitors who have been approved by the Designated Biologist would be allowed to handle desert tortoises.

If a Designated Biologist needs to be replaced, the specified information of the proposed replacement must be submitted to BLM's Authorized Officer and the CPM at least 10 working days prior to the termination or release of the preceding Designated Biologist. In an emergency, the project owner shall immediately notify the BLM Authorized Officer and the CPM to discuss the qualifications and approval of a short-term replacement while a permanent Designated Biologist is proposed to BLM's Authorized Officer and the CPM and for consideration.

Designated Biologists shall complete a USFWS Qualifications Form (USFWS 2008) (www.fws.gov/ventura/speciesinfo/protocols_guidelines) and submit it to the USFWS, BLM's Authorized Officer and the CPM within 60 days prior to ground breaking for review and final approval.

DESIGNATED BIOLOGIST DUTIES

BIO-2 The project owner shall ensure that the Designated Biologist performs the following during any site (or related facilities) mobilization, ground disturbance, grading, construction, operation, and closure activities. The Designated Biologist may be assisted by the approved Biological Monitor(s) but remains the contact for the project owner, BLM's Authorized Officer and the CPM. The Designated Biologist Duties shall include the following:

1. Advise the project owner's Construction and Operation Managers on the implementation of the biological resources conditions of certification;

2. Consult on the preparation of the Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP) to be submitted by the project owner;

3. Be available to supervise, conduct and coordinate mitigation, monitoring, and other biological resources compliance efforts, particularly in areas requiring avoidance or containing sensitive biological resources, such as special-status species or their habitat;

4. Clearly mark sensitive biological resource areas and inspect these areas at appropriate intervals for compliance with regulatory terms and conditions;

5. Inspect active construction areas where animals may have become trapped prior to construction commencing each day. At the end of the day, inspect for the installation of structures that prevent entrapment or allow escape during periods of construction inactivity. Periodically inspect areas with high vehicle activity (e.g., parking lots) for animals in harm's way;

6. Notify the project owner and BLM's Authorized Officer and the CPM of any non-compliance with any biological resources condition of certification;

7. Respond directly to inquiries of BLM's Authorized Officer and the CPM regarding biological resource issues;

8. Maintain written records of the tasks specified above and those included in the BRMIMP. Summaries of these records shall be submitted in the Monthly Compliance Report and the Annual Compliance Report;

9. Train the Biological Monitors as appropriate, and ensure their familiarity with the BRMIMP, Worker Environmental Awareness Program (WEAP) training, and USFWS guidelines on desert tortoise surveys and handling procedures <www.fws.gov/ventura/speciesinfo/protocols_guidelines>, and; and

10. Maintain the ability to be in regular, direct communication with representatives of CDFG, USFWS, BLM's Authorized Officer and the CPM, including notifying these agencies of dead or injured listed species and reporting special-status species observations to the California Natural Diversity Data Base.

Verification: The Designated Biologist shall submit in the Monthly Compliance Report to BLM's Authorized Officer and the CPM and copies of all written reports and summaries that document biological resources compliance activities. If actions may affect biological resources during operation a Designated Biologist shall be available for monitoring and reporting. During project operation, the Designated Biologist shall submit record summaries in the Annual Compliance Report unless his/her duties cease, as approved by BLM's Authorized Officer and the CPM.

BIOLOGICAL MONITOR SELECTION AND QUALIFICATIONS

BIO-3 The project owner's BLM- and CPM-approved Designated Biologist shall submit the resume, at least three references, and contact information of the proposed Biological Monitors to BLM's Authorized Officer and the CPM. The resume shall demonstrate, to the satisfaction of the CPM the appropriate education and experience to accomplish the assigned biological resource tasks. The Biological Monitor is the equivalent of the USFWS designated Desert Tortoise Monitor (USFWS 2008).

Biological Monitor(s) training by the Designated Biologist shall include familiarity with the conditions of certification, BRMIMP, WEAP, USFWS guidelines on desert tortoise surveys and handling procedures <www.fws.gov/ventura/speciesinfo/protocols_guidelines>.

Verification: The project owner shall submit the specified information to the BLM's Authorized Officer and the CPM for approval at least 30 days prior to the start of any project-related site disturbance activities. The Designated Biologist shall submit a written statement to BLM's Authorized Officer and the CPM confirming that individual Biological Monitor(s) has been trained including the date when training was completed. If additional biological monitors are needed during construction the specified information shall be submitted to BLM's Authorized Officer and the CPM and for approval at least 10 days prior to their first day of monitoring activities.

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BIOLOGICAL MONITOR DUTIES

BIO-4 The Biological Monitors shall assist the Designated Biologist in conducting surveys and in monitoring of mobilization, ground disturbance, grading, construction, operation, and closure activities. The Designated Biologist shall remain the contact for the project owner, BLM's Authorized Officer and the CPM.

Verification: The Designated Biologist shall submit in the Monthly Compliance Report to BLM's Authorized Officer and the CPM and copies of all written reports and summaries that document biological resources compliance activities, including those conducted by Biological Monitors. If actions may affect biological resources during operation a Biological Monitor, under the supervision of the Designated Biologist, shall be available for monitoring and reporting. During project operation, the Designated Biologist shall submit record summaries in the Annual Compliance Report unless their duties cease, as approved by BLM's Authorized Officer and the CPM.

DESIGNATED BIOLOGIST AND BIOLOGICAL MONITOR AUTHORITY

BIO-5 The project owner's construction/operation manager shall act on the advice of the Designated Biologist and Biological Monitor(s) to ensure conformance with the biological resources conditions of certification.

The Designated Biologist shall have the authority to immediately stop any activity that is not in compliance with these conditions and/or order any reasonable measure to avoid take of an individual of a listed species. If required by the Designated Biologist and Biological Monitor(s) the project owner's construction/operation manager shall halt all site mobilization, ground disturbance, grading, construction, and operation activities in areas specified by the Designated Biologist. The Designated Biologist shall:

1. Require a halt to all activities in any area when determined that there would be an unauthorized adverse impact to biological resources if the activities continued;

2. Inform the project owner and the construction/operation manager when to resume activities; and

3. Notify BLM's Authorized Officer and the CPM and if there is a halt of any activities and advise them of any corrective actions that have been taken or will be instituted as a result of the work stoppage.

If the Designated Biologist is unavailable for direct consultation, the Biological Monitor shall act on behalf of the Designated Biologist.

Verification: The project owner shall ensure that the Designated Biologist or Biological Monitor notifies BLM's Authorized Officer and the CPM immediately (and no later than the morning following the incident, or Monday morning in the case of a weekend) of any non-compliance or a halt of any site mobilization, ground disturbance, grading, construction, and operation activities. The project owner shall notify BLM's Authorized Officer and the CPM of the circumstances and actions being taken to resolve the problem.

Whenever corrective action is taken by the project owner, a determination of success or failure will be made by BLM's Authorized Officer and the CPM within five working days after receipt of notice that corrective action is completed, or the project owner will be notified by BLM's Authorized Officer and the CPM that coordination with other agencies will require additional time before a determination can be made.

WORKER ENVIRONMENTAL AWARENESS PROGRAM (WEAP)

BIO-6 The project owner shall develop and implement an Ivanpah SEGS-specific Worker Environmental Awareness Program (WEAP) and shall secure approval for the WEAP from USFWS, CDFG, BLM's Authorized Officer and the CPM. The WEAP shall be administered to all onsite personnel including surveyors, construction engineers, employees, contractors, contractor's employees, supervisors, inspectors, subcontractors, and delivery personnel. The WEAP shall be implemented during site mobilization, ground disturbance, grading, construction, operation, and closure. The WEAP shall:

1. Be developed by or in consultation with the Designated Biologist and consist of an on-site or training center presentation in which supporting written material and electronic media, including photographs of protected species, is made available to all participants. The training presentation shall be made available in the language best understood by the participants;

2. Discuss the locations and types of sensitive biological resources on the project site and adjacent areas, and explain the reasons for protecting these resources; provide information to participants that Gila monsters are venomous and should not be handled, and that no snakes, reptiles, or other wildlife shall be harmed;

3. Place special emphasis on desert tortoise, including information on physical characteristics, distribution, behavior, ecology, sensitivity to human activities, legal protection, penalties for violations, reporting requirements, and protection measures;

4. Include a discussion of fire prevention measures to be implemented by workers during project activities; request workers dispose of cigarettes and cigars appropriately and not leave them on the ground or buried;

5. Present the meaning of various temporary and permanent habitat protection measures;

6. Identify whom to contact if there are further comments and questions about the material discussed in the program; and

7. Include a training acknowledgment form to be signed by each worker indicating that they received training and shall abide by the guidelines.

The specific program can be administered by a competent individual(s) acceptable to the Designated Biologist.

Verification: At least 60 days prior to the start of any project-related site disturbance activities, the project owner shall provide to BLM's Authorized Officer and the CPM a copy of the draft WEAP and all supporting written materials and electronic media prepared or reviewed by the Designated Biologist and a resume of the person(s) administering the program.

The project owner shall provide in the Monthly Compliance Report the number of persons who have completed the training in the prior month and a running total of all persons who have completed the training to date. At least 10 days prior to site and related facilities mobilization, the project owner shall submit two copies of the BLM- and CPM-approved final WEAP.

Training acknowledgement forms signed during construction shall be kept on file by the project owner for at least six months after the start of commercial operation.

Throughout the life of the project, the worker education program shall be repeated annually for permanent employees, and shall be routinely administered within one week of arrival to any new construction personnel, foremen, contractors, subcontractors, and other personnel potentially working within the project area. Upon completion of the orientation, employees shall sign a form stating that they attended the program and understand all protection measures. These forms shall be maintained by the project owner and shall be made available to BLM's Authorized Officer and the CPM and upon request. Workers shall receive and be required to visibly display a hardhat sticker or certificate that they have completed the training.

During project operation, signed statements for operational personnel shall be kept on file for six months following the termination of an individual's employment.

BIOLOGICAL RESOURCES MITIGATION IMPLEMENTATION AND MONITORING PLAN (BRMIMP)

BIO-7 The project owner shall develop a BRMIMP and submit two copies of the proposed BRMIMP to the BLM-Authorized Officer and the CPM (for review and approval) and shall implement the measures identified in the approved BRMIMP. The BRMIMP shall incorporate avoidance and minimization measures described in final versions of the Desert Tortoise Translocation Plan, the Raven Management Plan, the Closure, Revegetation and Rehabilitation Plan, the Burrowing Owl Mitigation and Monitoring Plan, and the Weed Management Plan.

The BRMIMP shall be prepared in consultation with the Designated Biologist and include the following:

1. All biological resources mitigation, monitoring, and compliance measures proposed and agreed to by the project owner;

2. All biological resources conditions of certification identified as necessary to avoid or mitigate impacts;

3. All biological resource mitigation, monitoring and compliance measures required in federal agency terms and conditions, such as those provided in the USFWS Biological Opinion;

4. All sensitive biological resources to be impacted, avoided, or mitigated by project construction, operation, and closure;

5. All required mitigation measures for each sensitive biological resource;

6. A detailed description of measures that shall be taken to avoid or mitigate temporary disturbances from construction activities;

7. All locations on a map, at an approved scale, of sensitive biological resource areas subject to disturbance and areas requiring temporary protection and avoidance during construction and operation;

8. Aerial photographs, at an approved scale, of all areas to be disturbed during project construction activities; include one set prior to any site or related facilities mobilization disturbance and one set subsequent to completion of project construction. Provide planned timing of aerial photography and a description of why times were chosen. Provide a final accounting of the before/after acreages and a determination of whether additional habitat compensation is necessary in the Construction Termination Report;

9. Duration for each type of monitoring and a description of monitoring methodologies and frequency;

10. Performance standards to be used to help decide if/when proposed mitigation is or is not successful;

11. All performance standards and remedial measures to be implemented if performance standards are not met;

12. A discussion of biological resources-related facility closure measures including a description of funding mechanism(s); and

13. A process for proposing plan modifications to BLM's Authorized Officer and the CPM and appropriate agencies for review and approval; and

Verification: The project owner shall submit the BRMIMP to the BLM Authorized Officer and the CPM at least 60 days prior to start of any project-related site disturbance activities. The BRMIMP shall contain all of the required measures included in all biological Conditions of Certification. No ground disturbance may occur prior to approval of the final BRMIMP by BLM's Authorized Officer and the CPM.

BLM's Authorized Office and the CPM, in consultation with other appropriate agencies, will determine the BRMIMP's acceptability within 45 days of receipt. If there are any permits that have not yet been received when the BRMIMP is first submitted, these permits shall be submitted to BLM's Authorized Office and the CPM within five days of their receipt, and the BRMIMP shall be revised or supplemented to reflect the permit

condition within at least 10 days of their receipt by the project owner. Ten days prior to site and related facilities mobilization the revised BRMIMP shall be resubmitted to BLM's Authorized Officer and the CPM.

The project owner shall notify BLM's Authorized Officer and the CPM and no less than five working days before implementing any modifications to the approved BRMIMP to obtain BLM's Authorized Officer and CPM approval.

Any changes to the approved BRMIMP must also be approved by BLM's Authorized Officer and the CPM and in consultation with appropriate agencies to ensure no conflicts exist.

Implementation of BRMIMP measures (construction activities that were monitored, species observed) will be reported in the Monthly Compliance Reports by the Designated Biologist. Within 30 days after completion of project construction, the project owner shall provide to BLM's Authorized Officer and the CPM, for review and approval, a written construction termination report identifying which items of the BRMIMP have been completed, a summary of all modifications to mitigation measures made during the project's site mobilization, ground disturbance, grading, and construction phases, and which mitigation and monitoring items are still outstanding.

DESERT TORTOISE CLEARANCE SURVEYS AND FENCING

BIO-8 The project owner shall undertake appropriate measures to manage the construction site and related facilities in a manner to avoid or minimize impacts to desert tortoise. Methods for clearance surveys, fence installation, tortoise handling, artificial burrow construction, egg handling and other procedures would be consistent with those described in the *Guidelines for Handling Desert Tortoise During Construction Projects* (Desert Tortoise Council 1999) or more current guidance provided by CDFG and USFWS. The project owner shall also implement all terms and conditions described in the Biological Opinion prepared by USFWS. These measures include, but are not limited to, the following:

1. Fence Installation. To avoid impacts to desert tortoises the proposed fence alignment shall be flagged and the alignment surveyed within 24 hours prior to the initiation of construction of tortoise-exclusion fence. Surveys shall be conducted by the Designated Biologist(s) using techniques approved by the USFWS and CDFG. Biological Monitors may assist the Designated Biologist under his or her supervision. These surveys shall provide 100-percent coverage of all areas to be disturbed and an additional transect along both sides of the fence line. This fence line transect will cover an area approximately 90 feet wide centered on the fence alignment. Transects would be no greater than 30 feet apart. All desert tortoise burrows, and burrows constructed by other species that might be used by desert tortoises, shall be examined to assess occupancy of each burrow by desert tortoises and handled in accordance with USFWS-approved protocol.

2. Fence Installation. Prior to the initiation of construction activities for each solar plant, the project owner shall enclose the boundary of the affected solar plant with permanent chain-link fencing for security purposes and permanent desert tortoise exclusionary fencing would be attached to the bottom of the chain link fencing. The fence installation shall be supervised by the Designated Biologist and monitored by the Biological Monitors to ensure the safety of any tortoise present.

    a. Fence Material and Installation. The permanent tortoise exclusionary fencing shall consist of galvanized hard wire cloth 1-inch by 2-inch mesh sunk 12 inches into the ground, and 24 inches above the ground (but not less than 18 inches above the ground) (USFWS 2008). The fencing shall be buried approximately 6 inches below ground or bent at a right angle towards the outside of the project site and covered with dirt, rocks or gravel to discourage the tortoise from digging under the fence

    b. Security Gates. Security gates shall be designed with minimal ground clearance to deter ingress by tortoises. The gates may be electronically activated to open and close immediately after the vehicle(s) have entered or exited to prevent the gates from being kept open for long periods of time. Cattle grating designed to safely exclude desert tortoise shall be installed at the gated entries to discourage tortoises from gaining entry

    c. Utility Corridor Fencing. The utility rights-of-way shall be temporarily fenced on each side of the right-of-way prior to ground disturbing activities to prevent desert tortoise entry during construction. Temporary fencing must follow guidelines for permanent fencing and supporting stakes shall be sufficiently spaced to maintain fence integrity.

    d. Fence Inspections. Following installation of the desert tortoise exclusion fencing for both the permanent site fencing and temporary fencing in the utility corridors, the fencing shall be regularly inspected. Permanent fencing shall be inspected monthly and during/following all major rainfall events. Any damage to the fencing shall be temporarily repaired immediately to keep tortoises out of the site, and permanently repaired within two days of observing damage. Inspections of permanent site fencing shall occur for the life of the project. Temporary fencing must be inspected weekly and, where drainages intersect the fencing, during and immediately following major rainfall events. All temporary fencing shall be repaired immediately upon discovery and, if the fence may have permitted tortoise entry while damaged, the Designated Biologist shall inspect the area for tortoise.

3. Clearance Surveys. Following construction of the security fence and the attached tortoise exclusion fence, the fenced area shall be cleared of tortoises by Biological Monitors under the supervision of the Designated Biologist. Two complete passes with complete coverage shall be

conducted as described above. If a desert tortoise is located on the second survey, a third survey would be conducted. Transects would be no wider than 30 feet. Each separate survey would be walked in a different direction to allow opposing angles of observation. Vegetation salvage operations shall not begin until the area is deemed free of desert tortoises.

4. Burrow Searches. During clearance surveys all potential desert tortoise burrows within the fenced area shall be inspected to determine if tortoises are present. In some cases, a fiber optic scope may be needed to determine presence or absence within a deep burrow. To prevent reentry by a tortoise or other wildlife, all burrows shall be collapsed once absence has been determined. Tortoises taken from burrows and from elsewhere on the site shall be relocated or translocated as described in the Desert Tortoise Relocation/Translocation Plan.

5. Burrow Excavation/Handling. All potential desert tortoise burrows located would be excavated by hand by a Biological Monitor, tortoises removed, and collapsed or blocked to prevent occupation by desert tortoises. Burrows inhabited by tortoises shall be excavated using hand tools under the supervision of the Designated Biologist. If excavated during May through July, the Biological Monitor would search for desert tortoise nests/eggs, which are typically located near the entrance to burrows. All desert tortoise handling and removal, and burrow excavations, including nests, would be conducted by the Designated Biologist or a Biological Monitor in accordance with the Service-approved protocol (Desert Tortoise Council 1994, revised 1999). If the Desert Tortoise Council releases a revised protocol for handling of desert tortoises before initiation of project activities, the revised protocol would be implemented for the project.

6. Monitoring During Clearing. Following the tortoise clearance and translocation, workers and heavy equipment shall be allowed to enter the project site to perform vegetation salvage and earth work such as clearing, grubbing, leveling, trenching, and installation of heliostats. A Biological Monitor shall monitor clearing and grading activities to find and move tortoises missed during the initial tortoise clearance survey. Should a tortoise be discovered, it shall be relocated or translocated as described in the Desert Tortoise Relocation/Translocation Plan to an area approved by the Designated Biologist.

7. Reporting. The Designated Biologist shall record the following information for any desert tortoises handled: a) the locations (narrative and maps) and dates of observation; b) general condition and health, including injuries, state of healing and whether desert tortoise voided their bladders; c) location moved from and location moved to (using GPS technology); d) gender, carapace length, and diagnostic markings (i.e., identification numbers or marked lateral scutes); e) ambient temperature when handled and released; and f) digital photograph of each handled desert tortoise as described in the paragraph below. Desert tortoise moved from within project areas shall be marked for future identification as described in

Guidelines for Handling Desert Tortoise during Construction Projects (Desert Tortoise Council 1999) or more current guidance on the USFWS website. Digital photographs of the carapace, plastron, and fourth costal scute shall be taken. Scutes shall not be notched for identification.

Verification: All mitigation measures and their implementation methods shall be included in the BRMIMP and implemented. Implementation of the measures shall be reported in the Monthly Compliance Reports by the Designated Biologist. Within 30 days after completion of desert tortoise clearance surveys the Designated Biologist shall submit a report to BLM's Authorized Officer, the CPM, USFWS, and CDFG describing how each of the mitigation measures described above has been satisfied. The report shall include the desert tortoise survey results, capture and release locations of any relocated desert tortoises, and any other information needed to demonstrate compliance with the measures described above.

DESERT TORTOISE TRANSLOCATION PLAN

BIO-9 The project owner shall develop and implement a final Desert Tortoise Relocation/Translocation Plan (Plan) that is consistent with current USFWS approved guidelines, and meets the approval of BLM, USFWS, CDFG and Energy Commission staff. The final Plan shall be based on the draft Desert Tortoise Relocation/Translocation Plan prepared by the applicant dated May 2009 and shall include all revisions deemed necessary by BLM, USFWS, CDFG and the Energy Commission staff.

Verification: Within 60 days of publication of the Energy Commission Decision the project owner shall provide BLM's Authorized Officer and the CPM with the final version of a Desert Tortoise Relocation/Translocation Plan that has been reviewed and approved by BLM, USFWS, CDFG and Energy Commission staff. BLM's Authorized Officer and the CPM will determine the plan's acceptability within 15 days of receipt of the final plan. All modifications to the approved translocation must be made only after consultation with BLM's Authorized Officer, the CPM, USFWS, and CDFG. The project owner shall notify BLM's Authorized Officer and the CPM no fewer than 5 working days before implementing any BLM- and CPM-approved modifications to the Plan.

Within 30 days after initiation of translocation activities, the Designated Biologist shall provide to BLM's Authorized Officer and the CPM for review and approval, a written report identifying which items of the Plan have been completed, and a summary of all modifications to measures made during implementation of the Plan.

DESERT TORTOISE COMPLIANCE VERIFICATION

BIO-10 The project owner shall provide Energy Commission and BLM representatives with reasonable access to the project site and mitigation lands under the control of the project owner and shall otherwise fully cooperate with the Energy Commission's and BLM's efforts to verify the project owner's compliance with, or the effectiveness of, mitigation measures set forth in the conditions of certification. The project owner shall hold the Designated Biologist, the Energy Commission, and BLM harmless for any costs the project owner incurs in complying with the management measures, including stop work orders issued by BLM's Authorized Officer, the CPM, or

the Designated Biologist. The Designated Biologist shall do all of the following:

1. Notify BLM's Authorized Officer and the CPM and at least 14 calendar days before initiating vegetation salvage or ground-disturbing activities;

2. Immediately notify BLM's Authorized Officer and the CPM in writing if the project owner is not in compliance with any conditions of certification, including but not limited to any actual or anticipated failure to implement mitigation measures within the time periods specified in the conditions of certification;

3. Remain onsite daily while vegetation salvage, grubbing, grading and heliostat installation activities are taking place to avoid or minimize take of listed species, to check for compliance with all impact avoidance and minimization measures, and to check all exclusion zones to ensure that signs, stakes, and fencing are intact and that human activities are restricted in these protective zones.

4. Maintain and check desert tortoise exclusion fences on a daily basis to ensure the integrity of the fence is maintained. The Designated Biologist shall be present onsite to monitor construction and determine fence placement during fence installation.

5. Conduct compliance inspections at a minimum of once per month after clearing, grubbing, grading, and heliostat installation activities are completed and submit a monthly compliance report to BLM's Authorized Officer and the CPM ;

6. No later than January 31 of every year the ISEGS facility remains in operation, provide BLM's Authorized Officer and the CPM an annual Listed Species Status Report, which shall include, at a minimum: 1) a general description of the status of the project site and construction activities, including actual or projected completion dates, if known; 2) a copy of the table in the BRMIMP with notes showing the current implementation status of each mitigation measure; and 3) an assessment of the effectiveness of each completed or partially completed mitigation measure in minimizing and compensating for project impacts;

7. Ensure that all observations of listed species and their sign during project activities are reported to the Designated Biologist for inclusion in the next monthly compliance report submitted to BLM's Authorized Officer and the CPM;

8. No later than 45 days after the first sale of power provide BLM's Authorized Officer and the CPM a Final Listed Species Mitigation Report that shall include, at a minimum: 1) a copy of the table in the BRMIMP with notes showing when each of the mitigation measures was implemented; 2) all available information about project-related incidental take of listed species; 3) information about other project impacts on the listed species;

4) construction dates; 5) an assessment of the effectiveness of conditions of certification in minimizing and compensating for project impacts; 6) recommendations on how mitigation measures might be changed to more effectively minimize and mitigate the impacts of future projects on the listed species; and 7) any other pertinent information, including the level of take of the listed species associated with the project;

9. In the event of a sighting in an active construction area (e.g., with equipment, vehicles, or workers), injury, kill, or relocation of any listed species, notify BLM's Authorized Officer, the CPM, CDFG and USFWS immediately by phone and in no event later than noon on the business day following the event if it occurs outside normal business hours so that the agencies can determine what further actions, if any, are required to protect listed species;

10. Prepare written follow-up notification via FAX or electronic communication to these agencies within 2 calendar days of the incident and include the following information as relevant:

    a. If a desert tortoise is injured as a result of project related activities during construction, the Designated Biologist will immediately take it to a BLM- and CPM-approved wildlife rehabilitation and/or veterinarian clinic. Any veterinarian bills for such injured animals will be paid by the project owner. Following phone notification as required above, BLM's Authorized Officer, the CPM, CDFG, and USFWS will determine the final disposition of the injured animal, if it recovers. Written notification shall include, at a minimum, the date, time, location, circumstances of the incident, and the name of the facility where the animal was taken.

    b. If a desert tortoise is killed by project-related activities during construction, or if a desert tortoise is otherwise found dead, submit a written report with the same information as an injury report. These desert tortoises shall be salvaged according to guidelines described in *Salvaging Injured, Recently Dead, Ill, and Dying Wild, Free-Roaming Desert Tortoise* prepared by Kristin Berry, June 2001. The project owner shall pay to have these desert tortoises necropsied. The report shall include the date and time of the finding or incident.

    c. BLM's Authorized Officer and the CPM may issue the project owner a written stop work order to suspend any activity related to the construction or operation of the project for an appropriate period determined in consultation with BLM's Authorized Officer and the CPM in order to prevent or remedy a violation of one or more conditions of certification (including but not limited to failure to comply with reporting, monitoring, or habitat acquisition obligations) or to prevent the illegal take of an endangered, threatened, or candidate species. The project owner shall comply with the stop work order immediately upon receipt thereof.

Verification: No later than 2 calendar days following the above required notification of a sighting, kill, or relocation of a listed species, the project owner shall deliver to BLM's Authorized Officer, the CPM, CDFG, and USFWS via FAX or electronic communication the written report from the Designated Biologist describing all reported incidents of injury, kill, or relocation of a listed species, identifying who was notified, and explaining when the incidents occurred. In the case of a sighting in an active construction area, the project owner shall, at the same time, submit a map (e.g., using Geographic Information Systems) depicting both the limits of construction and sighting location to BLM's Authorized Officer, the CPM, CDFG and USFWS.

IMPACT AVOIDANCE AND MINIMIZATION MEASURES

BIO-11 During construction the project owner shall implement all feasible measures to avoid or minimize impacts to biological resources, including the following:

1. Limit Disturbance Areas. The boundaries of all areas to be disturbed (including staging areas, access roads, and sites for temporary placement of spoils) shall be delineated with stakes and flagging prior to construction activities in consultation with the Designated Biologist. Spoils and topsoil shall be stockpiled in disturbed areas lacking native vegetation and which do not provide habitat for special-status species. All disturbances, project vehicles and equipment shall be confined to the flagged areas.

2. Minimize Road Impacts. New and existing roads that are planned for construction, widening, or other improvements shall not extend beyond the flagged impact area as described above. All vehicles passing or turning around will do so within the planned impact area or in previously disturbed areas. Where new access is required outside of existing roads or the construction zone, the route will be clearly marked (i.e., flagged and/or staked) prior to the onset of construction.

3. Minimize Traffic Impacts. Vehicular traffic during project construction and operation shall be confined to existing routes of travel to and from the project site, and cross country vehicle and equipment use outside designated work areas shall be prohibited. The speed limit shall not exceed 20 miles per hour within the project area, on maintenance roads for linear facilities, or on access roads to the ISEGS site.

4. Monitor During Construction. The Designated Biologist or Biological Monitor shall be present at the construction site during all project activities that have potential to disturb soil, vegetation, and wildlife. In areas that have not been fenced with tortoise exclusion fencing and cleared, the USFWS-approved Designated Biologist or Biological Monitor shall walk immediately ahead of equipment during brushing and grading activities.

5. . Minimize Impacts of Transmission/Pipeline Alignments, Roads, Staging Areas. Staging areas for construction on the plant site shall be within the area that has been fenced with desert tortoise exclusion fencing and

cleared. For construction activities outside of the plant site (transmission line, pipeline alignments) access roads, pulling sites, and storage and parking areas shall be designed, installed, and maintained with the goal of minimizing impacts to native plant communities and sensitive biological resources. Transmission lines and all electrical components shall be designed, installed, and maintained in accordance with the Avian Power Line Interaction Committee's (APLIC's) Suggested Practices for Avian Protection on Power Lines (APLIC 2006) and Mitigating Bird Collisions with Power Lines (APLIC 2004) to reduce the likelihood of large bird electrocutions and collisions.

6. Avoid Use of Toxic Substances. Road surfacing and sealants as well as soil bonding and weighting agents used on unpaved surfaces shall be non-toxic to wildlife and plants.

7. .Minimize Lighting Impacts. Facility lighting shall be designed, installed, and maintained to prevent side casting of light towards wildlife habitat. To minimize risk of avian collisions with the heliostat towers, only flashing or strobe lights shall be installed on these towers.

8. Badger Surveys. Concurrent with the desert tortoise clearance survey, the Designated Biologist or Biological Monitors shall perform a preconstruction survey for badger dens in the project area, including areas within 250 feet of all project facilities, utility corridors, and access roads. If badger dens are found, each den shall be classified as inactive, potentially active, or definitely active. Inactive dens shall be excavated by hand and backfilled to prevent reuse by badgers. Potentially and definitely active dens shall be monitored by the Designated Biologist or Biological Monitor for three consecutive nights using a tracking medium (such as diatomaceous earth or fire clay) at the entrance. If no tracks are observed in the tracking medium after 3 nights, the den shall be excavated and backfilled by hand. If tracks are observed, the applicant shall develop and implement a trapping and relocation plan in consultation with the Designated Biologist and CDFG. BLM approval may be required prior to release of badgers on public lands.

9. Gila Monster Surveys. If a Gila monster is encountered during clearance surveys or during construction, a qualified biologist experienced with Gila monster survey and capture techniques shall capture and maintain it in a cool (<85 degrees F) environment until it can be released to a safe, suitable area beyond the construction impact zone. The biologist shall coordinate with staff and CDFG biologists in the transport and relocation of any Gila monsters encountered during project surveys, construction, or operation.

10. Avoid Vehicle Impacts to Desert Tortoise. Parking and storage shall occur within the area enclosed by desert tortoise exclusion fencing to the extent feasible. No vehicles or construction equipment parked outside the fenced area shall be moved prior to an inspection of the ground beneath

the vehicle for the presence of desert tortoise. If a desert tortoise is observed, it will be left to move on its own. If it does not move within 15 minutes, a Designated Biologist or Biological Monitor may remove and relocate the animal to a safe location if temperatures are within the range described in the USFWS protocol (www.fws.gov/ventura/speciesinfo/protocols_guidelines and Desert Tortoise Council 1999).

11. Avoid Wildlife Pitfalls:

    a. Backfill Trenches. At the end of each work day, the Designated Biologist shall ensure that all potential wildlife pitfalls (trenches, bores, and other excavations) outside the area fenced with desert tortoise exclusion fencing have been backfilled. If backfilling is not feasible, all trenches, bores, and other excavations shall be sloped at a 3:1 ratio at the ends to provide wildlife escape ramps, or covered completely to prevent wildlife access, or fully enclosed with desert tortoise-exclusion fencing. All trenches, bores, and other excavations outside the areas permanently fenced with desert tortoise exclusion fencing shall be inspected periodically throughout the day and at the end of each workday by the Designated Biologist or a Biological Monitor. Should a tortoise or other wildlife become trapped, the Designated Biologist or Biological Monitor shall remove and relocate the individual as described in the Desert Tortoise Relocation/Translocation Plan. Any wildlife encountered during the course of construction shall be allowed to leave the construction area unharmed.

    b. Avoid Entrapment of Desert Tortoise. Any construction pipe, culvert, or similar structure with a diameter greater than 3 inches, stored less than 8 inches aboveground and within desert tortoise habitat (i.e., outside the permanently fenced area) for one or more nights, shall be inspected for tortoises before the material is moved, buried or capped. As an alternative, all such structures may be capped before being stored outside the fenced area, or placed on pipe racks. These materials would not need to be inspected or capped if they are stored within the permanently fenced area after the clearance surveys have been completed.

    c. Cap Heliostat Holes. All holes drilled for heliostats shall be capped the same day they are drilled. Caps shall remain on the holes until heliostats are inserted into the holes, and shall be securely fastened and sufficiently sturdy to cover the heliostat holes indefinitely. The caps shall exclude all wildlife, and shall be inspected weekly by the Designated Biologist or Biological Monitors to ensure that the caps remain in place and that birds and terrestrial wildlife have not become trapped.

12. Minimize Standing Water. Water applied to construction areas and dirt roads for dust abatement shall use the minimal amount needed to meet

safety and air quality standards in an effort to prevent the formation of puddles, which could attract desert tortoises, common ravens and coyotes to construction sites.

13. Dispose of Roadkilled Animals. Road killed animals or other carcasses detected in the project area or on roads near the project area shall be picked up immediately upon detection and appropriately disposed of to avoid attracting common ravens and coyotes.

14. Minimize Spills of Hazardous Materials. All vehicles and equipment shall be maintained in proper working condition to minimize the potential for fugitive emissions of motor oil, antifreeze, hydraulic fluid, grease, or other hazardous materials. The Designated Biologist shall be informed of any hazardous spills immediately as directed in the project Hazardous Materials Plan. Hazardous spills shall be immediately cleaned up and the contaminated soil properly disposed of at a licensed facility. Servicing of construction equipment shall take place only at a designated area. Service/maintenance vehicles shall carry a bucket and pads to absorb leaks or spills.

15.. Worker Guidelines. During construction all trash and food-related waste shall be placed in self-closing containers and removed daily from the site. Workers shall not feed wildlife or bring pets to the project site. Except for law enforcement personnel, no workers or visitors to the site shall bring firearms or weapons. Vehicular traffic shall be confined to existing routes of travel to and from the project site, and cross country vehicle and equipment use outside designated work areas shall be prohibited. The speed limit when traveling on Colosseum Road and other dirt access routes within desert tortoise habitat shall not exceed 20 miles per hour.

16. Monitor Ground Disturbing Activities Prior to Site Mobilization. If ground-disturbing activities are required prior to site mobilization, such as for geotechnical borings or hazardous waste evaluations, a Designated Biologist or Biological Monitor shall be present to monitor any actions that could disturb soil, vegetation, or wildlife.

Verification: All mitigation measures and their implementation methods shall be included in the BRMIMP and implemented. Implementation of the measures will be reported in the Monthly Compliance Reports by the Designated Biologist. Within 30 days after completion of project construction, the project owner shall provide to BLM's Authorized Officer and the CPM, for review and approval, a written construction termination report identifying how measures have been completed.

RAVEN MANAGEMENT PLAN

BIO-12 The project owner shall implement a Raven Management Plan that is consistent with the most current USFWS-approved raven management guidelines, and which meets the approval of USFWS, CDFG, BLM, and the Energy Commission staff. The draft Raven Management Plan submitted by

the applicant (CH2M Hill 2008f) shall provide the basis for the final plan, subject to review and revisions from USFWS, CDFG, BLM, and the Energy Commission staff.

Verification: At least 60 days prior to start of any project-related ground disturbance activities, the project owner shall provide BLM's Authorized Officer, the CPM, USFWS, and CDFG with the final version of a Raven Management Plan that has been reviewed by USFWS, CDFG, BLM, and the Energy Commission staff. The CPM and BLM's Authorized Officer will determine the plan's acceptability within 15 days of receipt of the final plan. All modifications to the approved Raven Management Plan shall be made only after consultation with BLM and Energy Commission staff, USFWS, and CDFG. The project owner shall notify BLM's Authorized Officer and the CPM no less than 5 working days before implementing any BLM- and CPM-approved modifications to the Raven Management Plan.

Within 30 days after completion of project construction, the project owner shall provide to the CPM for review and approval, a written report identifying which items of the Raven Management Plan have been completed, a summary of all modifications to mitigation measures made during the project's construction phase, and which items are still outstanding.

WEED MANAGEMENT PLAN

BIO-13 The project owner shall implement a Weed Management Plan that meets the approval of BLM and the Energy Commission staff. The draft Weed Management Plan submitted by the applicant (CH2M Hill 2008e) shall provide the basis for the final plan, subject to review and revisions from BLM and Energy Commission staff, USFWS, and CDFG. In addition to describing weed eradication and control methods, and a reporting plan for weed management during and after construction, the final Weed Management Plan shall include at least the following Best Management Practices to prevent the spread and propagation of noxious weeds:

1. Limit the size of any vegetation and/or ground disturbance to the absolute minimum, and limit ingress and egress to defined routes.

2. Maintain vehicle wash and inspection stations and closely monitor the types of materials brought onto the site.

3. Reestablish vegetation quickly on disturbed sites.

4. Monitoring and rapid implementation of control measures to ensure early detection and eradication for weed invasions.

5. Use only weed-free straw or hay bales used for sediment barrier installations, and weed-free seed.

6. Reclamation and revegetation shall occur on all temporarily disturbed areas, including pipelines, transmission lines, and staging areas.

Verification: At least 60 days prior to start of any project-related ground disturbance activities, the project owner shall provide BLM's Authorized Officer and the CPM with the final version of a Weed Management Plan that has been reviewed and approved by BLM, and Energy Commission staff, USFWS, and CDFG. BLM's Authorized Officer and the CPM will determine the plan's acceptability within 15 days of receipt of the final plan. All modifications to the approved Weed Control Plan must be made only after consultation with the Energy Commission staff, BLM, USFWS, and CDFG. The project owner shall notify the CPM no less than 5 working days before implementing any BLM- and CPM-approved modifications to the Weed Management Plan.

Within 30 days after completion of project construction, the project owner shall provide to BLM's Authorized Officer and the CPM for review and approval, a written report identifying which items of the Weed Management Plan have been completed, a summary of all modifications to mitigation measures made during the project's construction phase, and which items are still outstanding.

CLOSURE, REVEGETATION AND REHABILITATION PLAN

BIO-14 The project owner shall develop and implement a revised Closure, Revegetation and Rehabilitation Plan (Plan) in cooperation with BLM and Energy Commission staff, USFWS and CDFG to guide site restoration and closure activities, including methods proposed for revegetation of disturbed areas immediately following construction and rehabilitation and revegetation upon closure of the facility. This plan must address preconstruction salvage and relocation of succulent vegetation from the site to either an onsite or nearby nursery facility for storage and propagation of material to reclaim disturbed areas. In the case of unexpected closure, the plan should assume restoration activities could possibly take place prior to the anticipated lifespan of the plant. The Plan shall address all issues discussed in **Biological Resources Appendix-A**: *Revisions to Draft Closure, Revegetation and Rehabilitation Plan*, and shall include but is not limited to the following elements in the revised plan:

1. Plan Purpose: The plan shall explicitly identify the objective of the revegetation plan to be re-creation of the types of habitats lost during construction and operation of the proposed solar energy facility. The final revegetation plan shall include introduction of mid- to late-successional species.

2. Standards/Monitoring: Performance standards for success thresholds, weed cover, performance monitoring methods and schedule, and maintenance monitoring in the revised Plan shall be conducted as described in **Biological Resources Appendix B**.

3. Baseline Surveys – Baseline vegetation surveys for planning restoration efforts shall be conducted as described in **Biological Resources Appendix B.**

4. Vegetation Clearing: Clearing of vegetation shall be limited to areas for which final maps are provided to BLM before approval of the ROW.

Clearing of vegetation will be permitted on roads, utility routes, heliostat maintenance pathways, building and parking areas, and temporary staging areas provided these are specifically documented on a georeferenced construction alignment drawing or aerial photo or shape file, showing the exact locations of soil disturbance. BLM will consider relocating specific installations prior to the beginning of construction and during construction on a case by case basis but will not approve additional acreage beyond that addressed in the current application.

5. Vegetation Mowing; Vegetation mowing shall be limited to areas adjoining vehicle pathways used for heliostat installation to allow installation of the heliostat pylon and allow for tracking clearance under the heliostat. Vegetation mowing may be repeated during the life of the facility to maintain appropriate clearance for heliostat tracking.

6. Succulent Salvage: The revised Plan shall include a table that shows proposed succulent salvage by species the number of plants onsite, the lower threshold height for salvage, the number in each size class, and the fate of plants not salvaged. An inventory and map of proposed succulent transplants shall be provided as described in Appendix A. Information gained from succulent transplant experience gained in ISEGS 1 shall be applied to future salvage operations, as described in **Biological Resources Appendix B**.

7. Seed Handling: Seed collection, testing and application shall be conducted as described in **Biological Resources Appendix B**, with collection areas within 10 miles of the project boundaries and on similar terrain, soil, exposure, slope, and elevation to the project site.

8. Soil Preparation: Soil descriptions, compaction measurements, mulch application, soil storage, seed farming, mycorrhizal inoculation, and biological crust collection and storage shall be conducted as described in **Biological Resources Appendix B.** Soil stockpiles shall not be placed on areas that support special-status plant species or other sensitive biological resources.

9. Weed Management. Weed management activities needed to control weeds resulting from mirror washing shall be conducted as described in **Biological Resources Appendix B**.

10. Final Closure Plan**.** A Final Closure Plan, which addresses the final revegetation and rehabilitation activities upon closure and decommissioning of the project, shall be completed as part of the revised Plan. The Final Closure Plan shall include a cost estimate, adjusted for inflation, reflecting the costs of the revegetation, rehabilitation, and monitoring for the duration of time estimated to achieve the objective of re-creating plant communities impacted by the project.

Verification: No more than 30 days from the Energy Commission Decision and BLM Record of Decision the project owner shall provide BLM's Authorized Officer and the CPM with a draft version of the revised Closure, Revegetation and Rehabilitation Plan. At least 60 days prior to start of any project-related ground disturbance activities, the project owner shall provide BLM's Authorized Officer and the CPM with the final version of the Closure, Revegetation and Rehabilitation Plan that has been reviewed and approved by BLM, USFWS, CDFG, and the Energy Commission staff. All modifications to the approved Revegetation and Reclamation Plan must be made only after consultation with BLM's Authorized Officer, the CPM, USFWS and CDFG. The project owner shall notify BLM's Authorized Officer and the CPM and no less than 5 working days before implementing any BLM- and CPM-approved modifications to the Closure, Revegetation and Rehabilitation Plan.

Within 30 days after completion of project construction for each phase of development, the project owner shall provide to BLM's Authorized Officer and the CPM for review and approval, a written report identifying which items of the Closure, Revegetation and Rehabilitation Plan have been completed, a summary of all modifications to mitigation measures made during the project's construction phase, and which items are still outstanding.

At least one year prior to planned closure and decommissioning the project owner shall submit to the BLM-Authorized Officer and the CPM a final Closure Plan for review to determine if revisions are needed. The project owner shall incorporate all required revisions to the final Closure Plan and submit to the BLM-Authorized Officer and the CPM no less than 90 days prior to the start of ground disturbing activities associated with closure and decommissioning activities.

PRE-CONSTRUCTION NEST SURVEYS

BIO-15 Pre-construction nest surveys shall be conducted if construction activities will occur from February 1 through August 31. The Designated Biologist or Biological Monitor conducting the surveys shall be experienced bird surveyors familiar with standard nest-locating techniques and shall perform surveys in accordance with the following guidelines:

1. Surveys shall cover all potential nesting habitat in the project site or within 500 feet of the boundaries of the site and linear facilities;

2. At least two pre-construction surveys shall be conducted, separated by a minimum 10-day interval. One of the surveys needs to be conducted within the 14-day period preceding initiation of construction activity. Additional follow-up surveys may be required if periods of construction inactivity exceed three weeks, an interval during which birds may establish a nesting territory and initiate egg laying and incubation;

3. If active nests are detected during the survey, a buffer zone (protected area surrounding the nest, the size of which is to be determined by the Designated Biologist in consultation with CDFG) and monitoring plan shall be developed. Nest locations shall be mapped and submitted, along with a report stating the survey results, to the CPM; and

4. The Designated Biologist shall monitor the nest until he or she determines that nestlings have fledged and dispersed; activities that might, in the opinion of the Designated Biologist, disturb nesting activities, shall be prohibited within the buffer zone until such a determination is made.

Verification: At least 10 days prior to the start of any project-related ground disturbance activities, the project owner shall provide the CPM a letter-report describing the findings of the pre-construction nest surveys, including the time, date, and duration of the survey; identity and qualifications of the surveyor (s); and a list of species observed. If active nests are detected during the survey, the report shall include a map or aerial photo identifying the location of the nest and shall depict the boundaries of the no-disturbance buffer zone around the nest.

BURROWING OWL IMPACT AVOIDANCE AND MINIMIZATION MEASURES

BIO-16 The project owner shall implement the following measures for the burrowing owl:

1. Complete a pre-construction survey for burrowing owls for any areas subject to disturbance from construction no less than 30 days prior to the start of initial ground disturbance activities. If burrowing owls are present within 500 feet of the project site or linear facilities, then the CDFG burrowing owl guidelines (1995) shall be implemented;

2. Monitor burrowing owl pairs within 500 feet of any activities that exceed ambient noise and/or vibration levels;

3. Establish a 500-foot set back from any active burrow and construct additional noise/visual barriers (e.g., haystacks or plywood fencing) to shield the active burrow from construction activities. Post signs (in both English and Spanish) designating presence of sensitive area;

4. Actively relocate all owls occupying burrows that will be temporarily or permanently impacted by the project and implement the following CDFG take avoidance measures:

   a. Occupied burrows shall not be disturbed during the nesting season (February 1 – August 31) unless a qualified biologist can verify through non-invasive methods that egg laying/incubation has not begun or juveniles are foraging independently and able to fly;

   b. A qualified biologist must relocate owls, confirm that owls have left burrows prior to ground-disturbing activities, and monitor the burrows. Once evacuation is confirmed, the biologist should hand excavate burrows and then fill burrows to prevent reoccupation; and

   c. Relocation of owls shall be approved by and conducted in consultation with CDFG.

5. Submit a Burrowing Owl Mitigation and Monitoring Plan to the CPM and CDFG for review and approval prior to relocation of owls (and incorporate

it into the project's BRMIMP) as well as a construction termination report with results to CDFG and CPM 30 days after completing owl relocation and monitoring and at least 30 days prior to the start of commercial operation.

Verification: The project owner shall submit a report to CDFG, USFWS, BLM's Authorized Officer and the CPM at least 30 days prior to the start of any project-related site disturbance activities that describes when surveys were completed, observations, mitigation measures, and the results of the mitigation. If burrowing owls are to be protected on site or relocated, the project owner shall coordinate with and report to CDFG, USFWS, BLM and Energy Commission staff on these proposed activities in a Burrowing Owl Mitigation and Monitoring Plan. Within 30 days after completion of owl relocation and monitoring, and the start of ground disturbance **or** at least 90 days prior to the sale of power, the project owner shall provide to the CDFG and CPM a written construction termination report identifying how measures have been completed.

DESERT TORTOISE COMPENSATORY MITIGATION

BIO-17 To fully mitigate for habitat loss and potential take of desert tortoise, the project owner shall provide compensatory mitigation at a 3:1 ratio for impacts to 4,073 acres or the area disturbed by the final project footprint. At least two thirds of the 3:1 mitigation to satisfy the Energy Commission's Complementary Mitigation Measures shall be achieved by acquisition, in fee title or in easement, of no less than 8,146 acres of land suitable for desert tortoise. The project owner shall provide funding for the acquisition, initial habitat improvements and long-term management endowment of these Energy Commission complementary compensation lands. The remaining third of the 3:1 compensatory mitigation, to satisfy BLM's mitigation requirements and the balance of the Energy Commission's mitigation requirements, shall be developed in accordance with BLM's desert tortoise mitigation requirements as described in the Northern and Eastern Mojave Desert Management Plan (BLM 2002). BLM's compensatory mitigation plan, serving as one third of the 3:1 mitigation ratio required to satisfy CESA, would include acquisition of up to 4,073 acres of land within the Eastern Mojave Recovery Unit, or desert tortoise habitat enhancement or rehabilitation activities that meet BLM, CDFG, USFWS and Energy Commission approval, or some combination of the two. The Energy Commission requirements for acquisition of 8,146 acres of compensation lands shall include the following:

1. Responsibility for Acquisition of Lands: The responsibility for acquisition of lands may be delegated by written agreement from the Energy Commission and CDFG to a third party, such as a non-governmental organization supportive of Mojave Desert habitat conservation. Such delegation shall be subject to approval by the CPM and CDFG, in consultation with BLM and USFWS, prior to land acquisition, enhancement or management activities. If habitat disturbance exceeds that described in this analysis, the project owner shall be responsible for funding acquisition, habitat improvements and long-term management of additional compensation lands or additional funds required to compensate for any additional habitat disturbances. Additional funds shall be based on

the adjusted market value of compensation lands at the time of construction to acquire and manage habitat. Water and mineral rights shall be included as part of the land acquisition. Agreements to delegate land acquisition to CDFG or an approved third party and to manage compensation lands shall be implemented within 18 months of the Energy Commission's decision.

2. Selection Criteria for Compensation Lands. The compensation lands selected for acquisition shall:

   a. be as close to the project site as possible;

   b. provide good quality habitat for desert tortoise with capacity to regenerate naturally when disturbances are removed;

   c. be near larger blocks of lands that are either already protected or planned for protection, or which could feasibly be protected long-term by a public resource agency or a non-governmental organization dedicated to habitat preservation;

   d. be connected to lands currently occupied by desert tortoise, ideally with populations that are stable, recovering, or likely to recover;

   e. not have a history of intensive recreational use or other disturbance that might make habitat recovery and restoration infeasible;

   f. not be characterized by high densities of invasive species, either on or immediately adjacent to the parcels under consideration, that might jeopardize habitat recovery and restoration, and

   g. not contain hazardous wastes.

3. Review and Approval of Compensation Lands Prior to Acquisition. A minimum of three months prior to acquisition of the property, the project owner shall submit a formal acquisition proposal to the CPM, CDFG, USFWS and BLM describing the parcel(s) intended for purchase. This acquisition proposal shall discuss the suitability of the proposed parcel(s) as compensation lands for desert tortoise in relation to the criteria listed above. Approval from CDFG and the CPM, in consultation with BLM and the USFWS, shall be required for acquisition of all parcels comprising the 8,146 acres.

4. Energy Commission Complementary Mitigation Security The project owner shall provide financial assurances to the CPM and CDFG with copies of the document(s) to BLM and the USFWS, to guarantee that an adequate level of funding is available to implement the Energy Commission Complementary Mitigation Measures described in this condition. These funds shall be used solely for implementation of the measures associated with the project. Alternatively, financial assurance can be provided to the CPM and CDFG in the form of an irrevocable letter

of credit, a pledged savings account or another form of security ("Security") prior to initiating ground-disturbing project activities. Prior to submittal to the CPM, the Security shall be approved by CDFG and the CPM, in consultation with BLM and the USFWS, to ensure funding in the amount of $20,446,460. This Security amount was calculated as follows and may be revised upon completion of a Property Analysis Record (PAR) or PAR-like analysis of the proposed compensation lands:

a. land acquisition costs for compensation lands, calculated at $910/acre = $7,412,860;

b. costs of initial habitat improvements to compensation lands, calculated at $250/acre = $2,036,500;

c. costs of establishing an endowment for long-term management of compensation lands, calculated at $1,350/acre = $10,997,100; and

d. total security = $20,446,460.

5. Compensation Lands Acquisition Conditions The project owner shall comply with the following conditions relating to acquisition of the Energy Commission Complementary Mitigation compensation lands after the CDFG and the CPM, in consultation with BLM and the USFWS, have approved the proposed compensation lands and received Security as applicable and as described above.

   a. Preliminary Report: The project owner, or approved third party, shall provide a recent preliminary title report, initial hazardous materials survey report, biological analysis, and other necessary documents for the proposed 8,146 acres. All documents conveying or conserving compensation lands and all conditions of title/easement are subject to a field review and approval by CDFG and the CPM, in consultation with BLM and the USFWS, California Department of General Services and, if applicable, the Fish and Game Commission and/or the Wildlife Conservation Board.

   b. Title/Conveyance: The project owner shall transfer fee title or a conservation easement to the 8,146 acres of compensation lands to CDFG under terms approved by CDFG. Alternatively, a non-profit organization qualified to manage compensation lands (pursuant to California Government Code section 65965) and approved by CDFG and the CPM may hold fee title or a conservation easement over the habitat mitigation lands. If the approved non-profit organization holds title, a conservation easement shall be recorded in favor of CDFG in a form approved by CDFG. If the approved non-profit holds a conservation easement, CDFG shall be named a third party beneficiary. If a Security is provided, the project owner or an approved third party shall complete the proposed compensation lands acquisition within 18 months of the start of project ground-disturbing activities.

c. Initial Habitat Improvement Fund. The project owner shall fund the initial protection and habitat improvement of the 8,146 acres. Alternatively, a non-profit organization may hold the habitat improvement funds if they are qualified to manage the compensation lands (pursuant to California Government Code section 65965) and if they meet the approval of CDFG and the CPM. If CDFG takes fee title to the compensation lands, the habitat improvement fund must go to CDFG.

d. Long-term Management Endowment Fund. Prior to ground-disturbing project activities, the project owner shall provide to CDFG a non-wasting capital endowment in the amount determined through the Property Analysis Record (PAR) or PAR-like analysis that will be conducted for the 8,146 acres. The project owner's financial responsibility for the actual cost of mitigation shall not increase by more than 25% of the Security Amount ($20,446,460). Alternatively, a non-profit organization may hold the endowment fees if they are qualified to manage the compensation lands (pursuant to California Government Code section 65965) and if they meet the approval of CDFG and the CPM. If CDFG takes fee title to the compensation lands, the endowment must go to CDFG, where it will be held in the special deposit fund established pursuant to California Government Code section 16370. If the special deposit fund is not used to manage the endowment, the California Wildlife Foundation or similarly approved entity identified by CDFG shall manage the endowment for CDFG and with CDFG supervision.

e. Interest, Principal, and Pooling of Funds. The project owner, CDFG and the CPM shall ensure that an agreement is in place with the endowment holder/manager to ensure the following conditions:

- Interest. Interest generated from the initial capital endowment shall be available for reinvestment into the principal and for the long-term operation, management, and protection of the approved compensation lands, including reasonable administrative overhead, biological monitoring, improvements to carrying capacity, law enforcement measures, and any other action approved by CDFG designed to protect or improve the habitat values of the compensation lands.
- Withdrawal of Principal. The endowment principal shall not be drawn upon unless such withdrawal is deemed necessary by the CDFG or the approved third-party endowment manager to ensure the continued viability of the species on the 8,146 acres. If CDFG takes fee title to the compensation lands, monies received by CDFG pursuant to this provision shall be deposited in a special deposit fund established pursuant to Government Code section 16370. If the special deposit fund is not used to manage the endowment, the California Wildlife Foundation or similarly approved

entity identified by CDFG will manage the endowment for CDFG with CDFG supervision.

- Pooling Endowment Funds. CDFG, or a CPM and CDFG approved non-profit organization qualified to hold endowments pursuant to California Government Code section 65965, may pool the endowment with other endowments for the operation, management, and protection of the 8,146 acres for local populations of desert tortoise. However, for reporting purposes, the endowment fund must be tracked and reported individually to the CDFG and CPM.
- Reimbursement Fund. The project owner shall provide reimbursement to CDFG or an approved third party for reasonable expenses incurred during title, easement, and documentation review; expenses incurred from other state or state approved federal agency reviews; and overhead related to providing compensation lands.

The project owner is responsible for all compensation lands acquisition/easement costs, including but not limited to, title and document review costs, as well as expenses incurred from other state agency reviews and overhead related to providing compensation lands to the department or approved third party; escrow fees or costs; environmental contaminants clearance; and other site cleanup measures.

Verification: A minimum of three months prior to acquisition of the property, the project owner shall submit a formal acquisition proposal to the CPM, CDFG, USFWS and BLM describing the parcels intended for purchase.

No later than 18 months following the publication of the Energy Commission Decision the project owner shall provide written verification to the CPM and CDFG that the Energy Commission Complementary Mitigation compensation lands or conservation easements have been acquired and recorded in favor of the approved recipient(s). Alternatively, no later than 30 days prior to beginning project ground-disturbing activities, the project owner shall provide written verification of Security in accordance with this condition of certification. If Security is provided, the project owner, or an approved third party, shall complete and provide written verification of the proposed compensation lands acquisition within 18 months of the start of project ground-disturbing activities. Within six months of the land or easement purchase, as determined by the date on the title, the project owner, or an approved third party, shall provide CDFG and the CPM with a management plan for the Energy Commission Complementary Mitigation compensation lands and associated funds. CDFG and the CPM shall review and approve the management plan, in consultation with BLM and the USFWS.

Within 90 days after completion of project construction, the project owner shall provide to the CPM and CDFG an analysis with the final accounting of the amount of habitat disturbed during project construction. If habitat disturbance exceeds 4,073 acres, the project owner shall provide a compensation plan to the CMP and CDFG for their review and approval, in consultation with BLM and the USFWS. The compensation plan shall be submitted no later than 90 days from the CPM's receipt of the final accounting, and

shall include a description of additional funds required or lands that must be purchased to compensate for the unanticipated habitat disturbances, and a schedule for that acquisition or funding inclusive of all associated endowment and enhancement costs. The amount of funding for habitat acquisition, initial habitat improvement, and long-term management endowment shall be calculated at the adjusted market value at the time of construction. The project owner's financial responsibility for the actual cost of mitigation shall not increase by more than 25% of the Security Amount ($20,446,460).

SPECIAL-STATUS PLANT IMPACT AVOIDANCE AND MINIMIZATION

BIO-18 The project owner shall implement the following measures to avoid and minimize impacts to special-status plant species. Items 2, 3, 5, 6, 7, and 10 are recommended exclusively by Energy Commission staff.

1. On-Site Plant Avoidance/Minimization Areas: To the extent feasible the project owner shall avoid and minimize disturbance to all special-status plant species within the project site. Impact avoidance and minimization efforts shall occur in all feasible locations but shall focus in particular on areas depicted in **Biological Resources Figure 2** that indicate the highest densities of Mojave milkweed, Rusby's desert-mallow, desert pincushion, nine-awned pappus grass, and Parish's club-cholla. The highest priorities for protection shall be Mojave milkweed, desert pincushion, and Rusby's desert-mallow. The project owner shall implement all feasible impact avoidance and minimization measures within the following areas:

    a. ISEGS 1 and 3: Reconfigure project features to the extent feasible within the northern portions of ISEGS 1 and 3 to avoid areas that support the highest density and diversity of special-status plant species.

    b. Construction Logistics Area: Reconfigure the layout and design of the Construction Logistics Area to maximize protection of high density and diversity special-status plant areas.

    c. Natural Gas Pipeline: Adjust the alignment of the proposed 75-foot wide natural gas pipeline and narrow the construction footprint to avoid special-status plant occurrences north of ISEGS 3.

2. Protection Goals : The project owner shall implement all feasible measures to protect 75 percent of the individuals of Mojave milkweed, Rusby's desert-mallow, desert pincushion, nine-awned pappus grass, and Parish's club-cholla within the project area (as mapped in Figure 5-3 of the applicant's final botanical survey report [CH2M Hill 2008x]). Each year during construction the measurement of percent protection achieved shall be calculated based on a comparison of numbers of individuals of each of these five species present in this area identified before construction compared to numbers remaining post –construction. These pre- and post-construction plant numbers shall be based on floristic surveys conducted by a qualified botanist.

3. Identify and Establish Special-Status Plant Protection Areas : The project owner shall identify Special-Status Plant Protection Areas within the project footprint as needed to achieve the 75 percent protection goal. To accurately identify the locations of these areas, pre-construction floristic surveys shall be conducted by a qualified botanist at the appropriate time of year for special-status plant identification including both spring and summer blooming periods. The surveys shall encompass all the high plant density areas depicted in **Biological Resources Figure 2** and shall extend 150 feet on both sides of the proposed gas pipeline alignment and 250 feet out from the project fenceline. The locations of the Special-Status Plant Protection Areas shall be clearly depicted on all final maps and project drawings and descriptions.

4. Protection of Adjacent Occurrences: The project owner shall identify special-status plants occurrences within 250 feet of the project fenceline during the pre-construction plant surveys described above. A qualified botanist shall delineate the boundaries of these special status plant occurrences at least 30 days prior to the initiation of ground disturbing activities. These flagged special status plant occurrences shall be designated as Environmentally Sensitive Areas on plans and specifications, and shall be protected from accidental impacts during construction (e.g. vehicle traffic, temporary placement of soils or vegetation) and from the indirect impacts of project operation (herbicide spraying, changes in upstream hydrology, etc).

5. Develop and Implement a Special-Status Plant Protection and Monitoring Plan : The project owner shall develop and implement a Special-Status Plant Protection and Monitoring Plan for special-status plants occurring within the Special-Status Plant Protection Areas. The goal of the Special-Status Plant Protection and Monitoring Plan shall be to maintain the special-status plant species within the Special-Status Plant Protection Areas as healthy, reproductive populations that can be sustained in perpetuity. At a minimum, the Special-Status Plant Protection and Monitoring Plan shall:

    - establish baseline conditions and numbers of the plant occurrences within the Special-Status Plant Protection Areas and success standards for protection of special-status plant occurrences within the Plant Protection Areas;
    - provide information about microhabitat preferences and fecundity, essential pollinators, reproductive biology, and propagation and culture requirements for each special-status species;
    - describe measures (e.g., fencing, signage) to avoid direct construction and operation impacts to special-status plants within the Special-Status Plant Protection Areas;
    - describe measures to avoid or minimize indirect construction and operations impacts to special-status plants within the Special-Status Plant Protection Areas (e.g., runoff from mirror-washing, use of soil

stabilizers/tackifiers, alterations of hydrology from drainage diversions, erosion/sedimentation from disturbed soils upslope, herbicide drift, the spread of non-native plants, etc).

- provide a monitoring schedule and plan for assessing the numbers and condition of special-status plants within the Special-Status Plant Protection Areas; and
- identify specific triggers for remedial action (e.g., numbers of plants dropping below a threshold);

6. Develop Special-Status Plant Remedial Action Plan : The project owner shall develop a detailed Special-Status Plant Remedial Action Plan to be implemented if special-status plants within the Plant Protection Areas fail to meet success standards described in the Special-Status Plant Protection and Monitoring Plan. The Plant Remedial Action Plan shall include specifications for ex-situ/offsite conservation of seed and other propagules, and the seed bank and other symbionts contained in the topsoil where these plants occur. The remedial measures described in the Plant Remedial Action Plan shall not substitute for plant protection or other mitigation measures. The Special-Status Plant Remedial Action Plan shall include, at a minimum:
   - guidelines for pre-construction seed collection (and/or other propagules) for each of the five species;
   - specifications for collecting, storing, and preserving the upper layer of soil containing seed and important soil organisms;
   - detailed replacement planting program with biologically meaningful quantitative and qualitative success criteria (see Pavlik 1996), monitoring specifications, and triggers for remedial action; and
   - ecological specifications for suitable planting sites.

7. Seed Collection : Implementation of the Special-Status Plant Remedial Action Plan would require a source of local source of seeds/propagules. In addition, seed collection would serve to preserve germplasm in the event that all mitigation fails. The project owner shall develop and implement a Seed Collection Plan to collect and store seed for Mojave milkweed, Rusby's desert-mallow, desert pincushion, nine-awned pappus grass, and Parish's club-cholla. The source of these seeds shall be from plants proposed for removal within the project footprint. The project owner shall engage the services of a qualified contractor approved by the CPM to undertake seed collection and storage.

8. Gas Pipeline Revegetation and Monitoring: In the natural gas pipeline construction corridor where disturbed soils will be revegetated, the topsoil excavated shall be segregated, kept intact, and protected, under conditions shown to sustain seed bank viability. At a minimum, the top 2 cm of the soil shall be separately stored and preserved. Topsoil salvage, storing, and replacement shall be replaced in its original vertical

orientation following pipeline installation ensuring the integrity of the top 2 cm in particular. The project owner shall prepare a Gas Pipeline Revegetation and Monitoring Plan targeted at re-establishment of Rusby's desert-mallow, desert pincushion, Mojave milkweed, and potentially other special-status plant species. The Gas Pipeline Revegetation and Monitoring Plan shall identify success criteria for re-establishment and shall continue for a period of no less than 10 years until the defined success criteria are achieved. The Gas Pipeline Revegetation and Monitoring Plan shall include measures for seeding or other remedial actions. If no individuals of Rusby's desert-mallow, desert pincushion, or Mojave milkweed, are located during the first year of monitoring.

9. Surveys on Acquired and Public Lands: The project owner shall conduct floristic surveys for Rusby's desert-mallow and Mojave milkweed on all lands that will be acquired as part of the desert tortoise compensatory mitigation requirements (see Condition of Certification **BIO-17**). Similar surveys shall be conducted for desert pincushion, nine-awned pappus grass, and Parish's club-cholla for those species for which the 75 percent on-site avoidance goal has not been achieved. The goal of the surveys shall be to identify at least the same number of occurrences on off-site lands as were impacted by the ISEGS project. If this goal is not met by surveys on proposed acquisition lands, additional surveys shall be conducted within suitable habitat on public lands until the same number of occurrences of each species that were impacted are identified. To be counted toward fulfillment of the goal the occurrences must reflect new data not previously documented in other survey efforts. The survey requirements shall include the following:

   - All surveys shall be conducted by a qualified botanist in accordance with BLM, CDFG, and CNPS plant survey guidelines;
   - Surveys shall occur the first spring after construction begins and continue each year until the same number of special-status plant occurrences are identified on acquisition lands and/or BLM lands as were impacted, or predicted to be impacted based on final site design, by the ISEGS project construction and operation;
   - For each year surveys are conducted yearly survey results shall be provided to the CPM, BLM's Authorized Officer and CDFG, and shall include CNDDB field survey forms for all special-status plant species encountered during the surveys; and
   - All field survey forms shall be submitted to the CNDDB at the time of submittal to the CPM, BLM and CDFG.
   - For each of the species for which surveys were conducted, the project owner's qualified botanist shall submit a completion report documenting fulfillment of the target goals and which describe the number of new, previously undiscovered occurrences identified and mapped. Locations shall be reported with GPS coordinates compatible with inclusion in a GIS database.

10. Security for Implementation of Plans : The project owner shall provide security adequate to fund implementation of the Special-Status Plant Protection and Monitoring Plan, the Special-Status Plant Remedial Action Plan for the life of the project, as well as the Seed Collection Plan, and the Gas Pipeline Revegetation Monitoring Plan.

Verification: No less than 30 days following the publication of the Energy Commission Decision the project owner shall submit final maps and design drawings depicting the location of Special-Status Plant Protection Areas within and adjacent to the project site, and shall identify the species and numbers of plants within each of the Special-Status Plant Protection Areas.

No less than 30 days following the publication of the Energy Commission Decision the project owner shall submit draft versions of the Special-Status Plant Protection and Monitoring Plan, the Special-Status Plant Remedial Action Plan, the Seed Collection Plan, and the Gas Pipeline Revegetation Monitoring Plan for review by the CPM, BLM's Authorized Agent, and CDFG. The project owner shall also provide a cost estimate for implementation of these plans which is subject to approval by the CPM, BLM's authorized agent, and the CDFG. The final plans shall be submitted for approval by the CPM, in consultation with BLM's Authorized Agent, CDFG, and CNPS within 90 days of the publication of the Commission Decision. The final plans shall be incorporated into the BRMIMP. At this time, the project owner shall also provide security sufficient to fund the implementation of the plans.

Within 30 days of the start of construction, the project owner shall submit a copy of the contract with the CPM-approved seed contractor and the check for seed collection and curation fees to the CPM.

On January 31st of each year following construction the project owner's qualified botanist shall submit a report, including CNDDB field survey forms, describing the results of off-site plant surveys to the BLM's authorized officer, the CPM, CDFG, and CNDDB. Submittal of survey reports shall continue until the same number of occurrences impacted by the project for Rusby's desert-mallow and Mojave milkweed are identified on these off-site lands as were impacted by the project. Similar reports shall be submitted for desert pincushion, nine-awned pappus grass, and Parish's club-cholla for each of those three species for which 75 percent avoidance was not achieved. For each of the species for which surveys were conducted, the project owner's qualified botanist shall submit a completion report documenting fulfillment of the target goals and which describe the number of new, previously undiscovered occurrences identified and mapped using GIS techniques for each species. Mapping results shall include GPS coordinates of the plants found.

The Designated Biologist shall maintain written and photographic records of the tasks described above, and summaries of these records shall be submitted along with the Monthly Compliance Reports to the CPM, BLM Authorized Agent, and CDFG. During project operation, the Designated Biologist shall submit record summaries in the Annual Compliance Report for a period not less than 10 years for the Gas Pipeline Revegetation Plan, and for the life of the project for the Special-Status Plant Protection and Monitoring Plan, and the Special-Status Plant Remedial Action Plan, including funding for the seed storage

NELSON'S BIGHORN SHEEP MITIGATION

BIO-19 To compensate for project impacts to Nelson's bighorn sheep the project owner shall finance, construct and manage an artificial water source in the eastern part of the Clark Mountain range or in the State Line Hills outside of designated Wilderness.

Verification: Within 60 days of publication of the Energy Commission Decision the project owner shall submit to the BLM's Authorized Officer, the CPM and CDFG a Draft Bighorn Sheep Mitigation Plan identifying a proposed location for the artificial water source and providing plans for its construction and management. At least 60 days prior to start of any project-related ground disturbance activities, the project owner shall provide BLM's Authorized Officer and the CPM with the final version of the Bighorn Sheep Mitigation Plan that has been reviewed and approved by BLM, CDFG, and the Energy Commission staff. BLM's Authorized Officer and the CPM will determine the plan's acceptability within 30 days of receipt of the final plan.

No later than 18 months following the publication of the Energy Commission Decision, the project owner shall provide written verification to BLM's Authorized Officer and the CPM that the construction of the artificial water source has been completed. At the same time, the project owner shall provide evidence of an agreement (Memorandum of Understanding) and a funding mechanism to provide ongoing maintenance of the water source by CDFG or some other party approved by BLM's Authorized Office and the CPM.

STREAMBED IMPACT MINIMIZATION AND COMPENSATION MEASURES

BIO-20 The project owner shall implement the following measures to avoid, minimize and mitigate for impacts to ephemeral drainages:

1. Acquire Off-Site Desert Wash: The project owner shall acquire, in fee or in easement, a parcel or parcels of land that includes ephemeral washes with at least 198 acres of state jurisdictional waters. The terms and conditions of this acquisition or easement shall be as described in Condition of Certification **BIO-17** with the additional criteria that the desert wash mitigation lands: 1) include at least 198 acres of state jurisdictional waters; 2) be characterized by similar soil permeability, hydrological and biological functions as the impacted drainages; and 3) be within the same watershed as the impacted wash. The desert wash mitigation lands may be included with the desert tortoise mitigation lands ONLY if the above three criteria are met.

2. Security for Implementation of Mitigation: A security in the form of an irrevocable letter of credit, pledged savings account, or certificate of deposit for the amount of all mitigation measures pursuant to this condition of certification shall be submitted to, and approved by, the CPM, in consultation with CDFG, prior to commencing project activities within areas of CDFG jurisdiction. This amount shall be based on a cost estimate which shall be submitted to CDFG for review and to the CPM for approval within 60 days of the Energy Commission Decision's publication and prior

to commencing project activities within areas of CDFG jurisdiction. The security shall be approved by the CPM, in consultation with CDFG's legal advisors, prior to its execution, and shall allow the CPM at its discretion to recover funds immediately if the CPM, in consultation with CDFG, determines there has been a default.

3. Preparation of Management Plan: The project owner shall submit to Energy Commission CPM and CDFG a draft Management Plan that reflects site-specific enhancement measures for the drainages on the acquired compensation lands. The objective of the Management Plan shall be to enhance the wildlife value of the drainages, and may include enhancement actions such as weed control, fencing to exclude livestock, or erosion control. No later than 12 months after publication of the Energy Commission Decision the project owner shall submit a final Management Plan for review and approval to the CPM and CDFG.

4. Right of Access and Review for Compliance Monitoring: The CPM reserves the right to enter the project site or allow CDFG to enter the project site at any time to ensure compliance with these conditions. The project owner herein grants to the CPM and to CDFG employees and/or their representatives the right to enter the project site at any time, to ensure compliance with the terms and conditions and/or to determine the impacts of storm events, maintenance activities, or other actions that might affect the restoration and revegetation efforts. The CPM and CDFG may, at the CPM's discretion, review relevant documents maintained by the operator, interview the operator's employees and agents, inspect the work site, and take other actions to assess compliance with or effectiveness of mitigation measures.

5. Notification: The project owner shall notify the CPM and CDFG, in writing, at least five days prior to initiation of project activities in jurisdictional areas as noted and at least five days prior to completion of project activities in jurisdictional areas. The project owner shall notify the CPM and CDFG of any change of conditions to the project, the jurisdictional impacts, or the mitigation efforts, if the conditions at the site of a proposed project change in a manner which changes risk to biological resources that may be substantially adversely affected by the proposed project. The notifying report shall be provided to the CPM and CDFG no later than seven days after the change of conditions is identified. As used here, change of condition refers to the process, procedures, and methods of operation of a project; the biological and physical characteristics of a project area; or the laws or regulations pertinent to the project as defined below. A copy of the notifying change of conditions report shall be included in the annual reports.

    a. Biological Conditions: a change in biological conditions includes, but is not limited to, the following: 1) the presence of biological resources within or adjacent to the project area, whether native or non-native, not previously known to occur in the area; or 2) the presence of biological

resources within or adjacent to the project area, whether native or non-native, the status of which has changed to endangered, rare, or threatened, as defined in section 15380 of Title 14 of the California Code of Regulations.

b. Physical Conditions: a change in physical conditions includes, but is not limited to, the following: 1) a change in the morphology of a river, stream, or lake, such as the lowering of a bed or scouring of a bank, or changes in stream form and configuration caused by storm events; 2) the movement of a river or stream channel to a different location; 3) a reduction of or other change in vegetation on the bed, channel, or bank of a drainage, or 4) changes to the hydrologic regime such as fluctuations in the timing or volume of water flows in a river or stream.

c. Legal Conditions: a change in legal conditions includes, but is not limited to, a change in Regulations, Statutory Law, a Judicial or Court decision, or the listing of a species, the status of which has changed to endangered, rare, or threatened, as defined in section 15380 of Title 14 of the California Code of Regulations.

6. Code of Regulations: The project owner shall provide a copy of the Streambed Impact Minimization and Compensation Measures from the Energy Commission Decision to all contractors, subcontractors, and the applicant's project supervisors. Copies shall be readily available at work sites at all times during periods of active work and must be presented to any CDFG personnel or personnel from another agency upon demand. The CPM reserves the right to issue a stop work order or allow CDFG to issue a stop work order after giving notice to the project owner, the CPM, if the CPM in consultation with CDFG, determines that the project owner has breached any of the terms or conditions or for other reasons, including but not limited to the following:

   a. The information provided by the applicant regarding streambed alteration is incomplete or inaccurate;

   b. New information becomes available that was not known to it in preparing the terms and conditions;

   c. The project or project activities as described in the Final Staff Assessment have changed; or

   d. The conditions affecting biological resources changed or the CPM, in consultation with CDFG, determines that project activities will result in a substantial adverse effect on the environment.

7. Best Management Practices: The project owner shall also comply with the following conditions:

   a. The project owner shall minimize road building, construction activities and vegetation clearing within ephemeral drainages to the extent feasible.

   b. The project owner shall not allow water containing mud, silt, or other pollutants from grading, aggregate washing, or other activities to enter ephemeral drainages or be placed in locations that may be subjected to high storm flows.

   c. The project owner shall comply with all litter and pollution laws. All contractors, subcontractors, and employees shall also obey these laws, and it shall be the responsibility of the project owner to ensure compliance.

   d. Spoil sites shall not be located within drainages or locations that may be subjected to high storm flows, where spoil shall be washed back into a drainage.

   e. Raw cement/concrete or washings thereof, asphalt, paint or other coating material, oil or other petroleum products, or any other substances that could be hazardous to vegetation or wildlife resources, resulting from project-related activities, shall be prevented from contaminating the soil and/or entering waters of the state. These materials, placed within or where they may enter a drainage or Ivanpah Dry Lake, by project owner or any party working under contract or with the permission of the project owner shall be removed immediately.

   f. No broken concrete, debris, soil, silt, sand, bark, slash, sawdust, rubbish, cement or concrete or washings thereof, oil or petroleum products or other organic or earthen material from any construction or associated activity of whatever nature shall be allowed to enter into, or placed where it may be washed by rainfall or runoff into, waters of the state.

   g. When operations are completed, any excess materials or debris shall be removed from the work area. No rubbish shall be deposited within 150 feet of the high water mark of any drainage.

   h. No equipment maintenance shall occur within 150 feet of any ephemeral drainage where petroleum products or other pollutants from the equipment may enter these areas under any flow.

Verification: No less than 90 days prior to acquisition of the parcel (s) containing 198 acres of waters of the state, the project owner, or a third-party approved by the CPM, in consultation with CDFG, shall submit a formal acquisition proposal to the CPM and CDFG describing the parcel(s) intended for purchase.

Draft agreements to delegate land acquisition to CDFG or an approved third party and agreements to manage compensation lands shall be submitted to Energy Commission staff for review and approval (in consultation with CDFG) prior to land acquisition. Such agreements shall be mutually approved and executed at least 60 days prior to start of any project-related ground disturbance activities. The project owner shall provide written verification to the CPM that the compensation lands have been acquired and recorded in favor of the approved recipient(s). Alternatively, before beginning project ground-disturbing activities, the project owner shall provide Security in accordance with this condition. Within 90 days after the land purchase, as determined by the date on the title, the project owner shall provide the CPM with a management plan for review and approval, in consultation with CDFG, for the compensation lands and associated funds.

No fewer than 30 days prior to the start of work potentially affecting waters of the state, the project owner shall provide written verification (i.e., through incorporation into the BRMIMP) to the CPM that the above best management practices will be implemented and provide a discussion of work in waters of the state in Compliance Reports for the duration of the project.

REFERENCES

The tn: 00000 in the references below indicates the transaction number under which the item is catalogued in the Energy Commission's Docket Unit. The transaction number allows for quicker search and retrieval of individual items docketed for a case or used for ease of reference and retrieval of exhibits cited in briefs and used at Evidentiary Hearings.

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Biological Resources Appendix A
Percentage of Statewide Documented Occurrences for Special Status Plant Species in the ISEGS Project

Biological Resources Appendix A - Table A-1
Percentage of Statewide Documented Element Occurrences[4] for Special-Status Plant Species in the ISEGS Project

Name Scientific (Common)	CDFG's CNDDB Rank Global/State and CNPS List	Total Documented Occurrences in CNDDB* (including project occurrences)	Additional Occurrences from Consortium of California Herbaria**	Occurrences From Other Available Data (other projects)***	Project Site Occurrences (as reported by CNDDB 8/2009)	Project Site % of Documented Occurrences in California (List 2 plants) or Globally (List 1B)
Androstephium breviflorum (**small-flowered androstephium**)	G5 S1.2, List 2.2	82	0	1	3	3/(82+1) = 4%
Asclepias nyctaginifolia (**Mojave milkweed**)	G4G5 S1, List 2.1	22	1	1	16	16/(22+1+1) = 67%
Coryphantha chlorantha **(desert pincushion)**	G2G3 S1, List 2.1	22	1	n/a	8	8/(22+1) = 35%
Enneapogon desvauxii (**nine-awned pappus grass**)	G5 S2, List 2.2	21	0	1	3	3/(21+1) = 14%
Grusonia parishii (**Parish's club-cholla)**	G3G4 S2, List 2.2	16	0	1	5	5/(16+1) = 29%
Sphaeralcea rusbyi var. *eremicola* (**Rusby's desert-mallow**)	G4T2 S2, List 1B.2	29	4	n/a	7	7/(29+4) = 21%

* Number of CNDDB element occurrences (August 2009 update)
** Number of occurrences derived from herbarium records, California Consortium of Herbaria
*** Number of occurrences derived from EA for the SCE El Dorado to Ivanpah 220 kV transmission line project

Global Rank is a reflection of the overall condition of an element throughout its global range:

G2—Imperiled	At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors;
G3—Vulnerable	At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors;
G4—Apparently Secure	Uncommon but not rare; some cause for long-term concern due to declines or other factors;
G5— Secure	Common; widespread and abundant.

Some of the G-ranks above are expressed as a range. Subspecies receive a T-rank attached to the G-rank. The G-rank refers to the whole species range, but the T-rank refers to the global condition of variety *eremicola* only.
State Rank:

[4] The term "Element Occurrence (EO)" refers to populations or groups of individuals occurring in close proximity to each other, and is defined by the CNDDB as individuals of a particular species occurring within one-quarter mile of each other. When numerous localities are documented by a reporter within very close proximity of each other, CNDDB uses this standardized and nationally accepted mapping convention, which allows a common metric for comparison, using a quarter-mile grid. Data provided to CNDDB by the applicant (CH2M Hill 2008c, Table 5-1) were mapped by CNDDB using this convention into the number of EOs shown in the column "Project Site Occurrences as reported by CNDDB 8/2009." These numbers should not be confused with numbers of individual plants.

S1— Critically Imperiled	Critically imperiled in the state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province;
S2— Imperiled	Imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province;
S3— Vulnerable	Vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation;
? —	Indicates some uncertainty about the rank.

State Rank Extension:
0.2—threatened

Table A-1 describes the status of the special-status plants found within the project footprint in terms of Element Occurrences (EOs) rather than numbers of individual plants. An EO is defined by CDFG's CNDDB as individuals of a particular species occurring within one-quarter mile of each other. Due to incomplete data, contributors to the CNDDB sometimes do not note the number of individuals when reporting CNDDB EOs and herbaria records, and the occurrence size in terms of individual plants cannot be ascertained. To provide a common metric for comparison with the CNDDB and herbarium data, Table A-1 expresses the occurrences of special-status plant species found on the ISEGS site during the 2007 and 2008 surveys in terms of EOs. Utah vine milkweed and desert portulaca are not included because they are not mapped in the CNDDB, as is the case for most CNPS List 4 plants.

BIOLOGICAL RESOURCES APPENDIX B: Issues to Address in the Closure, Revegetation and Rehabilitation Plan

Staff has reviewed the *Closure, Revegetation and Rehabilitation Plan for the Ivanpah Solar Electric Generating System, Eastern Mojave Desert, San Bernardino County, California*, June 2009 (CH2M Hill 2009q) and identified the following issues that need to be addressed in revisions to this document.

Proposed Conditions of Approval for ISEGS
Ted St. John, Ph.D.
Chambers Group, Inc.
Based on 2009-06-29_Applicant_Data_Response_Set_2K_TN-52208 (Data_Response_Set_2K).

Policies

General

Proposed Conditions of Approval for ISEGS
Ted St. John, Ph.D.
Chambers Group, Inc.

Reference in Data_Response_Set_2K:

Approach: Key future actions will be cut and pasted with “will” substituted for might, should, etc.

Proposed Wording of Condition: future actions will be cut and pasted with “will” substituted for might, should, etc.

End use of the ROW after ISEGS closure

Proposed Conditions of Approval for ISEGS
Ted St. John, Ph.D.
Chambers Group, Inc.

Deficiency Addressed by this Condition: Vague language

Reference in Data_Response_Set_2K: 1.1

Approach: The end use of the property 50 years from now is quality habitat of the types impacted by construction and operation. Contracts and permits may be amended by mutual agreement, but the current standards conform to laws and guidelines now in effect.

Proposed Wording of Condition: The objective of the revegetation plan and all related activities shall be re-creation of the types of habitat lost during construction and operation of the proposed solar energy facility. No project approvals will be issued, nor shall any plans or applications be based on other potential end uses of the property.

Shading from Mirrors

Proposed Conditions of Approval for ISEGS
Ted St. John, Ph.D.
Chambers Group, Inc.

Reference in Data_Response_Set_2K: This topic is not discussed in the draft.

Approach: Point out that shading from the mirrors is serious and can lead to competitive disadvantages to plants with the crassulacean acid metabolism photosynthetic pathway (CAM).

Proposed Wording of Condition: The fraction of the land surface that is to be occupied by mirrors will have an impact on the vegetation. Shading has selective effects on wavelengths of light that are critical to desert plants that have crassulacean acid metabolism (CAM). These plants include many succulents. Shading will inhibit growth and reduce competitive ability of CAM plant species and is considered an impact under these Conditions of Approval. Native CAM plant species that are subject to shading will be moved to a succulent storage area or an unshaded portion of the operations area. Under no circumstances shall salvaged succulents be stored within Special-Status Plant Protection Areas. Any such moves of CAM plants not already approved under other Conditions of Approval shall be specifically verified in writing by BLM or its designated representative.

Submittal of final closure, revegetation, and rehabilitation plan

Proposed Conditions of Approval for ISEGS
Ted St. John, Ph.D.
Chambers Group, Inc.

Deficiency Addressed by this Condition: Vague language

Reference in Data_Response_Set_2K: 7.1

Approach: Specify the importance of the final plan.

Proposed Wording of Condition: The Final Closure, Revegetation, and Rehabilitation Plan (final closure plan) shall be submitted and approved by BLM prior to issuance of the permit.

STANDARDS

Introduction of mid to late successional vegetation

Proposed Conditions of Approval for ISEGS
Ted St. John, Ph.D.
Chambers Group, Inc.

Deficiency Addressed by this Condition: the argument against introduction of late stages of succession during the restoration effort.

Reference in Data_Response_Set_2K: 7.3.1

Approach: Draw upon examples in which later stages of succession have been introduced, and provide standards to assure an effort to introduce plants other than ruderals.

Proposed Wording of Condition: Later stages of vegetation are not impossible to establish, and late successional species can be introduced at the same time as early stage species. Late stage species are often more dependent upon soil biological conditions and soil structure but can be successful in a mixture with early stage species. Performance standards

Proposed Conditions of Approval for ISEGS
Ted St. John, Ph.D.
Chambers Group, Inc.

Deficiency Addressed by this Condition: The low threshold being proposed for project success in Data_Response_Set_2K. Performance standards currently proposed by the applicant will not define a successful restoration project.

Reference in Data_Response_Set_2K: 7.8.1, Table 7-6

Approach: Specific and more stringent standards for project success;

Proposed Wording of Condition: Within each mapped pre-disturbance vegetation type, success criteria will be achieved as defined by performance and abundance of native and exotic plant species. Native plants in the vegetation shall reach over the first 10 years of growth 80 percent of the initial density, absolute cover, and species richness, with progressive improvement during the 10-year period. Exotic species shall reach over the first 10 years of growth no more than 4 times the absolute cover of exotic plants in the original vegetation. Every effort shall be made to minimize invasion by exotic species, and the performance standards shall include a maximum allowable cover of exotic species.

Standard for weed cover

Proposed Conditions of Approval for ISEGS
Ted St. John, Ph.D.
Chambers Group, Inc.

Deficiency Addressed by this Condition: Lax weed cover standards

Reference in Data_Response_Set_2K: 3.5.3 and 7.3.1.1

Approach: Reduce tolerance for weedy species in the revegetation effort

Proposed Wording of Condition: The vegetation to be introduced to the site shall consist entirely of plant species native to the northern Mojave Desert. No exotic plant species shall be included on the seed lists nor introduced with native species. Exotic species, regardless of their presence in the original vegetation, shall not be counted as successful vegetation establishment.

MONITORING

Baseline vegetation surveys

Proposed Conditions of Approval for ISEGS
Ted St. John, Ph.D.
Chambers Group, Inc.

Deficiency Addressed by this Condition: Restoration surveys are not suitable for planning the restoration effort.

Reference in Data_Response_Set_2K: 3.5.4

Approach: Requirement for vegetation surveys that can guide restoration planning. There will have to be thorough sampling within each vegetation type. The current plan provides fewer transects than there are vegetation types.

Proposed Wording of Condition: Pre-construction surveys of all vegetation on the subject sites shall be carried out in a manner able to guide restoration efforts and provide baseline measurements for judging project success. The entire proposed project area shall be divided into vegetation types as described by Sawyer and Keeler-Wolf. The boundaries of each vegetation type shall be mapped to GPS accuracy of one meter or less and provided to BLM as a series of shape files. Each vegetation type will have soil, terrain, exposure, elevation, and slope clearly indicated. For each vegetation type provide a list of perennials and appropriate annuals. Surveys shall be performed at a season when the year's annuals are identifiable; generally from early March through late April. Survey methodology should emphasize accuracy rather than precision. Generally it is preferred to record a large number of rapid determinations rather than a small number of detailed determinations. BLM will accept rapid methods such as the step-point method (Bonham 1988) provided transects are laid out in a manner that captures the true composition of the vegetation. The combined length of step-point transects in each vegetation type shall approximate the square root of the area of the vegetation type or at least 400 intercepts and shall be laid out to give unbiased representation of all portions of the vegetation type. Vegetation need not be divided into herb and shrub layers as long as all species intercepted by points are included in the survey. Additional species not encountered on the transects shall be recorded separately on a diversity list.

Maintenance monitoring schedule

Proposed Conditions of Approval for ISEGS
Ted St. John, Ph.D.
Chambers Group, Inc.

Deficiency Addressed by this Condition: Maintenance monitoring schedule must be frequent during early stages

Reference in Data_Response_Set_2K: 7.8.2.1

Approach: Monitoring. Performance standards currently proposed by the applicant will not define a successful restoration project.

Proposed Wording of Condition: Maintenance monitoring shall include visual inspection of all planting areas with brief e-mail reports to the applicant and all involved agencies. Monitoring shall be scheduled once per month during the first growing season after seed application, switching to once per quarter starting in July after seed application. Monitoring may be reduced to once per year in late March through mid May of each year after the second growing season.

Performance monitoring methods

Proposed Conditions of Approval for ISEGS
Ted St. John, Ph.D.
Chambers Group, Inc.

Deficiency Addressed by this Condition: Performance standards currently proposed by the applicant will not define a successful restoration project.

Reference in Data_Response_Set_2K: 7.8.2

Approach: Methods and schedule for performance monitoring

Proposed Wording of Condition: Performance monitoring shall be conducted annually during the spring flowering season, between mid March and mid May to assess restoration performance. Performance monitoring surveys of all vegetation on the subject sites shall be carried out in a manner able to detect project success. The entire proposed project area shall be divided into vegetation types as described by Sawyer and Keeler-Wolf. The boundaries of each vegetation type shall be compared with the baseline survey maps, and if the boundaries have changed the maps shall be updated and provided to BLM as a series of shape files. Each vegetation type will have soil, terrain, exposure, elevation, and slope clearly indicated. For each vegetation type provide a list of perennials and appropriate annuals. Surveys shall be performed at a season when the year's annuals are identifiable; generally from early March through late April. Survey methodology should emphasize accuracy rather than precision. Generally it is preferred to record a large number of rapid determinations rather than a small number of detailed determinations. BLM will accept rapid methods such as the step-point method (Bonham 1988) provided transects are laid out in a manner that captures the true composition of the vegetation. The combined length of step-point transects in each vegetation type shall approximate the square root of the area of the vegetation type or at least 400 intercepts and shall be laid out to give unbiased representation of all portions of the vegetation type. Vegetation need not be divided into herb and shrub layers as long as all species intercepted by points are included in the survey. Additional species not encountered on the transects shall be recorded separately on a diversity list.

TRANSPLANTS

Records of succulent transplantation

Proposed Conditions of Approval for ISEGS
Ted St. John, Ph.D.
Chambers Group, Inc.

Deficiency Addressed by this Condition: Lack of specificity on size and age of succulents to be transplanted.

Reference in Data_Response_Set_2K: 4.5

Approach: Present a table that shows by species the number of plants onsite, the lower threshold height for salvage, the number in each size class, and the fate of plants not salvaged.

Proposed Wording of Condition: Each area to be cleared or mowed under this application shall be surveyed in detail, and every succulent shall be inventoried and mapped. Applicant shall provide prior to breaking ground a table showing for each plant the species, height, UTM coordinates to an accuracy of one meter or less, and expected disposition of the specimen. Height above ground level shall be provided in the table. Separate height criteria will be agreed with BLM for each species of succulent. In no case shall the height criterion exclude all or most of a species, as would happen with a uniform criterion of one foot.

Succulent transplantation research

Proposed Conditions of Approval for ISEGS
Ted St. John, Ph.D.
Chambers Group, Inc.

Deficiency Addressed by this Condition: Research responsibilities not adequately addressed

Reference in Data_Response_Set_2K: 1.3.4

Approach: Ivanpah 1 subject to experimental evaluation for methods to be used on Ivanpah 2 and 3.

Proposed Wording of Condition: Succulent transplants done during preparation of the Ivanpah 1 site shall be fully documented and shall serve as trials of methods to be used during plant salvage on the Ivanpah 2 and 3 areas. Full records shall be available immediately upon request of BLM or their designated representatives and shall contain for each transplanted specimen the species, height, number of branches or pads as appropriate, donor location by UTM coordinates, methods used to remove, transport and store the plant, period of temporary storage, location, facility description and planting medium used for storage, and frequency of watering during storage. The records shall include plant condition at the time of collection, at the time of planting at the storage area, and quarterly during storage until such time as each plant is sold, placed in the field, or dies. No salvaged individuals of desert pincushion or Parish's club-cholla shall be sold to the public. These individuals shall be carefully collected and handled in accordance with the Special-Status Plant Remedial Action Plan.

CLEARING

Clearing of vegetation

Proposed Conditions of Approval for ISEGS
Ted St. John, Ph.D.
Chambers Group, Inc.

Deficiency Addressed by this Condition: Contradictory wording about extent of clearing.

Reference in Data_Response_Set_2K: 1.3.1, 1.3.2

Approach: No general clearing of vegetation will be carried out as stated in 1.3.2. Instead, 1.3.1 will apply.

Proposed Wording of Condition: Clearing of vegetation shall be limited to areas for which final maps are provided to BLM before approval of the ROW. Clearing of vegetation will be permitted on roads, utility routes, building and parking areas, and temporary staging areas provided these are specifically documented on a georeferenced aerial photo or shape file, showing the exact locations of soil disturbance. BLM will consider relocating specific installations prior to the beginning of construction but will not approve additional acreage under the current application.

Locations for mowing of vegetation

Proposed Conditions of Approval for ISEGS
Ted St. John, Ph.D.
Chambers Group, Inc.

Deficiency Addressed by this Condition: Contradictory wording about extent of clearing.

Reference in Data_Response_Set_2K: 1.3.2 and 2.2.1

Approach: Mowing limited to pre-defined and agreed areas.

Proposed Wording of Condition: Vegetation within the operations area may be mowed within agreed and pre-defined limits as required for access and operation. The pre-defined limits for mowing shall be specifically documented on a georeferenced aerial photo or shape file, showing the exact locations of proposed mowing. BLM will consider relocating the boundaries of the mowed areas prior to the beginning of construction but will not approve additional acreage under the current application.

Methods for mowing vegetation

Proposed Conditions of Approval for ISEGS
Ted St. John, Ph.D.
Chambers Group, Inc.

Deficiency Addressed by this Condition: Contradictory wording about extent of clearing.

Reference in Data_Response_Set_2K: 1.3.2

Approach: Methods and height of mowing.

Proposed Wording of Condition: Mowing may be carried out only by hand-operated string trimmers or tractor-mounted flail or rotary mowers. Tractors operated within native vegetation shall be provided with low ground pressure tires. The height of the mowing blade shall be at least 15 inches.

PLANTING

Seed collection

Proposed Conditions of Approval for ISEGS
Ted St. John, Ph.D.
Chambers Group, Inc.

Deficiency Addressed by this Condition: Seed collection procedures

Reference in Data_Response_Set_2K: 7.3.1.4

Approach: Range of species, collect from all to be destroyed.

Proposed Wording of Condition: Seed collection shall be carried out within an area mapped and provided to BLM with the project application. Special-status plant seed shall be separated from other native plant seed and handled according to the Special-Status Plant Remedial Action Plan.Future changes in seed collection area shall be negotiated separately with BLM. Collection areas shall be within 10 miles of the boundaries of the project site and shall be on similar terrain, soil, exposure, slope and elevation to the project site. Seed collection guidelines shall conform to all laws and regulations in effect at the time of collection and shall follow the guidelines for native seed collection provided by California Native Plant Society. Seed collection shall include all plant species known to be removed by construction and operation of the facility. If insufficient seeds are provided by "seed farming" and collection within 10 miles of the site, BLM may approve collection from a greater distance provided other environmental factors at the collection site are good matches to the project site.

Seed testing

Proposed Conditions of Approval for ISEGS
Ted St. John, Ph.D.
Chambers Group, Inc.

Deficiency Addressed by this Condition: Restoration Methods

Reference in Data_Response_Set_2K: 7.3.1.4, Table 7-1, 7.3.3.2

Approach: Seed testing

Proposed Wording of Condition: Batches of seeds collected or produced for this project shall be tested by a certified seed testing laboratory that will provide for each batch of seeds determinations of purity, germination, and seed count. Seed not sorted by plant species, including collections from under shrubs, from depressions in the soil, and from harvester ant caches, may be used to supplement defined seed batches but shall not be included in the claim of known seed applications.

Seed application

Proposed Conditions of Approval for ISEGS
Ted St. John, Ph.D.
Chambers Group, Inc.

Deficiency Addressed by this Condition: Restoration Methods

Reference in Data_Response_Set_2K: 7.4.1

Approach: Seed application by methods that provide good soil contact and protection from granivores. Information about the imprinting process and model specifications for imprinting contracts are available in St. John and Dixon (1996).

Proposed Wording of Condition: Seed shall be applied by methods that provide good seed-soil contact. The most successful methods in similar conditions are land imprinting

or broadcasting followed by a roller that will press seeds into the soil but not cause heavy compaction. Contrary to opinions expressed in the current application document, imprinting has often worked well on sandy loams and even pure sand. A communication to this effect is provided in an appendix from Dr. Robert Dixon, inventor of the land imprinter. Any imprinter must meet be able to form continuous imprints with two-inch berms between micro-watersheds of one square foot. Machines making imprints on only a small fraction of the soil surface shall not be substituted for Dixon imprinter. Pitting may be acceptable by agreement with BLM, with seed drilling a potential but not preferred choice.

SOIL PREPARATION

Soil description

Proposed Conditions of Approval for ISEGS
Ted St. John, Ph.D.
Chambers Group, Inc.

Deficiency Addressed by this Condition: Vague language

Reference in Data_Response_Set_2K: 7.2.5.1

Approach: Exact contents of soil baseline characterization

Proposed Wording of Condition: A soil baseline characterization shall be conducted before ground is broken at the proposed site. The characterization shall include:

a. Profile description of three representative pedons. (A pedon is the smallest three dimensional sampling unit displaying the full range of characteristics of a particular soil and typically occupies an area ranging from about 1 to 10 square yards [Brady and Weil, 2002]).

b. Characterization of surface condition (that is, is desert pavement or cryptogamic crust present). Description of cryptogamic crust shall include major groups of organisms identified at the site (filamentous cyanobacteria, other cyanobacteria, mosses, lichens, liverworts) and the characteristics by which they were identified. No identification shall be required apart from the general list presented in this paragraph.

c. Documentation of soil macro-invertebrates (that is, presence of ants, termites, and other significant macro-invertebrates)

d. Soil texture (that is, percent sand, silt, and clay), along with a reference to a widely accepted method for making the determination.

e. Bulk density, along with a reference to a generally accepted method for making the determination.

f. Fertility (that is, nutrient status, electrical conductivity, sodium adsorption ratio), along with methods by which composite samples were collected and the laboratory methods used to determine these properties. Composite samples shall contain equal contributions from at least six randomly-located collection points within the soil donor area.

g. Organic matter content and total carbon and nitrogen content, along with a reference to generally accepted methods for making the determinations.

Soil compaction shall be determined by measurement of bulk density in grams per cubic centimeter (or numerically equivalent units). Bulk density may be determined by any of several standard measurements, but the method used must be referenced to a widely-accepted soil methodology publication. In no case shall soil be compacted to bulk density that exceeds 1.6 g/cc except where no planting is to take place. Penetrometer measurements are not a substitute for bulk density measurements.

Mulch application

Proposed Conditions of Approval for ISEGS
Ted St. John, Ph.D.
Chambers Group, Inc.

Deficiency Addressed by this Condition: Mulch application has potential disadvantages as well as advantages.

Reference in Data_Response_Set_2K: 7.4.2

Approach: Mulch application is rarely done in this kind of restoration effort, but it could be beneficial.

Proposed Wording of Condition: Mulch application is done at the option of the operator. Mulch application to the soil shall consist of local non-weedy materials, the collection of which is incidental to other activities onsite. In no case shall mowing or grading of native vegetation be carried out for the sole purpose of generating mulch. Mulch shall be applied only to the soil surface unless the soil has already been inverted or severely disturbed through other procedures. Materials of relatively high nitrogen content, including alfalfa hay, shall not be applied.

SOIL STORAGE

Topsoil collection and storage

Proposed Conditions of Approval for ISEGS
Ted St. John, Ph.D.
Chambers Group, Inc.

Deficiency Addressed by this Condition: Restoration Methods

Reference in Data_Response_Set_2K: 7.2.3

Approach: Require certain stockpiling procedures

Proposed Wording of Condition: Topsoil for this project shall be defined as the soil volume from the original surface to 8 inches in depth. The upper 1/4 inch may be collected separately to preserve biological crust organisms as prescribed elsewhere in these Conditions of Approval. Topsoil may not be distinguishable by color or organic content but will have most fine roots during the active growing season. Topsoil shall be stored at locations agreed to by BLM and designated for this purpose. All stockpiles shall be on ground previously disturbed for another purpose, such as roads no longer in

use. If no disturbed location is available for topsoil storage, applicant will propose locations for BLM approval, then add the material on top of native vegetation at the agreed locations. Soil shall be collected, transported, and formed into stockpiles only while the soil is dry. The vegetation in place at or immediately before topsoil collection will be healthy native vegetation with less than 15 percent absolute cover of exotic weed growth. Soil occupied by vegetation of high plant diversity shall be given priority over soil occupied by low diversity native vegetation. Soil may be collected with a front loader, bulldozer, or scraper and transported to storage areas by front loader, dump truck, or scraper. The equipment transporting the soil shall not travel across the stockpile more than the minimum number of times required to build the soil to its intended depth. If transported in scrapers, the equipment shall travel new paths at each crossing to minimize the compaction of previous layers. The depth of the stockpiles shall not exceed 4 feet in the case of sandy loam or loamy sand soils. Topsoil stockpiles shall be kept dry and covered if no vegetation is introduced, but covers shall not be allowed to promote greenhouse heating of the stockpiles. If native vegetation is grown on the stockpiles to increase seeds and soil organisms, no cover shall be required. Artificial watering may be provided at the operator's option.
Stored topsoil may be reapplied as a layer over decompacted subgrade material as a means of implementing the restoration program. The topsoil layer shall be a minimum of 3 inches in depth. In general, topsoil may be applied to about twice the land area from which it was removed. The topsoil layer shall be bonded to the subgrade with a lightly-loaded sheepsfoot roller, a land imprinter, or other implement that interlocks material from the two layers without causing bulk density in excess of 1.6 grams per cubic centimeter. Seeds may be distributed concurrently with layer bonding if a land imprinter is employed for both purposes.

Seed farming

Proposed Conditions of Approval for ISEGS
Ted St. John, Ph.D.
Chambers Group, Inc.

Deficiency Addressed by this Condition: Unproductive uses of topsoil stockpiles under current proposal.

Reference in Data_Response_Set_2K: 7.2.3, 7.3.1.4

Approach: Seed farming

Proposed Wording of Condition: Topsoil to be stockpiled under other provisions of these conditions shall be used to grow native plant species for the purpose of producing native seeds and building beneficial microorganisms in the soil volume. All native plant species encountered in the vegetation surveys shall be in the growing rotation on the stockpiles. Most growing space shall be dedicated to the species for which the most seeds will be required. At least half by area of the growing area during each growing cycle shall be dedicated to plant species known to be good mycorrhizal host plants. These are often fast-growing, short-lived perennial grasses and composites, although representatives of many other plant families may be mycorrhizal hosts as well. Members of the families Chenopodiaceae and Amaranthaceae shall be limited to less than half the area of the soil stockpiles, with the other half occupied by known mycorrhizal host plant species.

Mycorrhizal inoculation

Proposed Conditions of Approval for ISEGS
Ted St. John, Ph.D.
Chambers Group, Inc.

Deficiency Addressed by this Condition: Document contains no specificity about mycorrhizal inoculation.

Reference in Data_Response_Set_2K: 6.2.3

Approach: Give plant species, locations, inoculation methods, sources of inoculum, and methods of application.

Proposed Wording of Condition: Mycorrhizal inoculation shall be carried out in all planting areas having fewer than one spore per cubic centimeter of topsoil, where topsoil is defined as soil between the surface and 8 inches depth, or to bedrock if the soil is less than 8 inches in depth. Spore counts shall be carried out by methods given in Johnson et al. or other accepted methodology as approved by the BLM project manager or his designated representative. Inoculation shall result in a minimum of one spore per cubic centimeter of soil as defined for initial spore counts. No inoculation shall be required in areas where the operator is able to demonstrate that all plant species on the list of final desired vegetation are known to be non-host species. This condition might be found in saline or very alkaline soils.

Biological crust collection and storage

Proposed Conditions of Approval for ISEGS
Ted St. John, Ph.D.
Chambers Group, Inc.

Deficiency Addressed by this Condition: The lack of attention to soil biological crust in a setting where it should be present and should be restored.

Reference in Data_Response_Set_2K: 7.2

Approach: Point out the role of soil biological crust in protecting the soil and holding weeds at bay, and require that key components of the soil crust be restored.

Proposed Wording of Condition: Soil biological crust is defined here as a mixture of organisms that occupy and protect the surface of the soil in most desert ecosystems. The organisms often include filamentous and non-filamentous cyanobacteria, mosses, lichens, liverworts and fungi. Soil biological crust shall be preserved by collecting the upper 1/4 inch of topsoil from areas to be graded. Applicant may flag specific areas known to contain biological crust organisms or collect upper soil from the entire area. BLM or its designated representative must concur that the correct areas have been flagged if collections are to include less than the entire area over which the soil surface will be disturbed. Collections are to emphasize filamentous cyanobacteria; but other cyanobacteria, mosses, lichens, and liverworts are also considered valuable contributors to the soil biological crust and will be important in protecting against erosion and reducing weed invasion. Soil surface crust shall be air dried and stored dry in a

shaded location in containers that allow air movement, such as loose-weave fabric bags. In no case shall the stored crust be subject to wetting or direct sunlight during storage. All containers shall be clearly labeled with date and location of original collection; name and contact information of persons responsible for identifying suitable material to collect; and the persons who collected, stored, and maintained collections.

Soil biological crust shall be re-applied at the time of replanting by crumbling the stored material and broadcasting it on the surface of the soil. Stored crust material may be applied to an area up to 10 times the area from which it was collected. Approximately 10 percent of the stored material shall be broadcast on topsoil storage areas among plants being grown for seed and soil microorganisms. When the growing cycle progresses to new planting, the soil supporting biological crust shall be collected and stored by the same methods prescribed for collections from the original soil, in clearly labeled bags or other suitable containers.

WEED MANAGEMENT

Mirror wash water

Proposed Conditions of Approval for ISEGS
Ted St. John, Ph.D.
Chambers Group, Inc.

Deficiency Addressed by this Condition: Moisture from washing mirrors is not adequately addressed

Reference in Data_Response_Set_2K: 5.3

Approach: Wash water may very well cause weed growth and root diseases of nearby native plants.

Proposed Wording of Condition: Even though mirror washing will be infrequent, evaporation will not be certain to remove moisture from soil. Washing will be done at night and throughout the calendar year and is likely to collect in the upper soil at least locally. Stored moisture can support vigorous weed growth and will present a risk for root disease in nearby native plants that are adapted for soil that is usually dry. All weed growth brought on by mirror washing shall be controlled by trimming the weeds to less than six inches in height. Any native succulents or plant species of concern within the drainage area of mirror washing will be monitored quarterly. If wilting or other signs of stress occur, the plants will be moved to an unshaded portion of the operations area. Any such moves of plants not already approved under other Conditions of Approval shall be specifically verified in writing by BLM or its designated representative.

REFERENCES

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1989. Measurement for Terrestrial Vegetation. New York, NY: John Wiley and Sons. Inc. 338p.

CH2MHill

2009 Attachment DR125-3B Closure, Revegetation, and Rehabilitation Plan for the Ivanpah Solar Electric Generating System, Eastern Mojave Desert, San Bernardino County, California. Prepared for Ivanpah Solar Electric Generating System, June 2009

Sawyer, John O. and Keeler-Wolf, Todd

1995. A Manual of California Vegetation. California Native Plant Society Press, Berkeley, California.

St. John, Ted, Ph.D. and Bob Dixon, Ph.D.

1997. Land Imprinting: An overview and proposed technical specifications. Tree of Life Nursery, San Juan Capistrano, CA.

APPENDICES

Letter from Bob Dixon

Dr. Robert M. Dixon is a retired soil scientist with the USDA Agricultural Research Service in Tucson, Arizona. He spent many years studying water infiltration in desert soils and devised the land imprinter as a solution to the problem of physical crusts that develop on bare soils and inhibit infiltration. Received August 12, 2009, in response to my inquiry:

Ted,

Imprinting works well in sandy soils and is definitely superior to seed drills because imprinting provides better seed-to-soil contact and better capillary flow of moisture to the seed because of greater soil firming by imprinters. Early on, imprinting was shown to be greatly superior for establishing stands of alfalfa in sandy Minnesota soils for the 2 reasons given above. Land imprinting works well in the sandy soil of desert dry washes.

Best Regards,

Bob Dixon

Photos of successful desert restoration sites

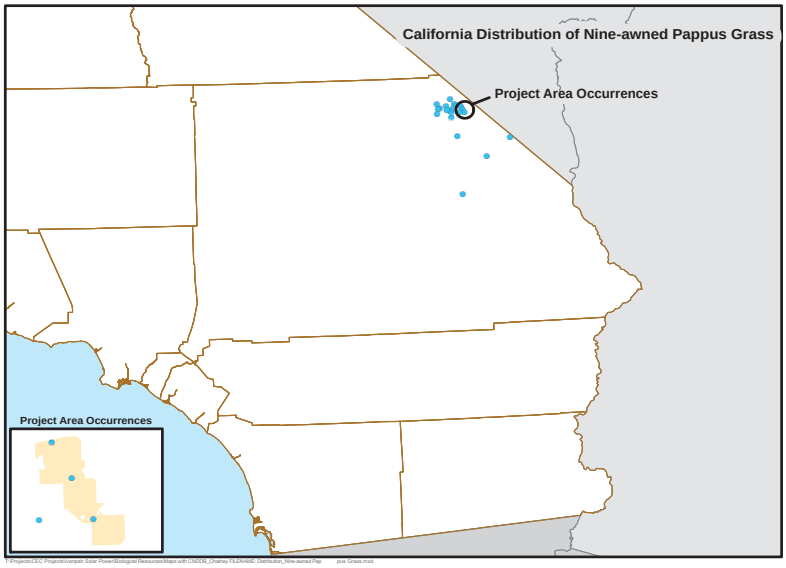
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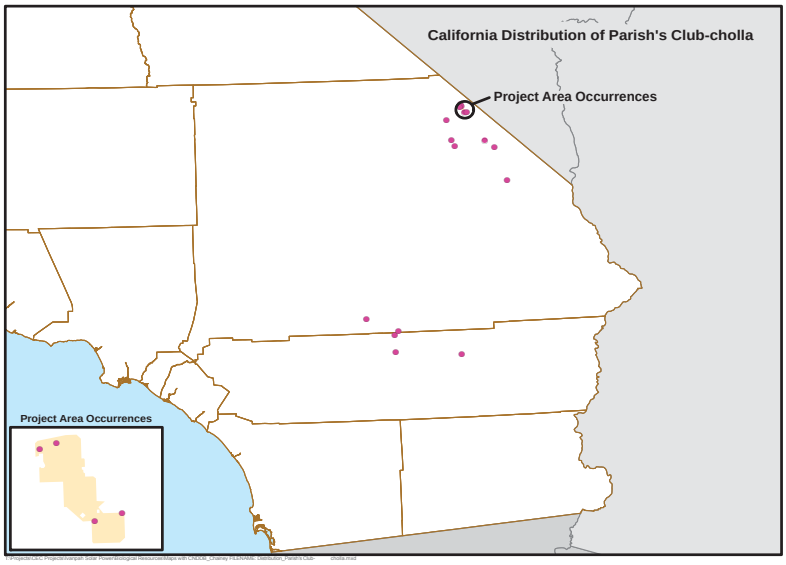
St. John and Dixon

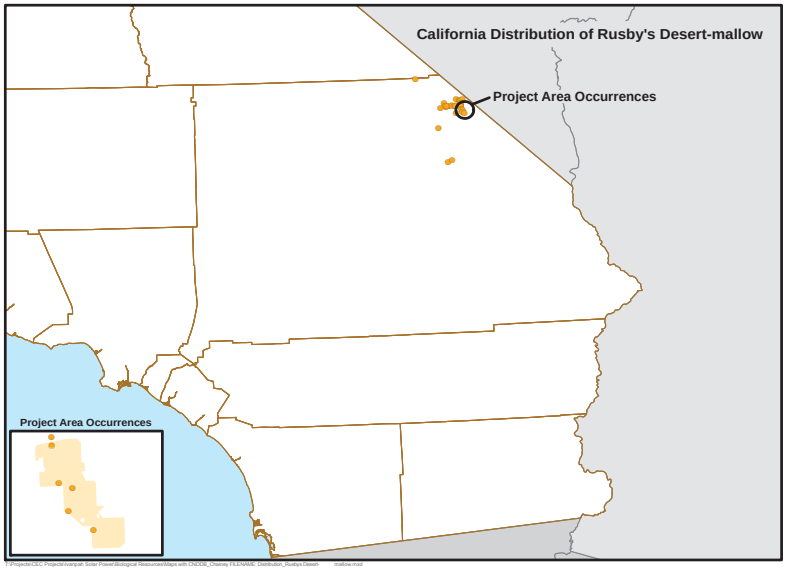
Booklet in Separate PDF

BIOLOGICAL RESOURCES - FIGURE 1A

California Distribution of Six Special-Status Species in the ISEGS Project Area





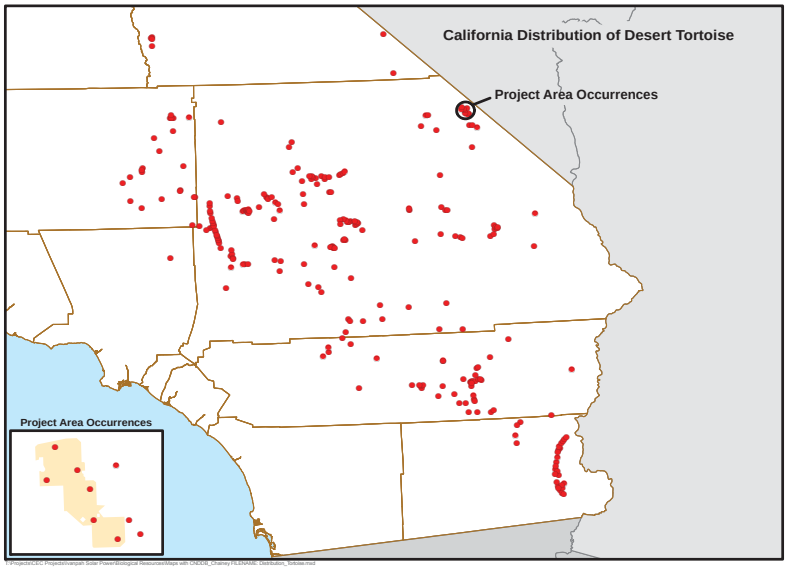


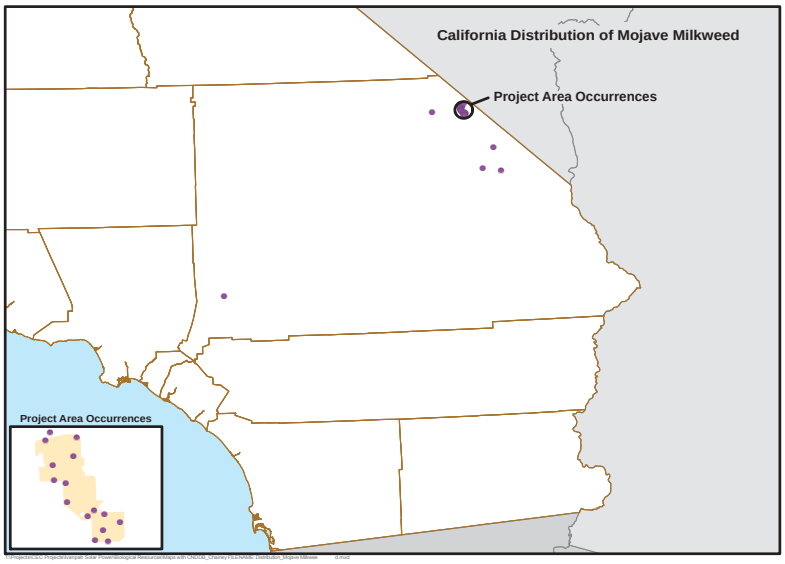
CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009

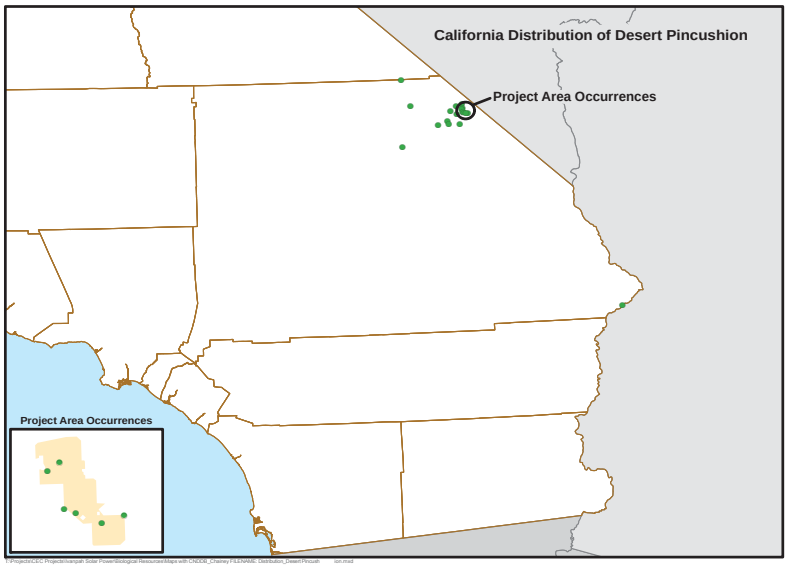
SOURCE: CNDDB, August 2009

BIOLOGICAL RESOURCES - FIGURE 1B

California Distribution of Six Special-Status Species in the ISEGS Project Area





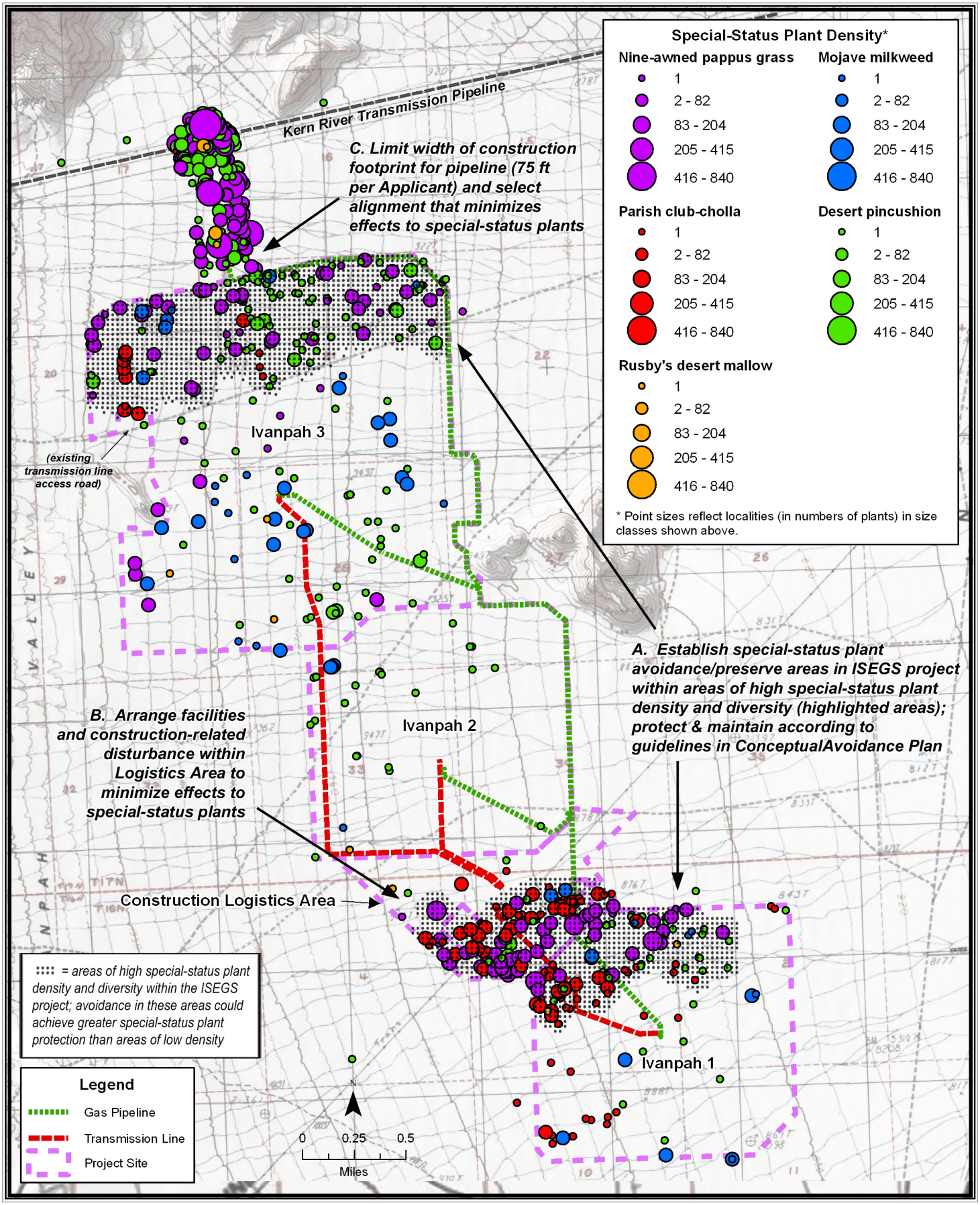


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009

SOURCE: CNDDB, August 2009

BIOLOGICAL RESOURCES - FIGURE 2

ISEGS - Conceptual Approach to Special-Status Plant Avoidance



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, SEPTEMBER 2009

SOURCE: California Energy Commission

CULTURAL RESOURCES

Prepared by Michael D. McGuirt and Sarah C. Murray

SUMMARY OF CONCLUSIONS

U.S. Bureau of Land Management (BLM) and Energy Commission staff (hereinafter jointly referred to as "staff") conclude that the ISEGS project would have no significant direct or indirect impacts on known, NRHP- or CRHR-eligible archaeological, ethnographic, or built-environment resources. Staff also concludes that the implementation of proposed Conditions of Certification **CUL-1** through **CUL-7** and **CUL-10** would reduce to less than significant, direct or indirect impacts to any such resources that are found during the course of the construction, operation, maintenance, closure, or decommissioning of the project. Staff further concludes that without mitigation, the effect of the Ivanpah Solar Energy Generating System (ISEGS) project on the Hoover Dam-to-San Bernardino transmission line, a historically significant built-environment resource, would be cumulatively considerable and would contribute to a significant cumulative effect on the environment. The adoption and implementation of Conditions of Certification **CUL-8** and **CUL-9** (mitigation measures) would render the potential effect of the proposed project on the resource less than cumulatively considerable.

Conditions of Certification **CUL-1** through **CUL-7** and **CUL-10** take into account the extensive and thorough field investigations that Bright Source (applicant) undertook for the present analysis and underwrites the recommendation of staff that the applicant be given substantial relief from routine monitoring requirements. The adoption and implementation of Conditions of Certification **CUL-1** through **CUL-7** and **CUL-10** ensure that the applicant would be able to respond quickly and effectively to what staff concludes is the highly improbable event that archaeological sites are found on the surface of the project area or buried beneath it during construction-related ground disturbance. Conditions of Certification referred to herein serve the purpose of both the Energy Commission's Conditions of Certification for purposes of the California Environmental Quality Act (CEQA) and BLM's Mitigation Measures for purposes of the National Environmental Policy Act (NEPA).

INTRODUCTION

This cultural resources assessment identifies the potential impacts of the ISEGS project on cultural resources. Cultural resources are defined under state law as buildings, sites, structures, objects, and historic districts. Three kinds of cultural resources are considered in this assessment: prehistoric, ethnographic, and historic.

Prehistoric archaeological resources are those materials relating to prehistoric human occupation and use of an area. These resources may include sites and deposits, structures, artifacts, rock art, trails, and other traces of Native American human behavior. In California, the prehistoric period began over 12,000 years ago and extended through the eighteenth century until 1769, when the first Europeans settled in California.

Ethnographic resources are those materials important to the heritage of a particular ethnic or cultural group, such as Native Americans or African, European, or Asian immigrants. They may include traditional resource collecting areas, ceremonial sites, topographic features, cemeteries, shrines, or ethnic neighborhoods and structures.

Historic-period resources are those materials, archaeological and architectural, usually associated with Euro-American exploration and settlement of an area and the beginning of a written historic record. They may include archaeological deposits, sites, structures, traveled ways, artifacts, or other evidence of human activity. Under federal and state requirements, historic cultural resources must be greater than fifty years old to be considered of potential historic importance. A resource less than fifty years of age may be historically important if the resource is of exceptional importance.

For the ISEGS project, staff provides an overview of the environmental setting and history of the project area, an inventory of the cultural resources identified in the project vicinity, and an analysis of the potential impacts from the proposed project using criteria from the California Environmental Quality Act (CEQA). The primary concern is to ensure that all potential impacts are identified and that conditions are set forth that ensure that impacts are mitigated below the level of significance.

If cultural resources are identified, staff determines whether there may be a project-related impact to them. If the cultural resources cannot be avoided, staff determines whether any of the impacted resources are eligible for the California Register of Historical Resources (CRHR) or the National Register of Historic Places (NRHP). If impacted resources are eligible for the register, staff recommends mitigation measures that ensure that impacts to the identified cultural resources are reduced to a less-than-significant level.

LAWS, ORDINANCES, REGULATION, AND STANDARDS

Projects licensed by the Energy Commission are reviewed to ensure compliance with all applicable laws. For the present analysis the applicable laws are primarily state laws. Although the Energy Commission has exclusive permitting authority over ISEGS, it typically ensures compliance with all applicable laws, ordinances, regulations, standards, plans, and policies.

CULTURAL RESOURCES TABLE 1
Laws, Ordinances, Regulations, and Standards

Applicable Law	Description
Federal	
36 CFR Part 800, implementing regulations of Section 106 of the National Historic Preservation Act	This regulation requires Federal agencies to take into account the effects of a proposed action on cultural resources.
National Environmental Policy Act (NEPA): Title 42, USC, section 4321-et seq.	This statute requires Federal agencies to consider potential environmental impacts of projects with Federal involvement and to consider appropriate mitigation measures.
Federal Land Policy and Management Act (FLPMA): Title 43, USC, section 1701 et seq.	This statute requires the Secretary of the Interior to retain and maintain public lands in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric water resource, and archeological values [Section 1701(a)(8)]; the Secretary, with respect to the public lands, shall promulgate rules and regulations to carry out the purposes of this Act and of other laws applicable to public lands [Section 1740].
Federal Guidelines for Historic Preservation Projects, Federal Register 44739-44738, 190 (September 30, 1983)	The Secretary of the Interior has published a set of Standards and Guidelines for Archeology[1] and Historic Preservation. These are considered to be the appropriate professional methods and techniques for the preservation of archeological and historic properties. The Secretary's standards and guidelines are used by Federal agencies, such as the Forest Service, the Bureau of Land Management, and the National Park Service. The California Office of Historic Preservation refers to these standards in its requirements for selection of qualified personnel and in the mitigation of potential impacts to cultural resources on public lands in California.
Executive Order 11593 May 13, 1971 (36 Federal Register 8921)	This order mandates the protection and enhancement of the cultural environment through providing leadership, establishing state offices of historic preservation, and developing criteria for assessing resource values.
American Indian Religious Freedom Act; Title 42, USC, Section 1996	Protects Native American religious practices, ethnic heritage sites, and land uses.

[1] Laws, ordinances, regulations, standards, and organizations may use different spellings of the word archaeology/archeology. Both spellings are acceptable in the English language (Morris 1976). Citations of LORS or the names of organizations will always use the spelling as it appears in the LORS or name.

Applicable Law	Description
Native American Graves Protection and Repatriation Act (1990); Title 25, USC Section 3001, et seq.,	The stature defines “cultural items,” “sacred objects,” and “objects of cultural patrimony;” establishes an ownership hierarchy; provides for review; allows excavation of human remains, but stipulates return of the remains according to ownership; sets penalties; calls for inventories; and provides for the return of specified cultural items.
U.S. Dept. of the Interior, Bureau of Land Manage-ment (BLM), the California Desert Conservation Area Plan 1980 as amended (CDCA)– Cultural Resources Element Goals	1. Broaden the archeological and historical knowledge of the CDCA through continuing efforts and the use of existing data. Continue the effort to identify the full array of the CDCA’s cultural resources.
	2. Preserve and protect representative sample of the full array of the CDCA’s cultural resources.
	3. Ensure that cultural resources are given full consideration in land use planning and management decisions, and ensure that BLM-authorized actions avoid inadvertent impacts.
	4. Ensure proper data recovery of significant (National Register of Historic Places-quality) cultural resources where adverse impacts can not be avoided.
State	
Public Resources Code 5097.98 (b) and (e)	Requires a landowner on whose property Native American human remains are found to limit further development activity in the vicinity until he/she confers with the Native American Heritage Commission-identified Most Likely Descendents (MLDs) to consider treatment options. In the absence of MLDs or of a treatment acceptable to all parties, the landowner is required to reinter the remains elsewhere on the property in a location not subject to further disturbance.
California Health and Safety Code, Section 7050.5	This code makes it a misdemeanor to disturb or remove human remains found outside a cemetery. This code also requires a project owner to halt construction if human remains are discovered and to contact the county coroner.
Local	
County of San Bernardino 2007 General Plan, Conservation Element, Goal CO 3 and Policies 3.1–3.5	The cultural and paleontological resources goal of the County is to preserve and promote its historic and prehistoric cultural heritage. The County intends to achieve this goal through the implementation of policies that identify and protect important archaeological and historic cultural resources in areas of the county that have been determined to have known cultural resource sensitivity, and on all lands where disturbance of previously undisturbed ground will occur. The County will, further, establish programs to preserve the information and heritage value of cultural and historical resources, comply with California Government Code Section 65352.2 (SB18) on all General Plan and specific plan actions, and ensure that important cultural resources are avoided or minimized to protect Native American beliefs and traditions.

SETTING

Information provided regarding the setting of the proposed project places it in its geographical and geological contexts and specifies the technical description of the project. Additionally, the archaeological, ethnographic, and historic backgrounds provide the contexts for the evaluation of the historical significance of any identified cultural resources within the project area of analysis.

REGIONAL SETTING

The proposed project area is in the Ivanpah Valley of the eastern Mojave Desert approximately 49 miles south-southwest of Las Vegas in San Bernardino County, California. The eastern Mojave Desert is a part of the Basin and Range physiographic province (Fenneman 1931), a broad region of almost parallel, block-faulted mountain ranges that trend approximately north to south and are characteristically separated by internally draining, debris-filled structural basins. The erosion of the largely Cenozoic era (beginning 65 million years ago and continuing to the present) ranges continues to contribute sediment to the poorly sorted gravel aprons or bajadas that predominate along the range flanks. The bajadas form most valley margins as they slope gradually down to the basin bottoms where seasonal lakes or playas often form. Low fault scarps and alluvial fans at the mouths of canyons periodically break the smooth, low-angle sweep of the bajadas (Eaton 1981; Thompson and Burke 1974). Local elevations in this part of the Mojave Desert range from approximately 1,700 to 2,600 feet above sea level on the valley bottoms to 4,900 to 7,900 feet above sea level along mountain range ridges. A bi-seasonal precipitation pattern in the eastern Mojave Desert delivers an average of six inches of annual rainfall from November through April and from July through September, with cool season precipitation being more significant (Hereford 2004). The largely alluvial parent material of the region's bajadas and valley bottoms, and the desert climate generally, support more weakly developed soil orders (Entisols and Aridisols) (NRCS 2007) where a Mojave Creosote Bush Scrub vegetation type predominates (BSE2007a, p. 5.2-9).

PROJECT, SITE, AND VICINITY DESCRIPTION

The site of the proposed project is on the middle portion of a bajada above and to the west of Ivanpah Dry Lake, a large playa that forms the bottom of Ivanpah Valley. The use of the project area, presently under the jurisdiction of the Needles Field Office in the U. S. Bureau of Land Management's (BLM) California Desert District, has historically been rather marginal. A sparse veneer of stone tools and stone chipping debris evidence a transitory Native American use of the project area and vicinity in the period prior to complete Euroamerican subjugation. The project area also appears to have been subject to sporadic prospecting for mineral resources over the last approximately 160 years. Sporadic mineral prospecting in and near the project area continues today. The eroded mountain remnants that jut above the relatively smooth, sloping surface of the proposed project area, landforms known as inselbergs, show evidence, in the form of abandoned and active prospect pits, of exploratory activity. The proposed project area's concurrent historic use has been for low intensity livestock grazing. The property continues this tradition of use today as part of the BLM Clark Mountain Allotment Grazing Lease (Clark Mountain Allotment) (BSE2007a, p. 5.6-14) adjacent to the Primm Valley Golf Club, Desert Course.

The proposed project involves the construction and operation of an approximately 400-MW concentrating solar power electric generation facility on a project area of approximately 4,065 acres. The project is proposed to be built in three phases, Ivanpah No. 1 (100 MW), Ivanpah No. 2 (100 MW), and Ivanpah No. 3 (200 MW), which would each be separate concentrating solar power plants. The three plants would be developed on contiguous property, sharing an administration and warehouse building, an operation and maintenance building, and a substation. The administration and warehouse building, a substation, a sewage package treatment plant, and detention ponds would be located between Ivanpah No. 1 and Ivanpah No. 2.

The three power plants each have the same basic types of components, arrays of mirrors or heliostats that are double-mounted on poles around central solar power towers. The Ivanpah No. 1 and Ivanpah No. 2 plants would each consist of approximately 110,000 heliostats, double-mounted on 55,000 poles, in a single array around a centralized solar power tower. The Ivanpah No. 3 plant would consist of approximately 208,000 heliostats, double-mounted on 104,000 poles, in five separate arrays. The five arrays will each be arced around a separate solar power tower. Each of the seven solar power towers for the project would be 469 feet tall.

Each of the three power plants would have a separate infrastructure system. The infrastructure for each of the three plants would include a power block facility that would house a natural gas-fired start-up boiler, air emission control system for the combustion of natural gas in the start-up boiler, steam turbine generator, an air-cooled condenser, wastewater treatment equipment, auxiliary equipment such as boiler commissioning and emergency outfall holding basins, and chemical storage containment areas. Plant infrastructure would also include a 250,000-gallon capacity raw water tank, dirt, gravel, or paved access and maintenance roads, storm water retention basins and diversion channels, and perimeter fencing.

The operation of the generation facility as a whole would require the development of further infrastructure. The natural gas-fired start-up boiler that is part of the power block facility for each of the three plants would draw natural gas from the Kern River Gas Transmission pipeline that is approximately 0.5 miles north of Ivanpah No. 3. An underground distribution pipeline would need to be installed to feed the start-up boiler at each power block facility. Raw groundwater needed for the whole facility would be drawn from one of two wells which would be constructed at the northwestern corner of Ivanpah No. 1, just outside the perimeter fence. Underground water pipelines would connect each of the three power blocks to the groundwater wells.

The transmission of the electricity that the generation facility produces would also require the construction of new transmission infrastructure and major upgrades to an existing transmission line. The ISEGS project would be interconnected to the Southern California Edison (SCE) grid by three new 115-kV transmission generation tie lines, a new substation that includes 230-kV/115-kV switch-racks, and upgrades to the SCE Eldorado-Baker-Coolwater-Dunn Siding-Mountain Pass 115-kV transmission line, which traverses the project site between the proposed Ivanpah No. 1 and Ivanpah No. 2 (CH2ML2008q). In order to transmit the full generation load projected for the ISEGS

project and other planned electric generation projects, the California Independent Systems Operator (ISO) has determined that approximately 36 miles of the existing 115-kV transmission line would need to be upgraded. The upgrade would include constructing a new double-circuit 230-kV transmission line between the Eldorado Substation in Nevada and the proposed new Ivanpah Substation in California, a distance of approximately 36 miles. The existing 115-kV transmission line would be removed and replaced with the proposed 230-kV transmission line. SCE also plans to remove the portion of the subject transmission line from the project area southwest to the Mountain Pass Substation and to replace that portion of the line with two, double-circuit, 115-kV pole lines. Additional upgrades may be required as mitigation prior to final approval of interconnection to California ISO and Non-California ISO controlled facilities (California ISO 2008).

The construction of the proposed project would also require the applicant to take steps to preserve existing public access routes that presently traverse the project area. Vehicle trails run through the proposed project site. To allow continued use and access the applicant would reroute three public trails and one trail that serves as an access to a mining claim. Colosseum Road would be rerouted between Ivanpah No. 1 and Ivanpah No. 2.

Environmental Setting

The proposed project area is a roughly 4,065-acre expanse of what is today an arid bajada. The environment of the bajada has changed through time causing concomitant shifts in the mosaic of natural resources available on it and adjacent landforms. Human use of the proposed project area over the past several thousand years may partly reflect local changes in the natural resource base. To more reliably assess the likelihood that archaeological deposits representing such use may be present, it is important to consider the historic character of local climate change, or the paleoclimate, and the effects of the paleoclimate on the physical development of the bajada and its ecology.

Paleoclimate

The present climate in the proposed project area represents a moderately dry and harsh period in the climate of the region relative to the last 12,000 years, the minimum timeframe for a human presence in the Mojave Desert. The climate of the Mojave Desert since the late Pleistocene epoch (prior to 10,000 thousand years ago) can be split into three broad phases. The climate of the region during the Pleistocene was relatively much more moist or mesic than the present climate and led to the development of a number of large permanent lakes on the floors of the region's valleys. The lakes slowly evaporated during the early Holocene epoch (10 thousand years ago to present) as the climate progressively became more arid. The period from approximately 5000 to 3000 B.C. marks a time of extreme aridity, often referred to as the mid-Holocene Altithermal (see Antevs 1948), and it marks the final desiccation of the lakes in the region. The climate since approximately 3000 B.C. has typically been more mesic relative to conditions during the Altithermal, and there is evidence for particularly wet periods from approximately 1000 B.C. to A.D. 1, and again from approximately A.D. 500 to 1400 (Bamforth 1990, p. 72).

Geology

The proposed project area lies on the western flank of the Ivanpah Valley in the eastern Mojave Desert. The Ivanpah Valley is an elongate, internally draining, structural basin (Park, et al. 2003, p. 72), a bolson, which trends approximately north to south. It is roughly 44 miles in length, typically averages 15 miles in width, and ranges in elevation from 2,608 feet above sea level on the valley floor to between 5,883 and 7,897 feet above sea level along the surrounding mountain ridges. The Ivanpah Mountains, the Clark Mountain Range, and the Spring Mountains bound the valley to the southwest, west, and northwest, respectively. The Lucy Gray Mountains, McCollough Range, and the New York Mountains bound the valley to the northeast, east, and southeast, respectively. The Clark Mountain Range and the Spring Mountains form an arc of Mesozoic to Paleozoic marine and terrestrial sedimentary rocks around a core of earlier Precambrian metamorphic rocks, with Tertiary volcanic rocks infrequently intruding into the sedimentary formations of the Spring Mountains. Along the eastern margin of the valley, the Lucy Gray Mountains, the McCollough Mountain Range, and the northern portion of the New York Mountains include Precambrian intrusive igneous and metamorphic rocks and Tertiary volcanic rocks. The balance of the New York Mountains and the Ivanpah Mountains are almost entirely Mesozoic granitic rocks (Jennings 1961; House, Buck, and Ramelli 2006; Ramelli, House, and Buck 2006a, 2006b). This diverse group of rocks is the source of the clastic[2] sediments that make up the Quaternary landforms across the valley and form the substrate in which local soil types develop.

Geomorphology

The discussion of the geomorphology of the proposed project area considers how and when the underlying bajada may have developed, and helps provide the physical contexts to assess whether physical remains from the past human use of former land surfaces on the bajada may be present as archaeological deposits.

Process Geomorphology

The Ivanpah Valley contains examples of most of the major landforms that are characteristic of Basin and Range bolsons. Alluvial fans, fan remnants, and bajadas front the mountain ranges that ring the valley. Below the coarse alluvial fan and remnant fan deposits, the broad bajadas sweep gradually down onto Ivanpah Dry Lake, the playa that forms the bottom of the valley floor. Numerous intermittent stream channels flow out of the mountains over more recent alluvial fans and past older fan remnants to braid across bajada surfaces and terminate out on the playa. The fine sediments that these stream channels transport are the source of playa fill and the dune sand along the playa margins.

The proposed project area is on the middle portion of a bajada that drapes the eastern base of the Clark Mountain Range. The project area ranges from approximately 180 feet to 835 feet above the floor of the playa. Gravity and water variously act to transport and deposit the weathered bedrock sediments that make up the broad bajada of the proposed project area. The sediments are typically larger and more poorly sorted upslope toward the mountains and grade to finer, better sorted particles downslope

[2] Clasts are rock fragments produced by physical processes.

where the bajada deposits ultimately interfinger with the lacustrine[3] sediments of the playa and other wind-blown or eolian deposits, and water-transported or alluvial deposits related to the playa's hydrological cycles.

The present surface of the proposed project area bajada is a mosaic of interconnected or anastomosing, intermittent stream channels (Cultural Resources Plate 1) of mostly coarse to very coarse sands, incipient desert pavements[4] of predominately very angular gravels and variable overflow and sheetwash deposits. One large and one small inselberg break the surface of the bajada adjacent to the northern portion of the proposed project area and represent relatively infrequent examples of such landforms in Ivanpah Valley.

The proposed project area bajada is a dynamic landform the development of which has undoubtedly been subject to alternating cycles of deposition and erosion that occur in response to regional fluctuations in climate. The presence on the surface of the proposed project area, in overflow and sheetwash deposits and in incipient desert pavements, of mixtures of very angular gravels with relatively fresh faces or new cleavage planes and rounded, sand-blasted gravels with well-developed rock varnish indicate a relatively mobile bajada surface in the recent past where former desert pavements are being eroded as new ones are being formed. A firm understanding of whether the net result of the dynamic processes at work on the surface of the bajada is or has been the thickening of bajada deposits, or the erosion of them, is important to the interpretation of the history of the bajada's development, its potential as a resource base for human use, and its potential to preserve archaeological deposits related to any such use.

Historical Geomorphology

The results of a recent geoarchaeology study of the proposed project area indicates that the present surface of the underlying bajada is a patchwork of actively eroding surfaces amid what have become slightly elevated remnants of older bajada surfaces of predominantly middle-to-late Holocene age (CH2ML2008b, pp. 9–18). An analysis in that study of the beach zones beneath the vicinity of the project area along the edge of Ivanpah Dry Lake suggests that the character of sediment deposition on the bajada was progradational[5] after approximately 6700 B.C. Deposition of sediments along the base of the bajada buried the beach zone there that was formed during the last high stand of Ivanpah Dry Lake during the early Holocene. The depositional regime on the bajada changed to one of net erosion after approximately 2000 B.C., most likely in response to the general increase in effective moisture in the late Holocene that appears to have led to a concomitant increase in vegetation cover and a decrease in the available sediment load.

[3] Derived from lake environments.

[4] Desert pavements are single layers of clasts borne upward over time by the slow, continual accretion of wind-borne silt. They progressively become more level and darker in contrast, and the surface clasts in the pavements become more tightly interlocked with age.

[5] Progradation refers to a depositional regime on alluvial fans, which are constituent landforms of bajadas, where streams are cutting down through the upper slopes of alluvial fans and depositing the eroding sediments on the lower slopes of those same fans.

The morphology of the present surface of the bajada is the result of erosion over the last 4,000 years. A complex network of anastomosing, intermittent stream channels traverse the bajada among remnant patches of older bajada surfaces that now rise several feet above the eroding surface of the broader landform. The remnant surfaces cover approximately 472 acres or 12 percent of the approximately 4,065-acre proposed project area. The remnant older bajada surfaces appear darker in contrast and are stonier relative to adjacent eroded surfaces. Desert pavements or incipient desert pavements form many of the remnant surfaces, while a few are more appropriately considered as stony debris flow remnants. Two of the darker (older) remnant surfaces observed in the recent study appear, on the basis of comparison to pavements in the Mojave Sink approximately 35 miles to the west, to be no older than early Holocene in age.

Pedology

The distribution of soil types over the bajada of the proposed project area provides a further index of the relative stability of different portions of the bajada's surface. The downslope portions of the proposed project area, where more recent alluvial deposits such as inset fans and intermittent stream floodplains and channels predominate, support the Arizo loamy sand, a very deep, excessively drained soil that forms in mixed alluvium. Arizo series soils are Entisols, an order where the parent material is clearly evident and where distinct soil horizons are absent.

The upslope portions of the proposed project area where older, more stable landforms such as alluvial fan remnants are present support the Popups sandy loam, a moderately deep, well-drained soil that also forms in mixed alluvium. Popups series soils are Aridisols, an order where soils develop distinct horizons under arid conditions. The development of a weakly cemented duripan approximately 33 to 59 inches below the surface is a characteristic of the Popups series that indicates a relative antiquity for soil types of the series.

Paleoecology

The ecology of the proposed project area has been dynamic through time. The vegetation type that is presently predominant in the project area is the Mojave Creosote Bush Scrub, which is typical in and on the valleys, alluvial fans, and lower mountain slopes of the Mojave Desert. The Mojave Yucca-Nevada Ephedra Scrub and Mojave Wash Scrub types are also present. The diversity of the vegetation types and the plant species in the project area generally decrease as one moves downslope across the project area bajada (BSE2007a, pp. 5.2-9, 5.2-27, and 5.2B-1).

The vegetation types above and to the west of the proposed project area vary as one ascends the slopes of the Clark Mountain Range. The Mojave Creosote Bush Scrub vegetation type grades into the Joshua Tree Woodland which, in turn, grades into the Piñon Pine-Juniper Woodland. This clinal[6] variation in vegetation patterns is common in southern California (Holland and Keil 1995, p. 397).

[6] A gradual change in a character or feature across the distributional range of a species or population, usually correlated with an environmental or geographic transition.

It is probable that the composition and pattern of local vegetation types has moved up and down in elevation across the proposed project area over the last 12,000 years in response to regional shifts in climate. A woodland association of *Pinus monophylla* (piñon pine), *Juniperus osteosperma* (Utah juniper), *Purshia mexicana* (bitterbush), *Cercocarpus ledifolius* (mountain mahogany), and *Prunus fasciculata* (desert almond) was found prior to approximately 9500 B.C. in areas higher than 3000 feet above sea level where *Larrea tridentata* (creosote bush) presently prevails. A desert scrub association of *Lycium cooperi* (wolfberry), *Salvia mojavensis* (Mojave sage), and *Prosopis juliflora* (mesquite) was found from approximately 8800 to 8400 B.C. near lacustrine shorelines in the region lower than 3,000 feet below sea level. Creosote bush does not appear to have become dominant in the region before 3000 B.C. And modern vegetation associations do not appear to have been in place before approximately 2500 B.C. (Koehler, Anderson, and Spaulding 2005).

Prehistoric Setting

The prehistory of the eastern Mojave Desert is the narrative of how human populations have adapted to marked fluctuations in the local environment over the course of at least the last 12,000 years. The archaeological remains of the region's prehistory are relatively scarce. Sparse scatters of stone tools and chipped stone tool manufacturing debris, and isolated artifacts, resources that typically yield information of marginal value, account for 40 to 60 percent of the archaeological remains found in the Mojave and Colorado Deserts. A relative paucity of intact buried archaeological deposits contributes further to the dearth of information on the prehistory of the region (Lyneis and Macko 1986, p. 52). The availability of water and the location of high-value resource patches in otherwise unproductive habitats appear to influence the distribution of the archaeological sites that are on the desert landscape (Lyneis and Macko 1986, p. 57; Sutton et al. 2007, p. 230). The broad trajectory of cultural development in the Mojave Desert appears to be a steady decline in residential mobility as local populations come to occupy increasingly larger valley or basin bottom base camps, in a few preferred locations, over longer periods of time, rather than working out of temporary camps in particularly productive environmental zones (Bamforth 1990, p. 74).

Over the past seven decades, Mojave Desert archaeologists have developed and refined a broad sequence of approximately six artifact groups or assemblages, each with distinctive types of stone projectiles, that represent the material record of the peoples who once lived in the proposed project area (Bamforth 1990, p. 72; Campbell 1936; Lyneis 1982; Rogers 1939; Sutton, et al. 2007; Warren 1984; Warren and Crabtree 1986). Choosing what staff believes to be a cultural chronology more applicable to the proposed project area than that used in the AFC (BSE2007a, pp. 5.3-7–5.3-10) and acknowledging recent proposed refinements to the chosen chronology (Sutton, et al. 2007), the discussion here of the region's prehistory will rely primarily on Warren's 1984 chronology and Warren and Crabtree's 1986 chronology. Following Warren and Crabtree, the periods of the chronology below represent units of time during which particular artifact assemblages appear to prevail rather than discrete, homogeneous past cultures.

Terminal Pleistocene Period (Prior to 10,000 B.C.)

The archaeological record of the Terminal Pleistocene Period in the Mojave Desert is particularly sparse. The most consistent evidence for human activity during this period are fragments of the characteristic fluted, concave-based, lanceolate spear or projectile point of the Clovis archaeological culture. The Clovis culture is a pan-Western Hemisphere archaeological phenomenon that manifests in diverse material patterns over North and South America. In the Mojave Desert, material culture assemblages that include Clovis projectile point fragments are typically sparse surface deposits (Lyneis and Macko 1986, p. 41). The evidence from such deposits suggests only that human groups during this time were probably small in number, were highly mobile, and lived in small, temporary camps near what were then permanent water sources (Sutton, et al. 2007, p. 234). It is unclear whether the Mojave Desert Clovis assemblages demonstrate a cultural continuity with the material remains of subsequent periods (Warren and Crabtree 1986, p. 184).

Lake Mojave Period (10,000 to 5000 B.C.)

Lake Mojave Period artifact assemblages appear to represent a cultural phenomenon that is antecedent to subsequent cultural developments in the Mojave Desert (Warren and Crabtree 1986, p. 184). Portions of archaeological sites or components that date to the Lake Mojave Period are typically sparse and vary little in assemblage composition (Bamforth 1990, p. 73), although components that include extensive accumulations of residential debris have more recently been found (Sutton, et al. 2007, p. 237). Lake Mojave components are most often found in the vicinity of high terraces above or on relict shorelines of what are now playas and along relict stream channels (Bamforth 1990, p. 72; Lyneis and Macko 1986, p. 41).

Lake Mojave Period assemblages include a relatively narrow range of stone tools and also represent a narrow range of site types. The index artifacts for the period are the local variants of the Great Basin stemmed series projectile point types, Lake Mojave and Silver Lake points. The balance of period assemblages may include bifaces, steep-edged unifaces, “small beaked gravers,” “narrow concave scrapers,” crescents, and occasional cobble-core tools and ground stone implements (Sutton, et al. 2007, p. 234; Warren 1984, p. 413). The assemblages primarily appear to represent temporary small camps and work stations. Infrequent accumulations of residential debris do indicate, however, that camps with longer use periods are also present.

The archaeological record of the Lake Mojave Period indicates that human populations during the Early Holocene were small, mobile groups practicing a hunting-and-foraging economy whereby groups shifted residency across the landscape among the most productive environmental zones as the resources in those zones became depleted over time (Bamforth 1990, p. 73; Lyneis and Macko 1986, p. 41).

Pinto Period (5000 to 2000 B.C.)

The evidence of human activity found in Pinto Period archaeological sites indicates a behavioral continuity with Lake Mojave Period developments (Warren 1984, p. 414). The Pinto Period witnesses the final desiccation of the Pleistocene pluvial lakes in the Mojave Desert and the adaptive transformation of local populations to the extreme

aridity of the mid-Holocene Altithermal (see Antevs 1948). It is unclear whether the Pinto Period directly follows the Lake Mojave Period, or may represent a resumption of the desert's use after a hiatus during the worst of the mid-Holocene droughts (Warren and Crabtree 1986, p. 184). Pinto Period components are typically surface deposits that are small in area and do not include midden deposits, constituent residential debris of ash, charcoal, and food and other organic residues, although larger components with broader ranges of artifacts and substantial midden deposits have more recently been found (Sutton, et al. 2007, p. 238, Warren 1984, p. 413 and 414). Pinto Period components are generally found on the landscape in the same places as deposits of the Lake Mojave Period (Bamforth 1990, p. 72, Lyneis and Macko 1986, p. 41). The suggestion has been made that the components may actually overlap in time (Bamforth 1990, p. 73, Sutton, et al. 2007, p. 238).

The most important distinction between the artifact assemblages of the Pinto Period and those of the preceding Lake Mojave Period appears to be the relative abundance of ground stone implements or milling tools. More recent research has found milling tools to occur in moderate abundance in most Pinto Period deposits and, occasionally, in great frequency (Sutton, et al. 2007, p. 238). The characteristic Pinto Period assemblage includes large and small leaf-shaped projectile points and knives, domed and elongated keeled scrapers, several forms of well-made flake scrapers, flat millingstones, and manos. Drills, engraving tools, and *Olivella* spp. shell beads also occur (Sutton, et al. 2008, p. 238; Warren 1984, p. 412; Warren and Crabtree 1986, p. 187). The index artifact for the period is the stemmed, indented-base Pinto series projectile point, the Mojave Desert variety of which is markedly crude in form and manufacture (Warren 1984, p. 411). A broad continuity in the chipped stone technology evident in both the Lake Mojave and Pinto Periods has been noted. Populations during these periods appear to make extensive use of toolstones[7] other than cryptocrystalline silica or obsidian, and they also make regular use of unifacial and bifacial core tool forms (Sutton, et al. 2007, p. 238).

More recent research indicates that Pinto Period assemblages may reflect the emergence of a two-tier settlement pattern. The small temporary or seasonal camps that appear to have been the primary focus of Lake Mojave Period activity may have become more task-specific camps that were subordinate to more permanent residential base camps. The increase during the Pinto Period in the relative frequency of milling tools suggests a corresponding increase in the reliance of local populations on plant resources (Sutton 2007, pp. 238–239).

Gypsum Period (2000 B.C. to A.D. 500)

Gypsum Period artifact assemblages, though scarce relative to earlier and later periods, appear to evidence a shift in the economy of local populations toward a much greater dependence on plant resources (Bamforth 1990, p. 73; Warren 1984, p. 419). Period

[7] Toolstone is a type of stone used to manufacture stone tools. Generally speaking, tools that require a sharp edge are made using cryptocrystalline materials that fracture in an easily-controlled conchoidal manner. Cryptocrystalline tool stones include flint, chert, rhyolite, and obsidian. These materials fracture in a predictable fashion, and are easily resharpened.

components are ephemeral in character, relatively more scarce in the southern and eastern portion of the Mojave Desert, smaller yet more numerous than components of the preceding periods, and found in more diverse locations on the landscape (Sutton, et al. 2007, p. 241).

Gypsum Period assemblages encompass a relatively broad array of artifact types. The index artifacts for the period include any combination of Gypsum (Gypsum Cave), Humboldt (Humboldt Concave Base), or Elko (Elko Eared, Elko Corner-notched) series projectile points (Sutton, et al. 2007, p. 241; Warren 1984, p. 414; Warren and Crabtree 1986, p. 187). The balance of period assemblages may include leaf-shaped projectile points; rectangular-based knives; flake scrapers; T-shaped drills; occasional large scraper-planes; choppers; hammerstones; manos and millingstones; mortars and pestles; shaft smoothers incised slate and sandstone tablets and pendants; fragments of drilled slate tubes; *Haliotis* spp. Rings; central California Middle Horizon bead and ornament types; *Olivella* spp. shell beads; and bone awls (Warren 1984, p. 418). The greater presence of quartz crystals, paint, split-twig figurines, and rock art also indicates the elaboration of ritual activity during this period (Warren and Crabtree 1986, pp. 188–189). The influence of the Anasazi archaeological culture of the Southwest is apparent in the eastern Mojave Desert toward the end of the Gypsum Period with the introduction of Anasazi ceramic types to period assemblages, and evidence of the replacement of the atlatl with the bow and arrow, as the larger Gypsum, Humboldt, and Elko series dart points give way to smaller Eastgate and Rose Spring arrow point types in the subsequent Saratoga Springs Period (Warren 1984, pp. 414–415).

The relative scarcity of Gypsum Period data complicates discussions of period settlement patterns in the Mojave Desert. Available data indicates that the focus of Gypsum Period components was lowland concentrations of plant resources along streams and in the lake basins (Bamforth 1990, p. 73; Sutton, et al. 2007, p. 241). One such resource may have been mesquite. The introduction of the mortar and pestle during this period and the use of these tools in the historic period to process mesquite pods have been taken to indicate that mesquite was first used in the Gypsum Period (Warren 1984, p. 419). Populations appear to have spent a substantial part of each year in residential base camps while dispatching task groups out to hunt (Bamforth 1990, p. 73). The presence of shell ornaments in the assemblages of the period also indicates the establishment of relatively routine trade with the southern California coast (Warren 1984, p. 419).

Saratoga Springs Period (A.D. 500 to 1200)

The artifact assemblages of the Sarasota Springs Period in the eastern Mojave Desert reflect the mixture of cultures that appears to have influenced the region.

Saratoga Springs Period assemblages encompass a broad, diverse array of artifact types, many of which appear to come from outside the region or reflect outside influences. The index artifacts for the period include Eastgate and Rose Spring projectile points. The core of the period assemblage includes millingstones and manos, mortars and pestles, incised stones, and slate pendants (Warren 1984, p. 420). Other characteristic artifact types of the period include small triangular knives, scrapers, drills, hammerstones, choppers, pendants of green schist, and Pacific Coast shell ornaments,

including *Olivella* Saucer beads, *Olivella* Barrel beads, and limpet rings (Warren 1984, p. 367). Anasazi grayware ceramics of the Basketmaker III through early Pueblo Periods (Pecos Classification, see Cordell 1984, pp. 55–58) are a notable element of the Saratoga Springs Period assemblage as well.

The archaeological data for the Saratoga Springs Period appear to indicate that local populations were developing broader spheres of interaction with outside groups, perhaps even allowing settlements of outsiders, in the context of a general continuity in local settlement patterns. The basic settlement pattern for the period appears not to change markedly from the Gypsum Period through to the Protohistoric Period (see below). The size of residential base camps and seasonal population dispersions to acquire more remote resources may both have been in slow decline however. The overexploitation of large mammals, due, in part, to the introduction of the bow and arrow during this period and to a deteriorating climate, may have led to a shift in hunting emphasis to small animals and reinforced the primary dependence of local populations on plant seed resources such as mesquite (Bamforth 1990, p. 74).

The Anasazi influence, presumably of the Virgin Branch (see Fowler and Madsen 1986, pp. 175–181), was marked in the eastern Mojave Desert during this period from at least A.D. 700 through A.D. 1150 (Warren 1984, pp. 373–373, 426–427). The distribution of Anasazi grayware ceramics, the key archaeological index of Anasazi influence, reaches from the lower Virgin River in southern Nevada into California as far west as the Cronise Basin in San Bernardino County. The primary focus of Anasazi influence in the vicinity of the proposed project area appears to have been the turquoise deposits in the area around Halloran Springs, roughly 30 miles southwest of the proposed project area. The sequence of ceramic types found at the turquoise mines in the area indicate that the period of Anasazi influence there was from approximately A.D. 700 to 900, during the Basketmaker III and Pueblo I Periods (Warren 1984, pp. 371–372). It remains unclear whether Anasazi peoples were actually in residence in the area (Warren 1984, p. 422) practicing the Virgin Branch horticultural lifeway, in residence living on stores of provisions, or not in residence and managing the extraction of turquoise through proxy labor. The Anasazi influence over the eastern Mojave Desert ultimately terminates around A.D. 1150 (Warren 1984, pp. 426–427).

Protohistoric Period (A.D. 1200 to present)

The speakers of Numic languages appear to displace the local populations of the eastern Mojave Desert at the outset of the Protohistoric Period, and to decisively eradicate Anasazi influence in the region (Warren 1984, p. 430).

The Protohistoric assemblage has been said to relate directly to the historic Paiute (Warren 1984, p. 427). The characteristic index artifacts for assemblages of the more northerly areas of the eastern Mojave Desert are Desert Side-notched projectile points and coarse, brownware ceramic types. The overall eastern Mojave assemblage strongly resembles assemblages across the northern Mojave Desert to Owens Valley and may derive from that region. Assemblages from the more southerly areas of the eastern Mojave Desert include Cottonwood Triangular projectile points, in addition to Desert Side-notched points, and the ceramic assemblage includes types representative of the Hakataya archaeological culture, a cultural unit of the Lower Colorado River and the

Colorado Desert. Among the Hakataya ceramics in the Protohistoric Period assemblages of the eastern Mojave Desert are brownwares, buffwares, and red-on-buff wares (Warren 1984, p. 427; Warren and Crabtree 1986, p. 191).

Despite the apparent shifts in the local populations in the eastern Mojave Desert and the ebb and flow of outside influences during the Sarasota Springs and Protohistoric Periods, the basic economic milieu and the settlement patterns of the local populations continue, in the Protohistoric Period, to reflect the trends in desert adaptation that had been developing in the Mojave Desert for millennia. Among the final elaborations to the local economy of the populations in the Mojave Desert may have been the addition, during the late Saratoga Springs Period and into the Protohistoric Period, of small gardens in preferred areas, the produce from which may have supplemented local diets in a minor way (Lyneis and Macko 1986, p. 41).

The influence of the Anasazi in the eastern Mojave Desert is supplanted by Hakataya influence from the Lower Colorado River and the Colorado Desert. Toward the end of the Saratoga Springs Period or the beginning of the Protohistoric Period around A.D. 1200, there is evidence of Hakataya influence or presence at the Halloran Springs turquoise mines lasting roughly a century. The Paiute have used the mines infrequently subsequent to the withdrawal of the Hakataya in about the fourteenth century (Warren 1984, p. 372 and 373).

Ethnographic Setting

The project area of analysis appears, on the basis of the available ethnographic literature, to fall in the ancestral territories of three major Native American groups, the Southern Paiute (Las Vegas Paiute and Pahrump Paiute), the Chemehuevi, and the Mojave. The Las Vegas Paiute, the Chemehuevi, and the Mojave made use of overlapping portions of the eastern Mojave Desert. The portions of the region that each group used and the ways that each group made use of those portions varied through time (Bean, Vane, and Young 1982:M-2). Brief discussions of the ethnography and the history of the Numic-speaking Southern Paiute and of the Mojave provide a transition for the cultural history of the region from late prehistory into the period of sustained European and Euroamerican contact and subjugation, and provides one context for the recognition and interpretation of ethnographic resources that may be in the project area of analysis.

Southern Paiute and Chemehuevi

The Southern Paiute peoples and the Chemehuevi, a closely related people, belong to the Southern Numic branch of the Uto-Aztecan language family. The territory of the Las Vegas Paiutes and the Pahrump Paiutes during the nineteenth century included an area from roughly Death Valley east to the Colorado River and from just north of present-day Las Vegas south to just north of the City of Needles, California. Chemehuevi territory during that period abuts the Las Vegas Paiute and Pahrump Paiute territory on the north and runs south to approximately the City of Blythe, California, to the west of the Colorado River (Kelly and Fowler 1986:figure 1). The nineteenth-century territories of the Southern Paiute and Chemehuevi groups reflect the adaptation of each to their unique physical and political environments subsequent to the apparent entry of Numic-

speakers into the region at approximately A.D. 1200 (see *Protohistoric Period* subsection above).

The economy of the Southern Paiute in general was largely one of subsistence. The particular variety of plant and animal resources used in the territory of each Southern Paiute group was dependent upon the mosaic of vegetation types found there. Major plant resources for the Las Vegas Paiute, the Pahrump Paiute, and the Chemehuevi included piñon nuts (*Pinus monophylla*), mesquite pods (*Prosopis juliflora*), and agave (*Agave utahensis*). A variety of seed resources were a lesser, although important food source (Kelly and Fowler 1986:370).

The chief source of protein for Southern Paiute groups was small game. Such game included rabbits, wood rats, mice, gophers, squirrels, chipmunks, and birds. Lizards, snakes, chuckwalla, and tortoise were also eaten, as were insect resources such as locusts, ant larvae, and caterpillars. Large game resources such as antelope and mountain sheep were supplementary protein sources.

Southern Paiute foraging and collecting schemes were supplemented in the late Protohistoric and early historic periods with floodplain and, apparently, irrigation agriculture. Typical cultigens, variously introduced from the North American Southwest, Mexico, and the lower Colorado River , included maize, squash, pumpkins, gourds, and, less frequently, beans. Other cultigens appear to be more local domesticates that came from the Mojave, and introduced European cultigens ultimately became more significant crop resources (Kelly and Fowler 1986:370).

The sociopolitical organization of the Southern Paiute groups did not include organs of central political control. The boundary for each group appears to have been relatively fluid and permeable. Groups were essentially clusters of individual households that variously coalesced and dispersed during the year to facilitate different economic pursuits. Favored residence locations adjacent to springs or agricultural plots were held as private property and subject to inheritance. Large household clusters often had a headman, whose authority was more advisory than authoritative (Kelly and Fowler 1986:380).

Mojave

The Mojave belong to the River branch of the Yuman language family (Kendall 1983). The core ancestral territory of the Mojave, possibly established as early as A.D. 1150, appears to have been what is now known as the Mohave Valley along the lower Colorado River. By the mid-nineteenth century, Mojave territory expanded to run along the lower Colorado River from roughly 25 miles north of Bullhead City, Arizona south to roughly 5 miles north of the City of Blythe, California (Stewart 1983:55).

The primary focus of the Mojave economy was agriculture. The group farmed the floodplain of the Colorado River relying on the annual overflow deposition of silt and organic matter to rejuvenate soil fertility. The principal crop was maize with Tepary beans, pumpkins, and melons being secondary cultigens (Stewart 1983:57 and 58).

The Mojave supplemented their agricultural pursuits with the foraging and collecting of wild plant resources, with fishing along the Colorado River, and, to a lesser degree, with hunting. Commonly used plant resources included a variety of seed plants, cactus fruit and other desert plants from the mesas adjacent to the river, and the pods of both mesquite (*Prosopis juliflora*) and screwbean (*Prosopis pubescens*) (Stewart 1983:57 and 59).

Fish was the primary source of meat for the Mojave. Fishing was typically done with dip nets, seines or drag nets, traps or weirs, or large, canoe-shaped basketry scoops with long handles along the Colorado River, or in muddy side sloughs or ponds (Stewart 1983:59).

Hunting was of relatively minor significance to the economy of the Mojave and was, as a consequence, less well developed as a cultural skill than among other adjacent groups out in the desert (Stewart 1983:59).

The Mojave may be thought of as a tribe (see Service 1962). They appear to have and to continue to regard themselves as one people. The tribe appears to be divided into three bands or more local groups, the northern, central, and southern divisions. Historically, each band was, in turn, further divided into settlements that were sprawling clusters of residences on low floodplain knolls adjacent to arable land. The nucleus of each settlement was an extended family. Each settlement appears to have had a group leader, and each band appears to have had one or several subchiefs. The tribe as a whole had a head chief, but the longevity of this position of status, prior to the arrival of the Europeans, is uncertain. Authority among the Mojave was derived from the ongoing consensus of subordinate tribal members. There was also only a minimal or incipient development of tribal political institutions (Stewart 1983:57 and 62).

Historic Setting

Roads

Much of the important history of the Mojave Desert took place beyond the proposed project area. The historic period of the region begins in 1776 with the travels of Francisco Garces between the Colorado River and the Mission system of coastal California. He became the first European to cross the Mojave Desert. His route followed the Native American trails (Mojave Trail) between the Needles area on the Colorado River, across to the Mojave River, and then through the Cajon Pass.

During the time of Mexican sovereignty in the area, in 1826 and again in 1827, Jedediah Strong Smith crossed the Mojave Desert via the Mojave Trail, both times traveling from east to west only. Smith was followed by early travelers to the region such as Ewing Young in 1829. Kit Carson was a notable member of Young's party. The Antonio Armijo party of 1829-30 was the first to complete a trip between Santa Fe and Los Angeles and the first known to have traveled a different route across the Mojave Desert. This route, a more northerly route, connected Las Vegas, Resting Springs, the Amargosa River, Salt Creek, and Bitter Springs with the Mojave Road near present-day Daggett. John C. Fremont traveled this route in 1844. While it is a matter of debate whether or not the

Amargosa River Route was the trail of the Spanish caravans, known as the Old Spanish Trail, it became the preferred route of travel between Salt Lake City and San Bernardino, connecting two distant Mormon communities following the War with Mexico in 1846.

Following the discovery of gold in California in 1848 and California statehood in 1850, increased traffic occurred in the Mojave Desert, much of it along the Old Spanish Trail or Mormon Road. Alterations to the Old Spanish Trail occurred after the discovery of the Kingston Cut-off in 1855 as well as other "short-cuts." These two routes, the Mojave Road, and the Old Spanish Trail or Mormon Road, were the primary nineteenth-century transportation routes through the Mojave Desert prior to the construction of railroads in the region (Warren, Knack, and Warren 1980; Warren and Roske 1981).

Mining

In addition to transportation routes, another major historic theme in the Mojave Desert during the American period (post-1846) was mining. A party of Mormons, led by Jefferson Hunt, discovered gold in the Salt Creek area, approximately 44 miles west of the proposed project area, in December of 1849. Sporadic attempts at mining in the Salt Creek area, as well as in other areas of the Mojave Desert and the San Bernardino Mountains, were hampered by ongoing conflicts with local Native American groups, who resisted the invasion of their respective territories.

Killings of miners resulted in a series of American military expeditions into the Mojave Desert around 1860 and led to the establishment of a number of military posts to the south of the proposed project area (Fort Cady, Hancock's Redoubt at Soda Springs, Rock Springs, and Fort Paiute). In addition, military posts were located in the San Bernardino Mountains in the 1850s at Cajon, Jurupa, and Rancho del Chino (Beck and Haase 1974).

In the 1860s prospectors fanned out over the Mojave Desert looking for another Sutter’s Mill or Comstock Lode, resulting in the discovery of ore in the Clark Mountain Range, and in the Providence, New York, Whipple, Turtle, and Sacramento Mountains, as well as important silver deposits near Tecopa Pass. Most of these discoveries were made within two days’ travel of major transportation routes. Between 1870 and World War I, mining activity continued and gold mining surpassed silver mining in the 1890s.

Precious metals were not the only commodity that was mined near the turn of the twentieth century. Large deposits of borates were discovered in the Calico area (Borate) and in and around Death Valley. Nitre was mined 15–20 miles north of the proposed project area near the turn of the twentieth century, as were gypsum and talc (Vredenburgh, Shumway, and Hartill 1981).

Railroads

By the beginning of the twentieth century, mining interests in the Amargosa Basin saw a need to provide better transportation for minerals and ore to the markets. Rail transportation along the Old Government Road (Mojave Road) had been open since 1883 with the completion of the Atlantic and Pacific Line (Santa Fe Railroad). By 1905 a second rail line bisected the Mojave Desert with the construction of the San Pedro, Los

Angeles, and Salt Lake Line (Union Pacific). William T. Coleman of San Francisco had developed the Harmony Borax Works using 20-mule teams to haul the deposits across the Mojave to the town of Mojave on the Southern Pacific Railroad.

In 1888 Coleman's borax properties, the Lila C. and the mines at Borate (Calico), passed to Francis M. "Borax" Smith who had found borates at Teel's Marsh in Nevada. In 1890 Smith combined all three properties to form the Pacific Coast Borax Company. Exhausting the supply at Teel's March, Smith moved operations to Calico. By 1900 the rich deposits at Calico began to give out, and Smith turned his attention to his property near Death Valley.

After a failed attempt in April 1904 to move his ore from the Lila C. mine near Death Valley to the California Eastern Railroad at Ivanpah, 100 miles to the south, via a rock-base wagon road, Smith conceived of a new railroad bisecting the Mojave Desert north to south. On July 19, 1904, he incorporated the Tonapah and Tidewater Railroad Company. Surveys were conducted for several alternate routes, and contracts were arranged. Following conversation with Montana Senator William A. Clark in Nevada, a route was chosen between Las Vegas and the Lila C. The construction of the railroad started in Las Vegas in the spring of 1905. By August it became clear that Senator Clark was building his own railroad to the Tonapah-Goldfield area to provide rail transportation for the newly found gold and silver mines in that area.

After talks with the Santa Fe Railroad, Smith altered his route, and by the latter part of 1905 a tent city had been established at Ludlow to begin the new railroad which was planned to extend 167 miles north to the goldfields, with a branch line cutting over to the Lila C. Smith envisioned a railroad from Tonapah, Nevada, to the tidewater at San Diego, hence the name. On November 19, 1905, the first tracks were laid on the T&T's loop out of Ludlow, and by May of 1906 the rail line extended for 75 miles to just beyond Dumont. Engineering problems slowed construction to Tecopa (Inyo County) due to the twelve mile Amargosa Canyon segment, but a year later trains were operating all the way to Tecopa. In June 1907 the rail line extended to Zabriskie, where wagon-hauled ore from the Lila C. was loaded for the 91-mile trip to Ludlow. Eighteen additional miles were completed to Evelyn by mid-July of that year. On August 16, 1907, the seven-mile branch line from the Lila C. connected with the T&T at Death Valley Junction. Additional construction extended the T&T to Gold Center, Nevada, the end of the line, on October 30, 1907. Smith made arrangements with the recently completed Bullfrog Goldfield Railroad to connect to the T&T and to use the Bullfrog track from Gold Center, north to Beatty, and west to Bullfrog and Rhyolite.

A spur line was constructed to China Ranch to facilitate gypsum and talc shipping in 1915 in the Willow Wash or China Ranch Wash. The T&T railroad was abandoned in 1940 when the rails were removed to support the war effort. Many of the ties were taken to Barstow and used in the construction of the El Rancho Motel (Myrick 1992). An unconfirmed report by Pat Mitchell (1994, personal communication), grazing allottee at Horse Thief Springs, indicates that the railroad tie-constructed cabin or house at Horse Thief Springs was also built of T&T railroad ties.

Hydroelectric Power Generation and Electric Power Transmission

The eastern Mojave Desert has been the major corridor for the transmission of hydroelectric power from Hoover Dam, roughly 51 miles to the northeast of the project site, to Los Angeles, approximately 244 miles to the southwest, since 1936. Hoover Dam and the electric transmission system that distributes the hydroelectric power that it produces underwrote much of the economic development of the West in the twentieth century and were particularly critical to the economic development of southern California during that period (Solar Partners I et al. 2008f:6).

Hoover Dam

Congress authorized the construction of Hoover Dam through the passage of the Boulder Canyon Project Act of 1928. The act was a response to both an increase in the regional demand for electric power and a desire to affect better flood control along the Colorado River. Construction of the dam began in 1931, and the dam structure itself was completed in 1935. The construction of the hydroelectric powerhouse and the installation of the first turbines took another year. The powerhouse went into operation in 1936. The installation of the balance of the turbines in the facility was completed in 1939. The original output of the powerhouse in 1939 was 700 MW, making it the largest hydroelectric facility in the world at that time (Solar Partners I et al. 2008f:5 and 6).

Hoover Dam Transmission System

Transmission systems were needed to power the construction of Hoover Dam and to distribute the hydroelectricity that it would ultimately generate. The design of the Boulder Canyon Project Act was for the Federal government to build the dam and the powerhouse and to supply the turbines. Power contractors were then to lease the turbines from the government, pay the government for the use of the pooled water, and to themselves supply the electric transmission lines for the distribution of the generated electricity. The government, however, first had to supply a transmission line to power the construction of the dam. Southern Sierras Power Company, subsequently the California Electric Power Company, won the contract to build that initial transmission line and did so in 1930 and 1931. A second contractor, the Interstate Telegraph Company, built a telephone line in 1931 that was necessary to the operation of the Southern Sierras Power Company transmission line. The California Electric Power Company reversed the direction of the transmission line in 1937 to begin delivery of electricity from Hoover Dam to the City of San Bernardino (Solar Partners I et al. 2008f:6 and 7).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

Regulatory Context

Various laws apply to the evaluation and treatment of cultural resources. CEQA requires the Energy Commission to evaluate resources by determining whether they meet several sets of specified criteria as NHPA requires the BLM to evaluate resources for

eligibility for listing on the NHRP. These evaluations then influence the analysis of potential impacts to the resources and the mitigation that may be required to ameliorate any such impacts.

The CEQA Guidelines provide a definition of a historical resource as a "resource listed in, or determined to be eligible by the State Historical Resources Commission, for listing in the CRHR", or "a resource listed in a local register of historical resources or identified as significant in a historical resource survey meeting the requirements of Section 5024.1 (g) of the Public Resources Code," or "any object , building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California, provided the agency's determination is supported by substantial evidence in light of the whole record." (California Code of Regulations, Title 14, section 15064.5(a)). Historical resources that are automatically listed in the CRHR include California historical resources listed in or formally determined eligible for the NRHP and California Registered Historical Landmarks from No. 770 onward (Public Resources Code, Section 5024.1(d)).

Under the CEQA Guidelines, a resource is generally considered to be historically significant if it meets the criteria for listing in the CRHR. These criteria are essentially the same as the eligibility criteria for the NRHP. In addition to being at least 50 years old,[8] a resource must meet at least one (and may meet more than one) of the following four criteria (Public Resources Code section 5024.1):

- Criterion 1, is associated with events that have made a significant contribution to the broad patterns of our history;
- Criterion 2, is associated with the lives of persons significant in our past;
- Criterion 3, embodies the distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or possesses high artistic values; or
- Criterion 4, has yielded, or may be likely to yield, information important to history or prehistory.

In addition, historical resources must also possess integrity of location, design, setting, materials, workmanship, feeling, and association (California Code of Regulations, Title 14, section 4852(c)).

Even if a resource is not listed or determined to be eligible for listing in the CRHR, CEQA allows the lead agency to make a determination as to whether the resource is a historical resource as defined in Public Resources Code sections 5020.1 (j) or 5024.1. Whether a proposed project would cause a substantial adverse change in the significance of historical resources is the issue that staff analyzes to determine if the project may have a significant effect on the environment. The significance of an impact depends on:

[8] The Office of Historic Preservation's Instructions for Recording Historical Resources (1995) endorses recording and evaluating resources over 45 years of age to accommodate a five-year lag in the planning process.

- The cultural resource impacted;
- The nature of the resource's historical significance;
- How the resource's historical significance is manifested physically and perceptually;
- Appraisals of those aspects of the resource's integrity that figure importantly in the manifestation of the resource's historical significance; and
- How much the impact will change those integrity appraisals.

Historical Resources Inventory

The development of the inventory of historical resources in and near the proposed project area is the requisite first step in the assessment of whether the project may, under Public Resources Code section 21084.1, cause a substantial adverse change in the significance of a historical resource, and may, therefore, have a significant effect on the environment. The effort to develop the inventory has involved conducting a sequence of investigatory phases that includes doing background research, consulting with local Native American communities, conducting primary field research, interpreting the results of the inventory effort, as a whole, and evaluating whether found cultural resources are historically significant. This section discusses the methods and the results of each inventory phase, develops the historical resources inventory for the analysis of the proposed project, and interprets the inventory to assess how well it represents the archaeology of the project area of analysis.

The project area of analysis is the geographic area in which the construction and operation of the proposed project may have the potential to directly and indirectly impact cultural resources. For the purpose of the present analysis, this geographic area includes the project site, which is the footprint of the concentrating solar power electric generation facility, the broader project area, which is the area that encompasses the project site and ancillary facilities, such as natural gas pipelines, water pipelines, transmission infrastructure, and access roads requisite to the operation of the generation facility, and areas beyond the project area where the project may visually intrude on cultural resources.

Background Research

The background research for the present analysis employs information that the applicant and the BLM gathered from literature and record searches, and information that the BLM and Energy Commission staff gathered as a result of consultation with local Native American communities and with other potential public interest groups. The purpose of the background information is to help formulate the initial cultural resources inventory for the present analysis, to identify information gaps, and to inform the design and the interpretation of the field research that will serve to complete the inventory.

Literature and Records Search

The literature and records search portion of the background research attempts to gather and interpret documentary evidence of the known cultural resources in the project area of analysis. The sources for the present search include the San Bernardo Archeological

Information Center (SBAIC) of the California Historical Resources Information System (CHRIS), and the BLM Needles Field Office.

CHRIS Search

Methods

CH2M HILL, the cultural resources consultant to the applicant, requested a records search from the SBAIC on June 21, 2007 (BSE2007a, App. 5-3C). The record search was limited to the area within a one-mile radius around the project site and 0.25 miles to each side of the linear infrastructure proposed for the project. The search returned information on the known inventory of prehistoric and historical archaeological resources, built-environment resources, cultural landscapes, traditional cultural resources, and the heritage resources for which designations of significance already exist, that fell within the defined search area. The search also provided information on the technical reports for the previous archaeological surveys that have taken place wholly or partly within 0.25 miles of the area subject to archaeological survey for the present analysis, and for the archaeological excavations and built-environment surveys that have taken place in the records search area. The CHRIS records search also accessed the *Survey of Surveys: A Summary of California's Historical and Architectural Resource Surveys* (1986), the *Five Views: An Ethnic Sites Survey for California* (1988), the listed California Historical Landmarks and California Points of Historical Interest, and the California Office of Historic Preservation's Determinations of Eligibility and Directory of Historic Properties.

Results

The SBAIC record search found that 21 investigations, 20 pedestrian surveys, and one ethnographic study, had been wholly or partially conducted in the record search area between 1978 and 1995 (Cultural Resources Table 2).

CULTURAL RESOURCES TABLE 2
Previous Cultural Resources Investigations in the Records Search Area

Type of Investigation	Number of Investigations of Type	Dates of Investigations	CHRIS Document Nos.
Linear pedestrian electric transmission line surveys	8	Late 1970s to mid-1990s	1060614, 1060763, 1060764, 1060874, 1061280, 1061479, 1062170, 1063668
Areal pedestrian survey to inventory California desert area archaeological site types	1	Late 1970s	1062218
Linear and areal pedestrian surveys for the ISEGS project	2	Early 1980s	1061156, 1061219
Ethnographic Study for the ISEGS project	1	Early 1980s	1061220
Linear pedestrian motorcycle race course survey	1	Early 1980s	1061381
Linear and areal pedestrian surveys for drilling areas and associated access roads	2	Mid-1980s	1061599, 1061605
Areal pedestrian parcel surveys	2	Mid-1980s	1061602, 1061612
Linear pedestrian fiber optic cable surveys	2	Late 1980s	1061613, 1061734
Linear pedestrian natural gas pipeline surveys	2	Late 1980s to early 1990s	1062211, 1062571

The total survey coverage in the project area that is the result of these previous investigations is roughly 242 acres or 6 percent.

While eight cultural resources are known for the record search area (Cultural Resources Table 3), only one is located in the project area of analysis, the Hoover Dam-to-San Bernardino Transmission Line (CA-SBR-10315H), originally built as a 132-kV line and presently operating as a 115-kV line.

CULTURAL RESOURCES TABLE 3
Previously Recorded Cultural Resources in the Records Search Area

Resource Designation No.	Description	Approximate Distance and Direction to Project Area
CA-SBR-816, 2341	Rock shelter	1.0 miles NW of Ivanpah No. 3
CA-SBR-2342	Rock shelter	1.0 miles NW of Ivanpah No. 3
CA-SBR-6956	Rock shelters and milling features	0.85 miles NW of Ivanpah No. 3
CA-SBR-7347H	Dirt road, two-track with low side berms	0.5 miles WSW of Ivanpah No. 1
CA-SBR-7689H	Arrowhead Trail Highway (State Route 31)	0.6 miles E of Ivanpah No. 1
CA-SBR-7694H	Boulder Transmission Lines 1, 2, and 3	0.8 miles N of Ivanpah No. 3
CA-SBR-10315H	Original 132-kV transmission line from the City of San Bernardino to the Hoover Dam, now known as the Eldorado-Baker-Coolwater-Dunn Siding-Mountain Pass 115-kV transmission line	Between Ivanpah No. 1 and Ivanpah No. 2
CA-SBR-10803H	Stock-loading facility with ancillary improvements	0.5 miles E of Ivanpah No. 1

BLM Needles Field Office National Environmental Policy Act (NEPA) Document

Document Origins and Purpose

The BLM Needles Field Office has a NEPA document on file, an Environmental Assessment (EA), for the recent renewal of the Clark Mountain grazing allotment that is useful to the present analysis (BLM 2007). The Clark Mountain allotment includes 97,848 acres of public land across a number of different environmental zones in Ivanpah and Mesquite Valleys in San Bernardino County, and encompasses the proposed project area.

The EA provides important information on the distribution of cultural resources beyond the one major environmental zone of the project area, mid-slope bajada with Mojave Creosote Bush Scrub. The cultural resources inventory in the EA for the Clark Mountain allotment offers a broader context of the different types of archaeological sites that reflect the variations in the prehistoric human use of the different environmental zones in the project vicinity through time, of the potential for shifts in the composition of archaeological site types across the project area bajada over the last 12,000 years as part of the human response to fluctuations in the climate of the region, and of the range of historical archaeological sites that may be found in the area of analysis for the project.

Results

The cultural resources inventory for the Clark Mountain allotment in the EA is primarily the result of sporadic pedestrian surveys that have taken place over the last 30 years. Approximately 2,661 acres of the 97,848 acres of public land in the allotment, or 2.7 percent, have been subject to survey. The result of the work has been the identification of 46 cultural resources (Cultural Resources Table 4).

The EA splits out the cultural resources inventory of the allotment relative to three major environmental zones, mountain ranges, valley floors, and zones of transition between the mountain ranges and valley floors. The Mountain Environmental Zone in Cultural Resources Table 4 relates solely to the mountain ranges proper in the allotment, the Clark Mountain Range and the Mesquite Mountains. The Valley Environmental Zone includes the alluvial and eolian landforms on or near the floors of Ivanpah and Mesquite Valleys and the inselbergs along the margins of the valleys. The Transition Environmental Zone covers the lower slopes of the mountains, the adjacent upper portions of local bajadas, and the canyons and springs that are found at that physiographic interface.

CULTURAL RESOURCES TABLE 4
Clark Mountain Allotment Cultural Resources Inventory

CHRIS Trinomial	Environmental Zone	Site Type
Prehistoric Archaeological Resources		
CA-SBR-817	Mountain (hillside)	Campsite
CA-SBR-7348	Mountain	Lithic scatter
CA-SBR-816	Mountain (hillside)	Rock shelter
CA-SBR-840	Mountain (hillside)	Rock shelters
CA-SBR-2342	Mountain (hillside)	Rock shelter (habitation)
CA-SBR-807	Transition	Roasting pits[9]
CA-SBR-809	Transition	Roasting pit
CA-SBR-838	Transition	Roasting pits
CA-SBR-859	Transition	Roasting pit
CA-SBR-2335	Transition	Rock shelter, small
CA-SBR-2395	Transition	Roasting pit
CA-SBR-5120	Transition	Roasting pits
CA-SBR-5317	Transition	Rock shelter
CA-SBR-7392	Transition	Campsite, temporary
CA-SBR-2969	Valley	Campsite
CA-SBR-2970	Valley	Campsite
CA-SBR-2971	Valley	Campsite
CA-SBR-4944	Valley (private land)	Campsite
CA-SBR-2791	Valley	Campsite, temporary
CA-SBR-5222	Valley	Campsite, temporary
CA-SBR-5439	Valley	Campsite, temporary
CA-SBR-5440	Valley	Campsite, temporary
CA-SBR-5223	Valley	Ceramic scatter, small
CA-SBR-3727	Valley	Lithic scatter
CA-SBR-5224	Valley	Lithic scatter, small
CA-SBR-6955	Valley	Lithic scatter
CA-SBR-4920	Valley	Trail
Historical Archaeological Resources		
CA-SBR-6835H	Mountain/ Transition/Valley	Von Schmidt 1872 Boundary Survey for California and Nevada
CA-SBR-7694H	Mountain/	Boulder Transmission

[9] "Roasting pits" here, also known as "ring midden roasting pits," are "elevated ring-shaped piles composed of stone and soil" that are commonly thought to derive from repeated episodes of roasting mescal (*Agave* spp.) or sotol (*Dasylirion* spp.). These archaeological features are most often found in the deserts of the Southwest (Kroesen and Schneider 2008, pp. 43 and 44).

CHRIS Trinomial	Environmental Zone	Site Type
	Transition/Valley	Corridor right-of-way
CA-SBR-9740[H]	Mountain	Historic mining
CA-SBR-6563H	Transition	Historic trash scatter
CA-SBR-6591H	Transition	Historic trash scatter
CA-SBR-10803H	Valley	Cattle corral
CA-SBR-10315H	Valley	Electric transmission line
CA-SBR-7347H	Valley	Historic road
CA-SBR-7689H	Valley	Historic road
CA-SBR-10802H	Valley	Historic road
CA-SBR-10806H	Valley	Historic road
CA-SBR-5221[H]	Valley	Historic salt works
CA-SBR-10804H	Valley	Historic site
CA-SBR-4701[H]	Valley	Historic stone walls
CA-SBR-6248H	Valley	Historic trash scatter
CA-SBR-6592H	Valley	Historic trash scatter
CA-SBR-6957H	Valley	Historic trash scatter
CA-SBR-6562H	Valley	Telegraph station
Dual-Component Archaeological Resource		
CA-SBR7098/H	Valley	Lithic scatter/historic trash scatter

The cultural resources inventory for the Clark Mountain allotment demonstrates distinct patterns for the prehistoric and historic human use of the environmental zones above, in, and below the proposed project area (Cultural Resources Table 5). The evidence for the prehistoric use of the Mountain Environmental Zone includes rock shelters, an open campsite, and a lithic scatter. The inventory for the Transition Environmental Zone in the allotment similarly includes a small rockshelter and a temporary open campsite, but is the only environmental zone in the allotment where roasting pits are found. The Valley Environmental Zone has the highest frequency of prehistoric archaeological sites. The Valley cultural resources inventory includes open temporary campsites and campsites that evidence more enduring use, scatters of lithic and ceramic artifacts, and a trail.

CULTURAL RESOURCES TABLE 5
Clark Mountain Allotment Cultural Resources Types and Environmental Zones

Archaeological Site Type	**Environmental Zone**		
	Mountain	**Transition**	**Valley**
Prehistoric Archaeological Sites			
Campsite	1	1	8
Ceramic scatter			1
Lithic scatter	1		3
Rock art			
Rock shelter	3	2	
Roasting pit		6	
Trail			1
Total (Number/Percent)	5/19%	9/33%	13/48%
Historical Archaeological Sites			
Cattle corral			1
Electric transmission line	1	1	2
Historic mining	1		
Historic road			4
Historic salt works			1
Historic site			1
Historic stone wall			1
Historic trash scatter		2	3
Land surveying boundary	1	1	1
Telegraph station			1
Total (Number/Percent)	3/14%	4/18%	15/68%

The evidence for the historic human use of the environmental zones in the vicinity of the project area exhibits markedly different patterns of activity from those characteristic of the prehistoric period. The Mountain Environmental Zone has been the focus of mining in the historic period and is represented in the cultural resources inventory for the Clark Mountain allotment by CA-SBR-9740[H]. Over time, intermittent stream flow has flushed historic refuse from the mines in the Clark Mountain Range and the Mesquite Mountains down into the Transition Environmental Zone where deposits of this refuse sporadically line the streambeds and banks of dry washes. The Valley Environmental Zone has been the focus of a more diverse range of uses in the historic period. The historic-period resources inventory for the Valley Environmental Zone includes evidence of livestock management and the development of electric transmission and transportation corridors, communications infrastructure, and manufacturing enterprises. The historic trash scatters, stone wall configurations, and the nondescript historic site are evidence of the more peripheral aspects of the range of historic activity out on the floors of Ivanpah and Mesquite Valleys.

Native American Consultation

The applicant, the BLM, and Energy Commission staff have undertaken to consult with the Native American groups that may have an interest in the project area, beginning with the applicant in June, 2007. The BLM, as the local federal land manager, is coordinating the ongoing Native American consultation for the proposed project on its own behalf and on behalf of the Energy Commission. The results of that consultation, to date, are found here.

Methods

CH2M HILL, the consultant to the applicant, contacted the California Native American Heritage Commission (NAHC) on June 27, 2007 to request that the NAHC search its Sacred Lands File to determine whether there are any reported Native American cultural resources in the project area of analysis, and to request that the NAHC provide a list of Native American contacts that may have knowledge of cultural resources in that area. On June 29, 2007, CH2M HILL, on the basis of the response from the NAHC, sent out letters to initiate correspondence with the Native American groups that the NAHC thought may have an interest in the project area (BSE2007a, p. 5.3-21 and appendix 5.3A; Cultural Resources Table 6).

The BLM has also sought to engage Native American groups beyond those on the NAHC contact list that the agency believes may have an interest in the lands in the project area of analysis and with which the agency maintains ongoing relationships (Cultural Resources Table 7). BLM Needles Field Office staff sent out letters initiating consultation with potentially affected tribes on October 4, 2007. On December 6, 2007, BLM submitted additional letters to the balance of the groups that the NAHC thought may have an interest in the project area. The purpose of the BLM letters was to initiate formal Federal contact with Native American groups about the proposed project and to initiate government-to-government consultation with those groups that are federally recognized. BLM Needles Field Office staff sent out a subsequent letter on March 5, 2009 to the recipients of its initial letter to inform them of the discovery of ISEGS-01, an archaeological site to the east of the project site (see “May 23, 2008 Pedestrian Reconnaissance Survey of Project Area Inselbergs” and “Investigation to Evaluate Archaeological Site ISEGS-01” subsections, below), to solicit input on and concerns about the new archaeological site, request information on any cultural or religious values that might be affected by the proposed project, and to inform them that the results of additional archaeological survey on the hills that flank the project site would be made available to them on request.

Results

The June 29, 2007 response of the NAHC to the above request says that the Sacred Lands File did not indicate any Native American cultural resources in the immediate project area and provides a list of Native American contacts (Cultural Resources Table 6). CH2M HILL mailed and emailed letters to each of the contacts on the June 29 list asking them to please contact the consultant if they had any knowledge of traditional cultural properties or areas of traditional cultural value in the project area, or if they had any concerns about the proposed project. As of August 13, 2007, the month of the filing

of the AFC for the proposed project, CH2M HILL had received no responses to the letters sent out on June 29 (BSE2007a, p. 5.3-21 and appendix 5.3A).

As of October, 2009, BLM Needles Field Office staff has had no response from any of the Native American groups to either round of correspondence. BLM Native American consultation efforts are ongoing.

CULTURAL RESOURCES TABLE 6 (BSE2007a, Appendix 5.3A)
NAHC Native American Contact List

Native American Group	Location of Group Contact	Federal Recognition
Cahuilla Band of Mission Indians of the Cahuilla Reservation	Community of Anza, Riverside County	Yes
Ramona Band of Cahuilla Mission Indians of California	Community of Anza, Riverside County	Yes
San Manuel Band of Serrano Mission Indians of the San Manuel Reservation	City of Highland, San Bernardino County	Yes
Chemehuevi Indian Tribe of the Chemehuevi Reservation	Chemehuevi Valley, San Bernardino County	Yes
AhaMaKav Cultural Society, Fort Mojave Indian Tribe	Mohave Valley, Mohave County, Arizona	n/a
Morongo Band of Cahuilla Mission Indians of the Morongo Reservation	City of Banning, Riverside County	Yes
Fort Mojave Indian Tribe of Arizona, California, and Nevada	City of Needles, San Bernardino County	Yes
Serrano Nation of Indians	City of Highland, San Bernardino County	No
San Fernando Band of Mission Indians	Community of Newhall, Los Angeles County	No

CULTURAL RESOURCES TABLE 7
BLM Needles Field Office List of Additional Native American Contacts

Native American Group	Location of Group Contact	Federal Recognition
Colorado River Indian Tribes of the Colorado River Indian Reservation	City of Parker, La Paz County, Arizona	Yes
Las Vegas Tribe of Paiute Indians of the Las Vegas Indian Colony	City of Las Vegas, Clark County, Nevada	Yes
Pahrump Paiute Tribe	Town of Pahrump, Nye County, Nevada	No

Consultation with Others

CH2M HILL made telephone calls to the San Bernardino Historical and Pioneer Society in the City of San Bernardino on June 27, 2007, in an attempt to reach Steve Shaw, President, and to the Nevada State Museum and Historical Society in Las Vegas on June 28, 2007, in an attempt to reach David Millman, Curator of Collections (History). Voicemails were left for both. As of August 13, 2007, the month of the filing of the AFC for the proposed project, CH2M HILL had received no responses (BSE2007a, p. 5.3-19).

Cultural Resources Distribution Models

One critical use of the information drawn together during the background research for a cultural resources analysis is to inform the design and the interpretation of the field research that will complete the cultural resources inventory for the analysis. The background research for the present analysis has identified one previously recorded cultural resource on the project site, CA-SBR-10315H (see *California Historical Resources Information System Search* subsection above), and found that roughly 94 percent of the project area has never been subject to cultural resources survey. A further role of background research is to help develop predictive or anticipatory models of the distribution of cultural resources across a project area of analysis. Such models of the types of archaeological, ethnographic, and built-environment resources, and the patterns of their distribution across and beneath the surface of the landforms of the project area of analysis, provide the means to tailor more appropriate research designs for the field investigations that will complete a cultural resources inventory, and help gauge the degree to which the results of those investigations may reflect the actual population of archaeological, ethnographic, and built-environment resources in the project area of analysis. Such models also provide important contexts for the ultimate interpretation of the results of those investigations.

Models of the distribution of prehistoric archaeological sites, of ethnographic resources, and of historical archaeological sites and built-environment resources are developed here and draw on information above in the “Environmental Setting,” “Prehistoric Setting,” “Ethnographic Setting,” and “Historic Setting” subsections, in addition to the above information in the “Background Research” subsection. Staff formulated data requests during the discovery phase of the present certification process on the basis these models to ensure the collection of enough information to factually support the conclusions of this analysis. The discussions in the “Interpretation of Results” subsection below also employ the models.

Model of Prehistoric Archaeological Resources

The analysis of the information in the “Environmental Setting,” “Prehistoric Setting,” and “Literature and Records Search” subsections leads to the conclusion that subsurface prehistoric archaeological deposits are unlikely to be present in the project area and that the likelihood of prehistoric archaeological deposits across the surface of the project area is generally low, with the possible exception that roasting pits and rock shelters could be present on the inselbergs adjacent to the project site.

The age of the constituent sedimentary deposits that make up the project area landform, the bajada, and the geomorphic processes that have been actively shaping it constrain the age and the physical integrity of the surface and subsurface archaeological deposits that may be present there. The subsurface portion of the bajada appears to have been formed between approximately 8,700 and 4,000 years ago. Processes of erosion appear to have been reworking the sedimentary deposits of the bajada over the course of the last 4,000 years (see “Historical Geomorphology” subsection, above).

Subsurface archaeological deposits that may be present in the project area would include cultural materials from the time range of 8,700 to 4,000 years ago that would

have been left on former bajada surfaces and then buried during the most recent cycle of sedimentary deposition on the middle and lower slopes of the bajada. This time range corresponds to the late Lake Mojave Period (10,000 to 5000 B.C.) and the Pinto Period (5000 to 2000 B.C.) (see “Prehistoric Setting” subsection, above). Lake Mojave and Pinto Period deposits are typically small, rather sparse accumulations of stone tools and stone tool manufacturing debris that are found in the vicinity of high terraces above or on relict shorelines along what are now playas. The portions of archaeological sites or components that date to this time range and largely represent temporary small camps and work stations are also found along relict stream channels. As the terraces and shorelines of Ivanpah Dry Lake are lower down on the bajada beneath the proposed project area, and as the ephemeral washes that course over the present surface of the project area are not the type of relict stream channels that would have held more perennial water sources in prehistory, the presence of subsurface Lake Mojave and Pinto Period archaeological deposits in the project is unlikely.

Archaeological deposits that may be present on the surface of the proposed project area would include cultural materials that date from 4,000 years ago to the present. Deposits of this age may survive with physical integrity on the more stable patches of the surface of the bajada, or have no physical integrity due to the erosion and re-deposition of the original deposits in ephemeral stream channels and over the adjacent channel banks. The time range for most surface archaeological manifestations would correspond to the Gypsum (2000 B.C. to A.D. 500), Saratoga Springs (A.D. 500 to 1200), and Protohistoric (A.D. 1200 to present) Periods. Gypsum Period components are ephemeral in character and are relatively scarcer in the vicinity of the project area. The basic settlement pattern from the Gypsum through the Protohistoric Period appears to demonstrate a focus on lowland concentrations of plant resources along streams and in the lake basins. Despite considerable evidence of outside (Virgin Anasazi and Hakataya) influence in the region during the Sarasota and Protohistoric Periods, the basic economic milieu and the associated settlement patterns reflect the ongoing local trends in desert adaptation that had been in place for millennia. As the stream and lake basin environments that would have been conducive to the development of plant resource concentrations in the Gypsum through Protohistoric Periods do not appear to have been present in the project area, modern vegetation associations having been in place by approximately 4,500 years ago (see “Paleoecology” subsection above), the presence of period surface deposits is unlikely.

The results of the CHRIS records search and the EA for the Clark Mountain allotment differ in their support of the above conclusions. The records search notes three prehistoric archaeological sites in the vicinity of the proposed project area, CA-SBR-816 (-2341), CA-SBR-2342, and CA-SBR-6956, and none in it. The three sites are rock shelters, one of which includes milling features, which lie approximately 0.85 to 1.0 miles to the northwest and approximately 160 feet above the project area at the base of the Clark Mountain Range. The project area encompasses the lower portion of what the EA for the Clark Mountain allotment delimits as the Transition Zone and the upper portion of the Valley Zone in that classification. On the basis of the results of the EA, the prehistoric archaeological record for the project area may include roasting pits, rockshelters, and campsites in the Transition Zone and campsites, lithic and ceramic scatters, and trails in the Valley Zone. The question of how many of these different site

types may be found in the project area is dependent upon where in the Transition and Valley Zones the different types cluster. The project area, being on the broad bajada slopes in the lower portion of the Transition Zone appears to be just beneath the lower mountain slopes and the upper bajada surfaces, where the surface presence of the roasting pits and the rockshelters appear to cluster (Kroesen and Schneider 1991, p. 50). Topographic exceptions are the inselbergs that flank the Ivanpah No. 3 portion of the project site, which may have geologic formations that would accommodate rockshelters and may host vegetation types that include the plant species that were being processed in the roasting pits. The site types characteristic of the Valley Zone typically cluster down on the valley floor in the vicinity of Ivanpah Dry Lake (BLM 2007), below the project area. As the project site is in the upper portion of the Valley Zone, the frequency of the Valley Zone site types may be rather low.

Model of Ethnographic Resources

The available information on the types of ethnographic resources that would be or are characteristic of the Southern Paiute or Mojave groups are too general and too spare to develop a useful predictive model about the resources that may be present in the project area of analysis. The study by Bean, Vale, and Young (1982) indicates that, in the vicinity of the proposed project area, known ethnographic areas of value include playa edges such as those around Ivanpah Dry Lake, grinding rock and roasting pit sites at Mountain Pass roughly eight miles to the southwest of the project site, piñon stands in the New York Mountains on the southeastern margin of Ivanpah Valley, and turquoise deposits in the Clark Mountain Range and in the vicinity of Turquoise Mountain roughly 30 miles to the west-southwest of the project site (Bean, Vale, and Young 1982:6-6–6-39). The identification of ethnographic resources for the present analysis must rely on efforts to identify ethnographic resources in the field and on further Native American consultation.

Model of Historical Archaeological and Built-Environment Resources

The analysis of the information in the “Environmental Setting,” “Historic Setting,” and “Literature and Records Search” subsections leads to the conclusion that subsurface historical archaeological deposits are most likely not present in the project area and that historical archaeological deposits and built-environment resources are likely present in low to moderate frequency across the surface of the project area.

As the subsurface portion of the bajada is 8,700 to 4,000 years of age and the surface of it has been subject to erosive forces for the last 4,000 years (see “Historical Geomorphology” subsection, above), there is almost no chance that buried historical archaeological deposits exist in the project area that are not detectable from the surface. Constructed subsurface features, such as basements, cellars, and trash and privy pits, would have been dug into the eroding surface of the bajada and would still be apparent today.

Historical archaeological deposits and built-environment resources that may be present on the surface of the proposed project area could hypothetically include cultural materials that date from the mid-nineteenth century to the present, the principal period of the historic use of the project area (see “Historic Setting” subsection, above). Historical archaeological deposits would be present with physical integrity on the more

stable patches of the surface of the bajada or have no physical integrity due to the erosion and re-deposition of the original deposits in ephemeral stream channels and over the adjacent channel banks. Surface deposits of historical archaeological materials that retain physical integrity, or primary deposits, would most likely relate to debris that was the result of the moderately heavy use of transportation routes from the floor of Ivanpah Valley to the mines in the Clark Mountain Range, to the west of the project area, and of transportation routes through the valley, parallel to its long axis. Evidence of such materials and of the actual transportation routes are moderately likely to be present in the project area, as are secondary deposits (deposits that lack physical integrity) of mining-related refuse that has washed down from the mountains and that now lie in and adjacent to ephemeral stream channels. Other historical archaeological materials and built-environment resources that may be present at lower frequency include resources related to ranching, homesteading, local industry, and the development of the utility infrastructure of the region.

The results of the CHRIS records search and the EA for the Clark Mountain allotment support the above conclusion. The records search notes five historical archaeological sites and built-environment resources in the vicinity of the proposed project area, including one that falls inside it (CA-SBR-10315H). These resources include a segment of a dirt road (CA-SBR-7347H), a segment of former State Route 31, or the Arrowhead Trail Highway (CA-SBR-7689H), portions of two utility corridors, operational and abandoned (CA-SBR-7694H and CA-SBR-10315H), and a livestock loading facility (CA-SBR-10803H). The EA for the Clark Mountain allotment indicates that the record of historical archaeological sites and built-environment resources in the project area may also include resources related to the development of local industry. The EA further notes the presence of several resource types that may relate to a number of the known historic themes that are germane to the project area. These resource types include nondescript historic sites, stone wall segments, and historic trash scatters. These more generic resource types, particularly the historic trash scatters, are more likely to be found higher in the project area toward the mines of the Clark Mountain Range, lower in the project area toward the floor of the valley, and along the routes of travel and utility corridors that traverse the project area.

Cultural Resources Inventory Fieldwork

The field efforts to identify the cultural resources in the proposed project area of analysis include a geoarchaeology study, two reconnaissance surveys, and two intensive surveys (Cultural Resources Table 8). Three new cultural resources have been found in the project area of analysis, not including the discovery of six isolate resources, and one previously known cultural resource has been re-recorded (Cultural Resources Table 9). On the basis of background research and the results of the field efforts, the total cultural resources inventory for the project area of analysis includes one archaeological resource, no ethnographic resources, and three built-environment resources.

CULTURAL RESOURCES TABLE 8
Cultural Resources Inventory Investigations for the Present Analysis

Investigation Type	Results	Report Reference
Geoarchaeology Study	Conclusion that surface and subsurface potential for archaeological remains is negligible	pp. 9–18, CH2ML2008b
Primary Intensive Pedestrian Cultural Resources Survey	Relocated one built-environment resource; found two new built-environment resources and six isolated artifacts	Fergusson 2007
Supplemental Intensive Pedestrian Cultural Resources Survey	No cultural resources found	Fergusson 2007
May 23, 2008 Pedestrian Reconnaissance Survey of Project Area Inselbergs	One archaeological resource found	Energy Commission staff field notes
September, 2008 Helicopter and Pedestrian Reconnaissance Survey	No Native American traditional use areas found	Helton, Lawson, and Spaulding 2008; Lawson, Helton, and Spaulding 2008

CULTURAL RESOURCES TABLE 9
Present Inventory of Cultural Resources in the Project Area of Analysis

Cultural Resource Type (Year of Initial Recordation)	Description	Location	California Register of Historical Resources Eligibility (CRHR) and National Register of Historic Places (NRHP) Status	Siting Case Report Reference
Historic Built-Environment Resources				
CA-SBR-10315H (1988)	Hoover Dam-to-San Bernardino transmission line, now known as the Eldorado-Baker-Coolwater-Dunn Siding-Mountain Pass 115 kV transmission line	Sec. 3, T. 16 N., R. 14 E., Between Ivanpah No. 1 and Ivanpah No. 2	Consensus determination (2S2) as individually eligible for the NRHP (10/22/93), and therefore listed on the CRHR	Fergusson 2007
CA-SBR-12574H (2007)	Dismantled telephone line and dirt road, two -track	Sec. 3 and 4, T. 16 N., R. 14 E., Through NW quadrant of Ivanpah No. 1	See "California Register of Historical Resources Eligibility" subsection, below	Fergusson 2007
CA-SBR-12575H (2007)	Dirt road, faint two-track	Sec. 3, T. 16 N., R. 14 E, Through NW quadrant of Ivanpah No. 1.	See "California Register of Historical Resources Eligibility" subsection, below	Fergusson 2007
Archaeological Resources				
ISEGS-01 (2008)	Complex of dry-stacked masonry features that include apparent terraces, niches, a bench, and a rock platform	Sec. 34, T. 17 N, R. 14 E., E of Ivanpah No. 2	See "California Register of Historical Resources Eligibility" subsection, below	Helton, Lawson, and Spaulding 2008; Lawson, Helton, and Spaulding 2008
Ethnographic Resources				
None				

This subsection discusses the methods and the results of each field inventory phase and interprets the resultant inventory relative to the cultural resources distribution models above to assess how well the inventory represents the archaeology of the project area. Descriptions of each cultural resource in the inventory, evaluations of the eligibility of each resource for inclusion in the CRHR and the NRHP, assessments of project impacts on each known historical resource, consideration of and potential impacts on archaeological resources that may lie buried on the project site, and proposed mitigation measures for significant impacts may be found in the "National Register of Historic Places and California Register of Historical Resources Eligibility" and "Identification and Assessment of Direct Impacts on Built-Environment Resources and Proposed Mitigation" subsections below.

Geoarchaeology Study

Staff made a request to the applicant (Data Request No. 40) to provide information that would facilitate the assessment of the potential for the project to encounter buried archaeological deposits during the construction, operation, maintenance, closure, and decommissioning of the project. The response from the applicant was a geoarchaeology[10] study that, on the basis of background research, spatial analysis, and primary field research, provides a thorough discussion of the historical geomorphology of the project area and an assessment of the likely presence of buried archaeological deposits there.

Methods

Data for the recent study of the geoarchaeology of the proposed project area (CH2ML2008b, pp. 9–18) comes from the use of remote sensing techniques and field observation. The study began with an analysis of satellite imagery of the northern end of Ivanpah Dry Lake to try and discern aspects of the depositional history of the bajada that underlies the project area, as a whole. A high- resolution aerial photograph of the project area was then used to analyze the surface morphology of the bajada and to delimit, on the basis of visual albedo[11], the darker (older) surface areas of the bajada that would not have been subject to more recent erosion. The resultant surface areas were then scored separately for albedo and apparent surface roughness, both being age-dependent attributes. A sample of the remotely delimited surface areas (N = 28) and two younger surface areas were field-inspected to evaluate the accuracy of the remote analysis and to more closely observe the sample surfaces for prehistoric archaeological remains.

Results

The geoarchaeology study (CH2ML2008b, pp. 9–18) concludes that the surface and subsurface prehistoric archaeological potential of the proposed project area, which is on the middle reaches of the Clark Mountain bajada, is negligible. The field inspection of a sample of 28 of the remnant patches of the older bajada surface did not result in the

[10] Geoarchaeology is a subdiscipline of archaeology that uses the techniques and approaches of earth sciences such as geology, geomorphology, sedimentology, pedology, and stratigraphy to identify, investigate, and interpret the history of the human use of present and former landscapes.

[11] The fraction of incident electromagnetic radiation reflected by a surface.

location of any archaeological remains. If buried prehistoric archaeological deposits were a component of the sedimentary matrix of the Clark Mountain bajada, then artifacts would be anticipated to be constituents of the surfaces of the remnant patches. They are not. The surfaces of the remnant patches are clad in what is referred to as desert pavements, accretionary deposits that form over a long period of time where a single layer of clasts is borne upward on a continually accreting layer of wind-blown or eolian silt. A subset of the artifacts that would be present on a hypothetical former surface of the bajada would become incorporated into a desert pavement that slowly developed over that former surface, leaving the balance of the artifacts on the former surface beneath the forming desert pavement. The absence of artifacts on or in the desert pavements of the remnant patches in the present investigation provides objective evidence that buried prehistoric archaeological deposits may be largely absent on the bajada. Further evidence that would appear to support this conclusion is that only three isolate prehistoric artifacts have been found as the result of the pedestrian surveys of the entire project area (see “Pedestrian Surveys” subsection, below). If buried prehistoric archaeological deposits were present in the project area, then, presumably, the artifacts and the sedimentary matrix from such deposits would be eroding out in places and open to observation on the surface of the bajada, what is now known to be an erosional landform. This does not occur.

One ancillary application of the results of the geoarchaeology study is the observation that even portions of the surface of the bajada that are more recent in age than the above remnant patches may have been stable for a while. A subfossil piñon log (*Pinus monophylla*) was found on a more recent bajada surface among recently active ephemeral streams. The log is thought to be anywhere from 1,100–3,400 years old and may date the surface on which it was found to that approximate age. This information and the recent inadvertent discovery of an intact historical archaeological site (Temporary field no. ISEGS-02) approximately 1,700 feet to the east of Ivanpah No. 2 (see “Traditional Cultural Property Reconnaissance Surveys” subsection, below) demonstrates that, although the bajada is subject to a geomorphic regime of net erosion, the landform provides enough stable surface patches to preserve a representative sample of the historical archaeological deposits that would reflect historic activity on the bajada.

Intensive Pedestrian Surveys

Primary Intensive Pedestrian Cultural Resources Survey

The applicant undertook an intensive pedestrian cultural resources survey of the originally proposed project area to comply with the Energy Commission’s siting regulations. The purpose of the survey was to provide information on the location and the character of the cultural resources that may lie on the surface of the project area. The results contribute to the compilation of the cultural resources inventory of the proposed project area.

Methods

CH2M HILL conducted the survey of the project area from April 25 through May 22, 2007, adjusting the survey methods while the survey was in progress. The survey of the majority of Ivanpah No. 1 was done using transects that were 15 meters apart. On the

basis of the field perception that the potential for encountering cultural resources was low due to disturbance from active, braided, ephemeral drainages, the BLM agreed to a request from CH2M HILL to widen the transect interval to 30 meters with the condition that survey areas that had desert pavements or rock outcrops with desert varnish would be examined more intensively. Ivanpah No. 2 and Ivanpah No. 3, and, apparently, the balance of the project area were surveyed under the latter protocol. When cultural resources were found during the survey, the field archaeologists would delimit the surface extent of each resource, plot the resource on a United States Geological Survey (USGS) 7.5-minute topographic quadrangle series map, and acquire global positioning system (GPS) data for the resource using a Trimble Geo XH mapping-grade unit. Additional field recordation efforts for archaeological sites were to photograph artifacts and site features, and to count and classify artifacts, where reasonable. No artifacts were collected during the survey. The archaeologists reported the ground visibility in the project area to have been approximately 90 percent, or excellent.

Results

CH2M HILL found two new cultural resources in the proposed project area (CA-SBR-12574H and CA-SBR-12575H) and six cultural resources isolates in primary depositional contexts. The isolate resources include a horseshoe, two mining prospects, an obsidian flake, an obsidian nodule, and a chert biface. It is of note that the lithic artifacts are of stone types for which there are no sources in Ivanpah Valley or the mountain ranges that form its margins. Historic tin cans, most apparently dating to the late 1800s, were also found in the stream beds and on the banks of nearly every major ephemeral stream in the project area. These artifacts were not recorded as isolate resources, because they were interpreted, in the field, as being the result of secondary re-deposition from upstream mining-related sites in the Clark Mountain Range.

Supplemental Intensive Pedestrian Cultural Resources Survey

Subsequent to the August 31, 2007 filing of the AFC for the proposed project, a number of the components of the project were altered, which resulted in the expansion of the project site. CH2M HILL, the consultant to the applicant, conducted additional intensive pedestrian survey on 371.45 acres to take into account portions of the expanded project site that had not been subject to prior survey.

Methods

Two CH2M HILL field archaeologists conducted the survey of 371.45 acres from April 29 through May 1, 2008, approximately six person- days, walking transects 15 meters apart. The archaeologists used USGS 7.5-minute topographic quadrangle series maps, aerial photographs, and Trimble hand-held GPS units to navigate to survey areas and to help record their observations. The visibility of the ground surface in the survey areas was reported to have been excellent, at approximately 90 percent.

Results

The archaeologists report the complete absence of prehistoric or historic cultural resources in the areas surveyed. They described the surface of the surveyed areas as exhibiting no evidence of modern development. Widespread evidence of bajada flooding events and sheetwash deposition was also noted.

Traditional Cultural Property Reconnaissance Surveys

May 23, 2008 Pedestrian Reconnaissance Survey of Project Area Inselbergs

Staff asked the applicant (Data Request No. 41) to provide information that would facilitate the assessment of the potential for the built project to affect Native American traditional use areas that may be in sight of the project area. The request sought discussions of both known ethnographic resources, and the potential for ethnographic resources that may not yet be known. To fulfill the request, the applicant would have had to more actively research extant ethnographic sources and expand the project area of analysis beyond the minimum requirements in the Energy Commission's siting regulations to include what were then unsurveyed lands surrounding the project site. The applicant's response to the data request was that the AFC already documented requests that the applicant had made of others for information on known Native American traditional use areas. Staff chose to conduct a pedestrian reconnaissance of a portion of the inselbergs in the vicinity of the project site to help develop a reasonable scope for a more specific request to the applicant to conduct an ethnographic field survey for the present analysis. The purpose of the reconnaissance was to acquire a sense of how likely ethnographic resources were to be present on the inselbergs adjacent to the project area, and to acquire a sense of the topography of the Clark Mountain Range foothills, beyond the inselbergs, and the potential for the project to affect any ethnographic resources that may be present there.

Methods

On May 23, 2008, Energy Commission staff Michael McGuirt and Misa Milliron, Energy Commission consultant Susan Sanders, and BLM staff Colin Grant conducted a biological and cultural resources reconnaissance survey of the Paleozoic marine limestone inselberg just to the west of the Ivanpah No. 3 project area boundary. Later in the day, during a brief respite in a rolling series of thunderstorms, the same group, minus Colin Grant, conducted further reconnaissance of the southern portion of the Precambrian metamorphic inselberg complex just to the east of the Ivanpah No. 3 project area boundary.

The reconnaissance entailed a brisk walk-over of the two areas. The group first drove to the northern end of the limestone inselberg and hiked along its single crest to its southern terminus. The smaller group then later hiked out from near the intersection of the Hoover Dam- to- San Bernardino 115- kV Transmission Line (CA-SBR-10315H) and Colosseum Road approximately 0.7 miles to the low hill that is the most southerly extent of the metamorphic inselberg complex. The latter group hiked the crest of the low hill from south to north and then hiked up to the summit of the most southerly crest of the primary inselberg of the complex, before returning to Colosseum Road. Navigation for the reconnaissance was done using a computer-generated TOPO! topographic map and a hand-held Suunto compass. Field notes and digital images made with a Nikon CoolPix P3 camera variably record the observations made on the reconnaissance. Ground surface visibility on both the limestone inselberg and the metamorphic inselberg complex was excellent as they are bedrock formations. Visibility ranged from 90 to 100 percent.

Results

Energy Commission staff found two new archaeological sites as a result of the brief reconnaissance (Temporary field nos. ISEGS-01 and ISEGS-02). Archaeological site ISEGS-02 was found on the way from Colosseum Road to the metamorphic inselberg complex, and, although it falls outside the project area of analysis, a brief description and interpretation of it is given here, because the presence of the site has a bearing on the potential frequency of historical archaeological sites across the middle reaches of the Clark Mountain bajada and on the differential stability of portions of the bajada surface. The discussion of archaeological site ISEGS-01 can be found in the "California Register of Historical Resources Eligibility" subsection below.

ISEGS-02 is a historic trash scatter or refuse deposit that appears to date roughly to the 1890s to 1910s. The site appears to be a discrete, primary deposit, measuring approximately 15–20 feet in diameter. It was found on a bajada surface slightly higher than the ephemeral stream channels nearby that flank it, on a bajada interfluve. The frequency of the artifacts in the deposit is moderate, and the deposit artifact assemblage includes one whole, embossed, manganese-decolorized, beverage bottle, two whole, colorless, wide-mouthed pickle jars with "Heinz" embossments, and many apparent food and evaporated milk tins. The food tins are hole-in-cap cans with apparent lock or folded-edge side seams, flush, stamped can ends, roughly 1–1½-inch-diameter, hand-soldered caps, and hand-soldered cap vents. The evaporated milk tins have flush, stamped can ends and hand-soldered, matchstick filler closures. The deposit, as a whole, appears to represent a single episode or cycle of activity, as multiple points of discard were not apparent. Given the distance of the deposit from any known or apparent roads or trails, or from any known or apparent loci of habitation, and given the apparent age of the deposit, it most likely represents the locus of a temporary campsite.

September, 2008 Helicopter and Pedestrian Reconnaissance Survey

Staff reinitiated discussions with the applicant on Data Request No. 41 at the June 23, 2008 Data Response and Issues Resolution Workshop in Primm, Nevada, and at the July 2, 2008 continuance of that workshop in Sacramento. Staff sought to encourage the applicant to provide information on the potential presence of Native American traditional use areas beyond the project site that would be subject to the direct impact of the stark visual intrusion that the project would impose on any such resources. To demonstrate the potential presence of Native American traditional use areas in sight of the proposed project, staff shared the preliminary results of the May 23, 2008 pedestrian reconnaissance survey of the inselbergs adjacent to the project area as evidence that such use areas may be present. Staff asked at the June 23 workshop that the applicant more formally evaluate the archaeological site that was found as a result of that reconnaissance (ISEGS-01) and that the applicant conduct a pedestrian reconnaissance of the inselbergs adjacent to the project site and along the ridgelines of the toe of approximately eleven of the Clark Mountain Range foothills that overlook the project site. The applicant agreed to the requests at the July 2 continuance of the workshop and asked, in turn, that CEC and BLM staff provide protocols for both the evaluation of ISEGS-01 and the reconnaissance survey. CEC and BLM staff jointly developed them, incorporating a subsequent request by the applicant to integrate the use of a helicopter in the reconnaissance survey. The BLM gave the applicant the "Protocol for Reconnaissance Survey for Native American Traditional Use Areas" and

the “Protocol for the Documentation and Evaluation of Archaeological Site ISEGS-01” on or about July 21, 2008 (CEC2008xx). The applicant produced a preliminary summary of the results of the field efforts for the protocols in a confidential technical memorandum of September 17, 2008 (Helton, Lawson, and Spaulding 2008), which references a forthcoming, more detailed letter report. The latter report (Lawson, Helton, and Spaulding 2008), a second confidential technical memorandum of December 5, 2008, provides the final results of both the reconnaissance survey and the evaluation of ISEGS-01 (see “Evaluation of Archaeological Site ISEGS-01” subsection, below).

Methods

The consultant to the applicant, CH2M HILL, implemented the “Protocol for Reconnaissance Survey for Native American Traditional Use Areas” (Reconnaissance Survey Protocol), making modest adjustments to the “Field Investigation Methods” in the protocol. The purpose of the reconnaissance was to facilitate the rapid field documentation of potential Native American traditional use areas in the portion of the project area of analysis where the proposed project would create direct visual impacts for such resources. The primary focus of the reconnaissance was the identification of archaeological sites, and natural landscape loci where cultural modification is apparent, that may be prehistoric or historic Native American traditional use areas. Archaeological sites and modified landscape loci that are not demonstrably of Native American origin and cannot reasonably be attributed to some manner of ongoing traditional use fall outside of the project area of analysis and further consideration in the present analysis, because direct visual impacts to those resources would not compromise their historic integrity.

The original Reconnaissance Survey Protocol requests that the applicant conduct a helicopter reconnaissance of the crest of each ridgeline in circled areas on a hardcopy map that Energy Commission and BLM staff gave to the applicant at the June 23 workshop. The cited map delimits a total of 12 circular reconnaissance survey areas (Areas 1–10, Limestone Ridge, and Metamorphic Hill, Cultural Resources Figure 1) in an arc from southwest of the project site clockwise to north of the project site, across the toe of the Clark Mountain Range foothills. The protocol requests that the applicant maintain a helicopter skid-to-ground height of approximately 25 feet while conducting the reconnaissance and assess the viability of the use of a helicopter for the reconnaissance of Native American traditional use areas by conducting an initial flyover of ISEGS-01. If ISEGS-01 was not clearly visible from a 25-foot height, then the applicant was to abandon the use of the helicopter and conduct the survey of the ridgelines in the reconnaissance survey areas on foot. If ISEGS-01 was clearly visible from 25 feet, then the applicant was to use the helicopter to survey the subject ridgelines and follow up the helicopter survey with pedestrian surveys of sample areas on several of the ridgelines in the reconnaissance survey areas to verify the accuracy of the results of the helicopter survey. The applicant chose instead to conduct pedestrian surveys of the Limestone Ridge, the Paleozoic marine limestone inselberg just to the west of the Ivanpah No. 3 project site boundary, and the Metamorphic Hill, the Precambrian metamorphic inselberg complex just to the east of the Ivanpah No. 3 project site boundary, and to conduct a helicopter reconnaissance of a sample of the ridgelines in Areas 1–10. In late August, 2008, the applicant, citing the length and the steep grade of many of the ridgelines in Areas 1–10, submitted revised maps of those

survey areas that delimited 22 reconnaissance targets. The reconnaissance targets are a sample of the flatter ridges and of the topographic highs within each survey area that possess unobstructed views of the surrounding terrain (Cultural Resources Figure 1). The applicant requested that Energy Commission and BLM staff agree to restrict the helicopter survey to the 22 reconnaissance targets. Energy Commission and BLM staff agreed to this revision to the original Reconnaissance Survey Protocol. Subsequent to Energy Commission and BLM staff approval of the revision to the protocol, the applicant added a further reconnaissance survey area, Area 11, to the north-northeast of the project site and five new reconnaissance targets, for a total of 27 reconnaissance targets.

The Reconnaissance Survey Protocol also includes methods for the recordation of archaeological deposits found as a result of the survey, “Field Recordation of Archaeological Remains.” The applicant was to complete California Department of Parks and Recreation (DPR) 523A and 523J forms for each archaeological site, and each locus of cultural modification to the natural landscape, found that *may* be a prehistoric or historic Native American traditional use area, record field notes that document descriptions of and GPS coordinates for archaeological sites and loci of natural landscape modification that the applicant does *not* believe are Native American traditional use areas, and record field notes that document descriptions of isolate artifacts and diffuse artifact scatters that collectively make up the low frequency background of the local archaeological record. The purpose of the documentation of archaeological remains and modified landscape loci that are not thought to be of Native American origin is to document the authenticity and accuracy of the results of the reconnaissance, and to provide an empirical archaeological context for the interpretation of the results, whether positive *or* negative.

CH2M HILL archaeologists conducted the pedestrian reconnaissance survey of the Limestone Ridge and the Metamorphic Hill, intermittently, from September 2 through 4, 2008. The archaeologists conducted meandering pedestrian surveys of the crest of the ridge and the topographic highs of the metamorphic rock outcrops that compose the Metamorphic Hill, or the Precambrian metamorphic inselberg complex. Photographs and GPS coordinates were taken of and for archaeological sites and loci of landscape modification that the archaeologists understood as unlikely to be Native American in origin, and of and for other archaeological sites and loci of indeterminate cultural affinity. Field notes on artifacts found in association with such sites or loci were taken. The other field recordation methods of the Reconnaissance Survey Protocol also appear to have been followed.

CH2M HILL archaeologists conducted the helicopter portion of the reconnaissance survey on September 8 and 9, 2008. Each of the 27 reconnaissance targets were subject to close aerial survey and videotaping at heights of approximately 50 to 300 feet above the ground, in apparent deviation from the Reconnaissance Survey Protocol. Navigation to each reconnaissance target was accomplished through the use of the GPS navigation computer in the helicopter, reference to hardcopy USGS 7.5-minute topographic quadrangle series maps, and hand-held GPS units. Where safe landing zones for the helicopter were found in Areas 1–7, and 11 (There were 14 such zones, or N =14), the archaeologists conducted meandering pedestrian surveys of the crest of target ridgelines and of the topographic highs. Photographs and GPS coordinates were

taken along each surveyed ridge crest. The other field recordation methods of the Reconnaissance Survey Protocol also appear to have been followed.

Results

The helicopter and pedestrian reconnaissance survey did not result in the discovery of archaeological features or deposits that CH2M HILL archaeologists understood to be Native American traditional use areas. The reported results of the survey are presented here to document their authenticity and accuracy, and to better enable the interpretation of the archaeological record of the project area by articulating its broader archaeological context. As the vast majority of the archaeological features and deposits found unambiguously represent historic mining or prospecting activity and the balance of the features and deposits do not appear to comport in character to known prehistoric or historic Native American traditional use areas, they receive no further consideration in the present analysis.

Limestone Ridge

The result of the pedestrian survey of the Limestone Ridge was the discovery of an unreported number of historic mining and related features, and, apparently, three rock shelters. The historic mining and related features include an unreported number of mine adits and prospect pits, a concrete staircase, and a large can dump. The can dump consists primarily of sanitary cans, and includes, as lesser constituents, screw-top colorless glass jars, pull-tab beer and juice cans, and at least one evaporated milk tin with a matchstick filler closure.

The three rock shelters on the Limestone Ridge were, with one exception, devoid of artifacts and therefore difficult to ascribe to a particular culture. One rock shelter on the western side of the ridge is of unreported dimensions and has what appears to be dry-stacked rock walls of unreported dimensions associated with it. No artifacts were found in association with the shelter.

Another rock shelter of unreported location on the ridge has an entrance that is 75 centimeters high and 80 centimeters wide, and recedes two meters back into the ridge. The ceiling of the shelter apparently has small holes of unreported dimensions that open out to the sky. There appear to be dry-stacked rocks on either side of the entrance, one of which may be a short wall. Three stacked rocks flank the eastern side of the shelter entrance, and 15, approximately 20-by-20-centimeter, stacked cobbles form a wall on the western side of the entrance. Approximately 20 smaller cobbles act as filler stones, or chinks in the voids between the larger stones in the wall. Both the wall and the three stacked rocks are reported to have further smaller gravel chinks. The condition of the wall and the three stacked rocks is reported to be good. No artifacts were found in association with this shelter.

The third rock shelter appears to be near the crest of the ridge and opens up onto the western and eastern sides of it. A slightly polished, apparent artifact, or manuports, was found inside the shelter. The manuport is reported to be a large igneous rock with one very flat surface that apparently has small, polished protrusions on it that do not exceed one centimeter in height. The protrusions are reported not to evidence grinding, and other protrusions and protruding ridges on the subject surface are reported to not be

flat. The archaeologists for the applicant interpret the manuport as likely indicative of the prehistoric use of the shelter.

Metamorphic Hill

The result of the pedestrian survey of the Metamorphic Hill was the apparent discovery of numerous prospect pits, a number of rock cairns, large areas of mechanical disturbance, a rock wall, an abandoned truck, and a geocache. The Metamorphic Hill, or the Precambrian metamorphic inselberg complex just to the east of the Ivanpah No. 3 project site boundary is made up of a smaller western inselberg, a much larger eastern inselberg, and a tiny southern knoll where ISEGS-01 is found. Three prospect pit and rock cairn complexes were found on the western and eastern inselbergs, two on the former and one on the eastern side of the latter. Each complex appears to include a single prospect pit and a single rock cairn, probably the discovery monument that marks the location of the mineral vein or lode originally exposed in each adjacent prospect pit.

A rock wall and rock cairn complex was found on the southwestern side of the eastern inselberg just above an ephemeral stream on the surface of the adjacent bajada. A portion of the east-to-west-trending rock wall and the whole cairn have fallen apart. The intact portion of the rock wall, approximately three-quarters of its eastern extent, measures approximately 3.0 meters in length and 1.5 meters in height. The wall is founded on a local outcrop of metamorphic bedrock and is itself of unreported rock type. The base of the wall is of boulders that are approximately 20 by 30 centimeters in dimension, and the size of the rock gradually decreases toward the top of the wall, the last course of which includes cobbles that are approximately 10 by 20 centimeters in dimension. An unreported number of prospect pits and an unreported type of abandoned truck were found near the wall and cairn complex. No artifacts were found in or near the broader complex.

A partially intact, solitary rock cairn was found downslope, apparently on the southern side of the western inselberg. The cairn is made up of approximately 12 large cobbles of the local metamorphic rock that encircle a large, white quartzite cobble. Additional large metamorphic cobbles and a further quartzite cobble abut the base of the cairn.

Areas 1–11

The result of the helicopter survey of Areas 1–11 appears to be the discovery of a minimum of 16 cairns, apparently of rock, a mine shaft, a mine adit, a prospect pit, and two historic trash scatters. The applicant does not clearly report the total number of archaeological features, artifact concentrations, or isolate artifacts found. This minimum inventory of archaeological remains is differentially distributed among the foothills to the southwest and west of the project site (Areas 1–6) and those to the north of it (Areas 7–11).

Areas 1–6

The arc of reconnaissance survey areas to the southwest and west of the project site, Areas 1–6, were found to have 12 of the 16 cairns, apparently of rock, the mine shaft, the mine adit, the prospect pit, and both historic trash scatters. The applicant does not clearly report the associations among these features and artifact concentrations, but a number of relatively secure associations can be made. Six of the 12 cairns appear to

bear some association with the mine shaft (N = 2), the mine adit (N = 3), and the prospect pit (N = 1). These cairns most likely were discovery monuments or boundary markers for historic lode claims. Two of the above six cairns, one that may be associated with the mine shaft and another that may be associated with the prospect pit, are reported to have been found in association with historic trash scatters, or refuse deposits. The historic refuse deposit near the mine shaft is reported to include two Prince Albert tobacco tins, and a historic beer can. The refuse deposit near the prospect pit, which the applicant appears to report as having been mechanically excavated, is reported to include one horse or burro shoe, one meat tin, and a fragmentary brown glass bottle body with two mold seams.

Four of the 12 cairns found in Areas 1–6 were found in a close group in a small saddle along a ridgeline. Each of these cairns is reported to be small and to include a few rocks of unreported type. No other archaeological features or artifacts were found in association with this cairn group.

One of the final two cairns, both of which were found as isolate archaeological features, is reported to include a wooden lathe of unreported dimensions.

Areas 7–11

The arc of reconnaissance survey areas to the north of the project site, Areas 7–11, were found to have four of the 16 cairns found as a result of the helicopter survey. The four cairns appear to have each been found as isolate archaeological features. One is reported to include a wooden lathe of unreported dimensions.

Interpretation of Results

The total cultural resources inventory for the project area of analysis includes one previously known and two new built-environment resources, and one new archaeological resource (see Cultural Resources Table 9, above). The comparison and interpretation of the results of the efforts to develop the project inventory are made here, relative to the cultural resources distribution models above, to assess the reliability of the results.

Model of Prehistoric Archaeological Resources

Comparison

The results of the efforts to identify prehistoric archaeological resources in the project area of analysis conform well to the predictions of the above model for this resource class. The composite pedestrian survey of 100 percent of the project area resulted in the identification of only three isolate prehistoric artifacts, one obsidian flake, one obsidian nodule, and one complete chert biface.

Interpretation

The extremely low frequency of unambiguous prehistoric material culture across the project area of analysis confirms the above anticipatory model for the area and appears to indicate almost no use of this portion of the Clark Mountain bajada throughout prehistory. The dearth of prehistoric artifacts in the area suggests that this portion of the

bajada has been nothing more than a transit zone between the floor of Ivanpah Valley and the Clark Mountain Range. The use of this portion of the bajada for any kind of resource collection or processing over the millennia would have undoubtedly left at least a low-frequency material trace. There is virtually none. The material trace of human activity in the area is so faint that the use of the project area as a transit zone must have been light as well. One would anticipate a higher frequency of artifacts resulting even from incidental discard had the use of the area been greater. A useful focus of future inquiry would be to investigate whether analogous environmental contexts in the region evidence a similarly light mode of human use.

Interpretation of Ethnographic Resources

No cultural resources were found in the project area of analysis that can be thought, on the basis of archaeological evidence, to unambiguously represent ethnographic resources. One or more of the three rock shelters that were found on the Limestone Ridge, the Paleozoic marine limestone inselberg just to the west of the Ivanpah No. 3 project site boundary, one or more of the isolate cairns or the cairn group found across the toe of the Clark Mountain Range foothills, and archaeological site ISEGS-01 may be Native American in origin, but none of them clearly evidence any manner of ongoing traditional use. The resources may or may not have the potential to yield information important to Native American prehistory or history, but, in the absence of attributes that unambiguously indicate continuity of use into the present or use modes that are not mundane, there is no archaeological evidence to assert the association of the resources with traditional Native American practices. Native American consultation to date contributes no further insight into the character of these resources.

Model of Historical Archaeological and Built-environment Resources

Comparison

The historical archaeological and built-environment resources found in the project area include a variety of the resource types that the above model anticipates, but the frequency of the resources is a bit lower than the model predicts. The built-environment resources include one operational (CA-SBR-10315H) and one abandoned (CA-SBR-12574H) utility corridor, and a roughly east-to-west-trending segment of a dirt road (CA-SBR-12575H). The frequency of primary deposits of historical archaeological resources in the project area is particularly low and includes only three isolate resources, a horseshoe and two mining prospects.

Interpretation

The inventory of built-environment resources comports relatively well with the anticipatory model for historical archaeological and built-environment resources. The extremely low frequency of primary deposits of historical archaeological resources in the project area is a phenomenon of interest. Given the presumed relatively high volume of foot, horse, wagon, and, most recently, automobile traffic that would have passed through the project area coming up off of the valley floor and heading toward the mines in the Clark Mountain Range, principally from the 1860s through the 1910s, one would anticipate a higher frequency of intact deposits of historical archaeological materials. One would anticipate finding debris along the travel corridors in proportion to the volume of the traffic that passed though the area, and one would further anticipate finding

refuse deposits related to temporary camps, such as ISEGS-02, that would have been used during travel to and to stage departures into the Clark Mountain Range, and to support mine prospecting efforts closer to the project area, on the limestone inselberg and in the metamorphic inselberg complex. The low frequency of primary deposits of historical archaeological materials may, therefore, indicate a lower volume of transit through the project area than had been presumed and further indicate that transit was typically without stops.

Reliability of Cultural Resources Inventory

Energy Commission staff finds, on the basis of the above analysis, that the cultural resources inventory for the project area of analysis is a reliable body of information on which the Commission can, in part, base its decision on the potential for the construction, operation, maintenance, closure, and decommissioning of the proposed project to have a significant effect on cultural resources.

National Register of Historic Places and California Register of Historical Resources Eligibility

The cultural resources inventory for the project area of analysis presently includes three built-environment resources and one archaeological resource (Cultural Resources Table 9). One of the built-environment resources, the Hoover Dam-to-San Bernardino transmission line (CA-SBR-10315H), has already been determined eligible, by consensus, for inclusion in the NRHP and is listed on the CRHR as a consequence of that determination. The CRHR eligibility of the other three resources, CA-SBR-12574H, CA-SBR-12575H, and ISEGS-01, is formally being considered here for the first time.

Investigation to Evaluate Archaeological Site ISEGS-01

Archaeological site ISEGS-01 was found as a result of the May 23, 2008 pedestrian reconnaissance survey of the inselbergs in the project area of analysis (see “Traditional Cultural Property Reconnaissance Surveys” subsection, above). Staff asked at the June 23, 2008 Data Response and Issues Resolution Workshop in Primm, Nevada, that the applicant more formally evaluate ISEGS-01. The applicant agreed to that request at the July 2, 2008 continuance of the workshop in Sacramento, and asked, in turn, that CEC and BLM staff provide a protocol for the evaluation. CEC and BLM staff jointly developed that protocol, and the BLM gave the applicant the “Protocol for the Documentation and Evaluation of Archaeological Site ISEGS-01” (ISEGS-01 Evaluation Protocol) on or about July 21, 2008 (CEC2008xx). The applicant produced a preliminary summary of the results of the field efforts for both the ISEGS-01 Evaluation Protocol and the Reconnaissance Survey Protocol in a confidential technical memorandum of September 17, 2008 (Helton, Lawson, and Spaulding 2008), which references a forthcoming, more detailed letter report. The latter report (Lawson, Helton, and Spaulding 2008), a second confidential technical memorandum of December 5, 2008, provides the final results of both protocols (see “September, 2008 Helicopter and Pedestrian Reconnaissance Survey” subsection, above, for the results of the Reconnaissance Survey Protocol).

Methods

The consultant to the applicant, CH2M HILL, implemented the ISEGS-01 Evaluation Protocol, substantively augmenting the "Background Literature Review" in the protocol. The purpose of the protocol was to more formally assess and evaluate the origin and the historical significance of ISEGS-01 in an attempt to acquire the minimum amount of data necessary to determine whether the subject site is a Native American traditional use area eligible for inclusion in either the CRHR or the National Register of Historic Places (NRHP), and, if so, whether the degradation of the integrity of the site from the construction and operation of the proposed project would be either a substantial adverse change in the significance of a historical resource under CEQA or an adverse effect under the National Historic Preservation Act. CEC and BLM staff state in the protocol that the CEC and the BLM would consider the results of the work done under this protocol sufficient to conclude the *archaeological* effort to determine whether ISEGS-01 is a Native American traditional use area.

The ISEGS-01 Evaluation Protocol requests that the applicant conduct a program of background research and field investigation. The background research portion of the program, as originally proposed, has two parts. One part is a review of the extant ethnographic literature on the Southern Paiute, the Chemehuevi, and the Mojave to discern whether site types comparable to ISEGS-01 are known for any of these groups. The Southern Paiute, the Chemehuevi, and the Mojave each identify a relationship between the project area of analysis and the ancestral territories of their respective groups. The applicant chose to refine the ethnographic literature review to look at the archaeology and the known ethnographic construction and use of rock art, and rock feature sites such as rock alignments, rock rings, and rock cairns, and to look at known construction methods of ethnographic architecture and features. The second part of the background research in the protocol requests that the applicant contact cultural resource managers, cultural resource management consultants, and archaeological scholars of the Great Basin and of the Southwest to inquire whether ISEGS-01 represents a familiar site type and to solicit professional opinions as to its origin and use. The applicant ultimately chose to augment the background research with additional archival research into the archaeological site types that have been found in mountain ranges near the project area, and into early and more recent historic accounts of exploration, travel, and economic activity in and around the project area of analysis, the purpose of both efforts being to try and locate cultural resources similar to ISEGS-01 to facilitate its interpretation. The applicant conducted the background research under the protocol during September and October, 2008. The sources that the applicant used for the research include the following paper and electronic-format media, repositories, and individuals:

- Russell Crowe's 1903 *Miner's Map of Death Valley and the Proposed Salt Lake Railroads,* SBAIC
- J. Harold Barnun's 1911 *Map of San Bernardino County,].S. Bright Surveyor,* SBAIC
- 1917 *Part of the Mohave Region Relief Map,* SBAIC
- 1932 *Blackburn's Map of San Bernardino County,* SBAIC

- 1955 *Roach Lake* 15' USGS quadrangle topographic map, University of Alabama, Historical Maps, electronic resource, http://alabamamaps.ua.edu/index.html
- 1968 *State of California Map, Southern Half,* University of Alabama, Historical Maps, electronic resource, http://alabamamaps.ua.edu/index.html
- Dennis G. Casebier's 1987 *Guide to the Mojave Trail*, SBAIC
- Brigadier General, A.A. Humphreys, Chief of Engineers, 1872, *Preliminary Report Concerning Explorations and Survey, Principally in Nevada and Arizona,* Washington D.C., Government Printing Office
- George Montague Wheeler, 1876, *Annual Report on Geological Exploration and Surveys West of the 100th Meridian,* Washington D.C., Government Printing Office
- Clarence King, 1877, *Report of the Geological Exploration of the 40th Parallel-Made by Order,* Washington D.C., Government Printing Office
- George M. Wheeler, First Lieutenant, Army Corps of Engineers, 1879, *Report upon United States Geographical Surveys West of the One Hundredth Meridian, Volume VII-Archaeology,* Washington D.C., Government Printing Office
- George M. Wheeler, Army Corps of *Engineers, 1901, Preliminary Report Concerning Explorations and Surveys Principally in Nevada*, Washington, D.C., Government Printing Office
- Samuel S. Gannett, 1903, Department of the Interior (DOI) United States Geographical Survey (USGS), *Results of the Primary Triangulation and Primary Traverse, Fiscal Year 1902–1903,* Washington D.C., Government Printing Office
- State of California Mine and Mining Claims database, SBAIC
- WorldCat, http://www.worldcat.org/
- JSTOR, www.jstor.org/
- Anthropology Plus, http://www.oclc.org/support/documentation/firstsearch/databases/dbdetails/details/AnthropologyPlus.htm
- ArticleFirst, http://www.oclc.org/support/documentation/FirstSearch/databases/dbdetails/details/ArticleFirst.htm
- AntroSource, http://www.aaanet.org/publications/anthrosource/
- Science Direct, http://www.sciencedirect.com/
- University of California-Irvine Library
- California State University-Long Beach Library
- Orange County Public Library
- Orange Library
- California State University-Fullerton, Pollack Library
- Newport Beach Public Library, Newport Beach
- Los Angeles Public Library Photo Collection, Los Angeles Public Library
- Dianne Winslow, Director, Harry Reid Center for Environmental Studies, Las Vegas
- Jeffrey R. Wedding, Archaeologist, Harry Reid Center for Environmental Studies, Las Vegas
- Robert R. Reynolds, Paleontologist, LSA Associates, Inc., Irvine
- Roderick McLean, Archaeologist, LSA Associates, Inc., Irvine

- James Cleland, Archaeologist, EDAW, San Diego
- Robin Laska, Acting Coordinator, CHRIS San Bernardino Archaeological Information Center, Redlands
- Albert Knight, Archaeologist, Southern California rock art consultant
- Dr. M.C Hall, Coordinator, CHRIS Eastern Information Center, Riverside
- Carrie Simmons, BLM, El Centro Field Office, El Centro
- James Shearer, BLM, Barstow Field Office, Barstow
- Wanda Raschkow, BLM, Palm Springs Field Office, Palm Springs
- Eric Ritter, BLM, Redding Field Office, Redding
- Susanne Rowe, BLM, Las Vegas Field Office, Las Vegas
- John Murray, BLM, California Desert District, Moreno Valley

The "Field and Laboratory Investigations" portion of the ISEGS-01 Evaluation Protocol requests that the applicant conduct a phased investigation of the site. The phases of the investigation were to include

1) a close field examination of the site and the site vicinity, including visual inspection for artifacts, cultural manuports, and ecofacts,
2) appropriate geophysical inspections of site features and the site vicinity to ascertain the presence of ferrous metal objects or other subsurface anomalies,
3) an examination of the rock features on the site to ascertain the material composition of the features, feature construction methods apparent in the placement patterns of individual feature rocks, and the apparent relative age of the features as may be discerned by the differential development of patination and varnish, or of organism growth on feature rocks, and,
4) if the results of the above examinations and inspections proved to be inconclusive, test excavations of individual archaeological features on the site to ascertain the presence or absence of cultural residues.

The protocol also lays out a specific suite of excavation and sampling techniques that were to be used in the event that test excavation was determined to be warranted.

The archaeologists for the applicant implemented the field investigation portion of the protocol at ISEGS-01 on September 2 and 4, 2008. The close field inspection of the site and the site vicinity was apparently a tight visual scour of those areas and included the use of reflected sunlight to examine a group of constructed rock niches on the site. The geophysical inspection of the site was conducted with a Fisher Model M-96 metal detector. The entire site and all of the site features were swept with the detector, as was the level ground around the site. The applicant chose to make relative age determinations the focus of the examination of the rock features on the site. The examination took into account three different potential indices of the relative age of the site—the origin and apparent age of the quartzite rock that composes part of one terrace pavement, the degree of weathering of the constituent rocks in the rock features of the site, and the development of desert pavements on site rock terraces. To execute the examination of the features, close observations and notes were made of the color, shape, orientation, and relative distribution of the rocks that make up the features and of the rocks that form pavements on the site terraces.

Results

The results of the implementation of the ISEGS-01 Evaluation Protocol are, unfortunately, inconclusive. The background research on and the field investigation of the site are unable to reliably associate it with any particular time period, or any particular archaeological, ethnographic, or historic culture. The origin of the site, the character of its use, and its age, from an *archaeological* perspective, are enigmatic.

Background Research and an Interpretative Context for ISEGS-01

The background research for ISEGS-01, though relatively comprehensive, was largely unproductive. Additional archival research into the archaeological site types that have been found in mountain ranges near the project area and into early and more recent historic accounts of exploration, travel, and economic activity in and around the project area of analysis did not reveal or suggest any cultural resources that closely resemble ISEGS-01. Examinations of records for prehistoric and historic archaeological sites in the Spring and Lucy Gray mountain ranges and the State Line Hills in Nevada, and the Clark, Ivanpah, and Mescal mountain ranges in California, in a 15 to 20-mile radius around the project area found a total of 14 archaeological sites with constructed rock features. Seven of the 14 sites are unambiguously historic, one is unambiguously prehistoric, and the age of the other six is indeterminate. The historical archaeological sites include two mining sites with adits, a shaft, prospect pits, tailings, rock cairns, and historic refuse, two apparent ruins of dry-stacked masonry structures, two sites with a circular rock feature, two rock alignments of different forms and historic refuse, and one rock cairn with historic refuse. The prehistoric site has two rock alignments, a circular rock feature, a cleared area, a small dugout, a rock pile, and chipped and ground stone tools. The archaeological sites of indeterminate age include four sites with a circular rock feature, two rock alignments, a rock-lined dirt mound, and a small concentration of basalt cobbles, one apparent ruin of a dry-stacked masonry structure, and a “C”-shaped dry-stacked rock feature measuring 75 to 125 centimeters in height with a small (~ 1 m) square vestibule adjacent to it.

The review of both early and more recent historic accounts of exploration, travel, and economic activity in and around the project area of analysis reaffirms the broader outlines of the historic context of the project area, but does not provide more focused insight into the possible origin, function, or age of ISEGS-01.

Consultation with public sector cultural resource managers, cultural resource management consultants, and archaeological scholars also did not help interpret ISEGS-01. A number of those consulted thought that the absence of obvious eolian deposits on the site and the apparent lack of embeddedness[12] in the archaeological features of the site indicate a more recent timeframe for the construction of the site. Professional opinion on the character of the site spans a diverse range. Some see a connection to Native American shamanism in the panoramic view that the site commands and in the relatively abundant presence of quartzite on the site. Others

[12] Embeddedness describes the degree to which fine sediments surround coarse substrates on the surface of the landscape. A well-embedded archaeological feature is one where the voids or the interstices between the rocks that compose a feature are completely filled with fine sediment, and the character of the articulation of the feature with the surface of the landscape is similarly masked by fine sediment.

thought that the site features may be related to historic land surveying efforts in the region. A further opinion is that the site features may be the result of recent or historic boredom. The thought is that historic or recent miners, prospectors, or those accompanying them, or military personnel on training missions may have constructed the features for lack of anything else to do.

Neither the review of the archaeological and ethnographic literature relating to rock art and rock feature sites nor the review of Southern Paiute, Chemehuevi, or Mojave architecture and construction methods found any information that could reliably be used to interpret the individual features of ISEGS-01 or the site as a whole.

Field Investigation of ISEGS-01

Given that the background research did not yield information substantive to the interpretation of ISEGS-01, the field investigation of the site offers the only objective source of data to develop our understanding of it.

The initial step in the field investigation of ISEGS-01 was the close field inspection of the site. The site was found to include five dry-stacked rock features and feature complexes (Features A–E) (Cultural Resources Figure 2 and Plate 2) arranged on either side of the crest of the tiny inselberg directly south of the larger eastern portion of the Precambrian metamorphic inselberg complex, which is east of the Ivanpah No. 3 project site boundary. The feature complexes include an eastern and western set of rock-faced terraces. The eastern terrace complex (Feature B) abuts a bedrock outcrop along the crest of its host inselberg and includes what appear to be a constructed rock bench and three constructed stone niches. There is a rock upright incorporated into the face of one of the terraces in the complex, and part of the surface of the fill of the terrace immediately beneath the upright is a jumbled pavement of angular quartzite cobbles. There are differences in the observations of the applicant and of Energy Commission staff as to the precise number and configuration of the site features, but the western terrace complex (Feature D) appears to include two or three terraces, while the eastern terrace complex appears to include four terraces. There are three additional rock features on the site. To the north-northeast of the eastern terrace complex, there is a stand-alone, triangular rock-faced feature (Feature A) with a fill of angular cobbles of the local metamorphic rock. To the east-southeast of the eastern terrace complex, there is what the applicant refers to as the “three-tiered rock feature” (Feature E). The feature appears to be a contiguous series of four, small, roughly square, rock-faced terraces. To the south-southeast of the eastern terrace complex, there is what the applicant refers to as the “dry-stacked rock wall” (Feature C). The feature is relatively short in length and presently measures approximately 50 to 60 centimeters in height. The applicant notes that a portion of the wall appears to have collapsed.

The field inspection of ISEGS-01, its constituent rock features, and the near-vicinity found no artifacts that could be unambiguously associated with the construction or use of the site. No portable material culture objects of any type were found in or among the site features. A sparse scatter of historic artifacts was found in a range of five to 15 meters from the site. Those artifacts include a fragmentary “7-Up” soda bottle that the archaeologists for the applicant date to the 1970s, colorless glass fragments that the

archaeologists for the applicant interpret as beverage bottle fragments, and a recent shotgun shell casing.

The geophysical prospection of ISEGS-01 with the Fisher Model M-96 metal detector produced no signals that would indicate the potential presence of metallic debris.

The examination of the rock features of ISEGS-01 for potential indices of the relative age of the site concludes that the probable time of its construction ranges somewhere from the very late or terminal prehistoric period to the early historic period. The examination took into account three different potential indices of the relative age of the site—the origin and apparent age of the quartzite rock that composes part of one terrace pavement, the degree of weathering of the constituent rocks in the rock features of the site, and the development of desert pavements behind site rock terraces. The archaeologists for the applicant found that the origin of the quartzite rock that makes up the jumbled pavement of angular cobbles on one of the terraces of Feature B is a wide ($\leq$ 3 m) vein of quartzite approximately 30 meters to the northeast of the site. The vein has apparently been subject to mechanical prospection with heavy equipment. A comparison of the degree of weathering of the quartzite in the pavement versus the quartzite in and around the vein, in particular, the degree of discoloration and the shape of the rock, demonstrates that the quartzite that makes up the pavement was extracted from the vein prior to its mechanical prospection. There is a much higher incidence (30%) of the quartzite in the pavement being discolored from long-term weathering, of becoming reddened over time, than there is in the quartzite from the vein (4%). As the discoloration of the quartzite occurs primarily 5–10 centimeters below the surface of the vein, much of the quartzite for the pavement appears to have been gathered prior to the removal of that weathered zone by the mechanical prospection. The archaeologists also noted that the quartzite of the terrace pavement and the quartzite in and around the vein were similarly angular in shape. The quartzite of the pavement does not appear to have been exposed for the many hundreds or thousands of years that would typically be necessary to dull and round the sharp edges of the pavement cobbles.

The examination of the degree of weathering of the constituent rocks in the rock features of ISEGS-01 suggest that the features were constructed decades to centuries ago, but not millennia. The constituent rock of the rock features is predominantly the Precambrian metamorphic rock that composes the inselberg that hosts ISEGS-01 and that is found as the major component of the colluvium that mantles the inselberg. The metamorphic rock of the colluvium was presumably the source of the rock used to construct the site features. The slab- or tabular-shaped rocks are typically partially buried or seated in the inselberg's colluvial matrix of finer sediment, and, over time, the colluvial rock is subject to processes of weathering. The exposed portions of the rock are subject to physical and chemical weathering from the sun, rain, and dilute botanical acids, while the buried portions of the rock are subject to processes of pedogenic alteration that include oxidation or reddening of rock surfaces and the slow accumulation of a $CaCO_3$ rind. Rock that was dislodged from the surface of the inselberg to construct the features on ISEGS-01 would originally have had one side, the exposed side, almost black from the development of rock varnish and the other side, the buried side, a patchwork of deep red staining and beige $CaCO_3$ crust. Over time, the exposure of the rock in the constructed features to the elements slowly washes the red

staining and dissolves the $CaCO_3$ until ultimately, neither are apparent. The archaeologists for the applicant quantified the amount of rock in features A and B where red staining was apparent and found that, generally, the number of rocks that had no red staining was greater than would be anticipated if the features were relatively newly constructed. The archaeologists interpreted the degree of red staining found to indicate, grossly, that the features have been in place for decades to centuries.

A final examination was made of the degree to which desert pavements have developed on the flat surfaces or treads of the terraces that are parts of features B and E, and the surface of feature A. Desert pavements that have developed over thousands of years come to exhibit a suite of characteristics that include the progressive leveling of the land surface, the reduction in the size of constituent pavement rocks due to fracturing, the loss of sharp edges on constituent pavement rocks, the progressive darkening of pavement rock as a deeper rock varnish develops, and the progressive accumulation of fine silt among and beneath the surface rock that forms the desert pavement. The archaeologists for the applicant documented the degree to which the terrace treads of features B and E, and the surface of feature A displayed these characteristics and found that, while there was a noticeable accumulation of silt beneath the subject surfaces, the accumulation was relatively slight. The archaeologists found, in consideration of the broader suite of desert pavement characteristics, that the pavements on features A, B, and E were incipient phenomena, not representing thousands of years of development.

The archaeologists for the applicant found, in consideration of the total complement of the field examinations of ISEGS-01, that the construction of the site most likely dates to somewhere from the very late or terminal prehistoric period to the early historic period, and were unable to establish the cultural identity of the people who built the site. The character of the partial quartzite pavement on feature B, the degree of $CaCO_3$ rind removal and the relative loss of red staining on constituent rocks of the rock features on the site, and the incipient character of desert pavement development on those features are the evidentiary basis for the interpretation of the age of the site. The absence of metallic or other artifacts or cultural residues that are clearly associated with the construction or use of the site, and construction techniques and architectural forms that are presently indistinct make it difficult to attribute the site to any particular group of people.

There are a number of aspects of the ISEGS-01 Evaluation Protocol that the applicant did not address that warrant consideration. The protocol requests (“Consultation with Regional Experts” subsection) that the applicant contact and solicit the professional opinions of experts in the archaeology of both the Great Basin and the Southwest. The rock features on the site, several of which resemble agricultural features, are not common archaeological forms in either California or many parts of the Great Basin. The forms may be more common in the eastern and southern Great Basin and in the Southwest or resemble other forms found there. It does not appear that any of the professionals that the applicant contacted are experts in Southwest archaeology generally or prehistoric agriculture in the Southwest, more particularly. Consultation with experts in these areas may have been useful to the interpretation of the site.

The ISEGS-01 Evaluation Protocol also requests that the applicant examine the rock features of the site to ascertain what the feature construction methods were. The

applicant chose to focus on questions of the relative age of the features to the exclusion of considerations of how the features were built, the potential functions of the individual feature types, or how, potentially, the functions of the feature types may articulate the overall use of the site.

ISEGS-01 appears to be an odd grouping of agricultural and non-utilitarian features on a relatively inhospitable knoll in the Mojave Desert, a grouping that does not appear to be typical of California or Great Basin prehistory. The long, narrow, rock-faced terrace series of features B and D appear similar to hillslope agricultural terraces known prehistorically for many parts of the world and still widely in use today. Referring to Energy Commission staff photographs from the May 23, 2008 pedestrian reconnaissance survey of the project area inselbergs, the terrace series of features B and D exhibit attributes that evidence the purposive construction of features to impound sediment. While the one to four courses of jumbled boulders and cobbles that appear to typically compose the single-faced terrace facades convey a sense that terrace construction was expedient, the facades appear to be relatively sound and they appear to be purposively backed, on the upslope face, by a layer of cobbles and gravels. Such a layer is common in agricultural terrace construction, with the purpose of helping to impound the sediment behind the terrace facade so that the sediment is less likely to erode downslope through the terrace face. Whether the terrace fill that the archaeologists for the applicant describe as typically being a silty, clast-supported matrix would support or inhibit plant growth is unknown.

What appear to be non-utilitarian features are found in and among the terrace series of ISEGS-01. There is the stand-alone, triangular rock feature, feature A, that essentially forms a small rock platform. The construction method of the facade of the feature appears to parallel that of the terrace series, while the fill of the feature appears, on the basis of the photographs in the confidential technical memorandum of December 5, 2008, to be primarily angular cobbles of the local metamorphic rock. Other apparently non-utilitarian features include the rock upright that abuts the partial quartzite pavement on one of the terraces in the feature B terrace series, the quartzite pavement itself, the apparent bench feature which abuts the bedrock outcrop upslope and west of feature B, and the three constructed rock niches built into that same bedrock outcrop. A further anomalous feature is the apparent remnant, dry-stacked rock wall, feature C.

ISEGS-01 is certainly enigmatic. There is presently no reliable *archaeological* means to verify or refute the character of the use of the site. Among innumerable other potential interpretations for the site, Energy Commission and BLM staff wonder whether it may be a late prehistoric or early historic Native American traditional use area, more specifically, a site the use of which may have been ritual in character. The points that staff would offer in support of this interpretation are the location of the site on a landform that is inhospitable and would appear to represent the economic periphery of the geography of any people, the presence of the set of the non-utilitarian features above, and the presence of what appear to be agricultural terraces that, while utilitarian in form and construction, are of a scale too small to produce substantive food resource yields, a scale that may indicate the purpose of the terraces is more symbolic than economic. The purpose of the terraces may have been to represent or symbolize agriculture to the users of the site rather than to actually have been used to conduct agriculture.

Whatever the use of ISEGS-01 may have been, Energy Commission and BLM staff only hope that the present inability of our discipline to readily attribute the site to a particular group of people or to a certain span of time does not constrain our willingness to openly face the question of its history.

Archaeological Resources

One archaeological resource, ISEGS-01 is now known to be present in the project area of analysis. The results of the investigation to gather information to evaluate the historical significance of the archaeological site are found in the "Investigation to Evaluate Archaeological Site ISEGS-01" subsection above. A summary of the information from the subsection is provided here as a brief context for the staff recommendation on the eligibility of the resource for listing in the CRHR.

ISEGS-01 is an archaeological site that includes five dry-stacked rock features and feature complexes arranged on either side of the crest of the tiny inselberg directly south of the larger eastern portion of the Precambrian metamorphic inselberg complex, which is east of the Ivanpah No. 3 project site boundary. The feature complexes include eastern and western sets of relatively long, rock-faced terraces, another contiguous series of four, small, roughly square, rock-faced terraces, a stand-alone, triangular rock-faced feature with a fill of angular cobbles of the local metamorphic rock, and a remnant dry-stacked rock wall.

The field inspection of ISEGS-01, its constituent rock features, and the near-vicinity found no artifacts that could be unambiguously associated with the construction or use of the site. No portable material culture objects of any type were found in or among the site features. A sparse scatter of three historic artifacts was found in a range of five to 15 meters from the site.

The investigation of ISEGS-01 was unable to conclusively establish the age or the cultural identity of the builders or users of the site. Neither the review of the archaeological and ethnographic literature relating to rock art and rock feature sites nor the review of Southern Paiute, Chemehuevi, or Mojave architecture and construction methods found any information that could reliably be used to interpret the individual features of ISEGS-01 or the site as a whole. The geophysical prospection of the site and site vicinity with a metal detector produced no signals that would indicate the potential presence of metallic debris. Geoarchaeological examinations of the rock features of ISEGS-01 for potential indices of the relative age of the site conclude that the probable time of its construction ranges somewhere from the very late or terminal prehistoric period to the early historic period. The archaeologists for the applicant were ultimately unable to establish the cultural identity of the people who built the site. Among innumerable other potential interpretations for the site, Energy Commission and BLM staff speculate whether it may be a late prehistoric or early historic Native American traditional use area, more specifically, a site the use of which may have been ritual in character.

Given that ISEGS-01, notwithstanding the thorough investigation and consideration of the resource, cannot be associated with events that have made a significant contribution to the broad patterns of our history or with the lives of persons significant in

our past, that it cannot be associated with or said to embody the distinctive characteristics of a type, period, or method of construction, that it cannot be associated with or said to represent the work of a master, or possess high artistic values, and that it has not yielded, and is not likely to yield, information important to prehistory or history, the BLM determines that the site does not meet any of the criteria for inclusion on the NRHP. Energy Commission staff recommends that the Energy Commission, as lead agency and pursuant to Title 13, Public Resources Code, section 21084.5, determine that ISEGS-01 is not eligible for listing in the CRHR.

The results of the evaluation of the historical significance of ISEGS-01 constitute a relatively unusual circumstance where the resource is being recommended as not eligible for listing in either the NRHP or the CRHR, because the site cannot be reliably associated with any time period, or any archaeological, ethnographic, or historic culture. Energy Commission and BLM staff would like to note here that this circumstance does not necessarily mean that the archaeological site is not, in a more objective sense, historically significant. It is plausible that further future investigation of the resource may ultimately establish the associations necessary to conclude a definitive evaluation of its place in prehistory or history. State and Federal regulatory historic preservation programs have a defined reach, and ISEGS-01 appears to be beyond the present regulatory reach of CEQA, NEPA, and the NHPA. The consideration of the resource in the present analysis well demonstrates the due diligence of the applicant for the proposed project, and of BLM and Energy Commission staff to fulfill the obligations of our joint regulatory processes. Others in the public will hopefully be able to invoke alternate State and Federal historic preservation programs in the future to ensure the preservation of ISEGS-01 until it is better understood.

Ethnographic Resources

No CRHR-eligible ethnographic resources have yet been found in the project area of analysis.

Built Environment Resources

Three built-environment resources are now known to be present in the proposed project area. They include the Hoover Dam-to-San Bernardino transmission line (CA-SBR-10315H), a dismantled, early-to-mid-twentieth-century telephone line and an unimproved, two-track dirt road that parallels it (CA-SBR-12574H), and an approximately 1,200-foot -long segment of a faint, unimproved two-track dirt road (CA-SBR-12575H).

Additional consideration is given here to the presence and the historical significance of a discontiguous, multi-element resource, the Hoover Dam-to-San Bernardino transmission facility, which incorporates the material elements that are critical for the resource to transmit electricity.

Hoover Dam-to-San Bernardino Transmission Line (CA-SBR-10315H)

The Hoover Dam-to-San Bernardino transmission line (CA-SBR-10315H) continues in operation today as the Eldorado-Baker-Coolwater-Dunn Siding-Mountain Pass 115-kV transmission line. The line trends approximately northeast to southwest between the proposed Ivanpah No. 1 and No. 2. The typical structures that make up the transmission

line are metal, H-frame, riveted, latticed masts and metal crossbeams. The design specifications for the H-frame structures call for the masts to be 17 feet apart and 52 feet tall. The crossbeams that span each pair of masts are approximately 34 feet in length and carry three transmission cables. Only one of the H-frame structures in the project area appears to have been replaced since the original construction of the line. The replacement structure has wooden masts and a wooden crossbeam (pp. 12–14, Solar Partners I et al. 2008f).

Southern Sierras Power Company, a wholly-owned ally company of the Nevada-California Power Company, began construction of the original 132-kV Hoover Dam-to-San Bernardino transmission line in 1930 in BLM Right-of-Way (ROW) Grant No. R 01730 (p. 7, Solar Partners I et al. 2008f). The 225-mile-long line was completed in 1931 in a record 225 days. The original purpose of the line was to carry electricity from the City of San Bernardino to the construction site for Hoover Dam. The line was reversed in August of 1937 to carry electricity back to San Bernardino from Unit A-8, a 55,000-h.p., 40-MW hydroelectric turbine, at Hoover Dam. A telephone line, CA-SBR-12574H, was built in 1931 approximately 3,000 feet to the southeast of the transmission line, also inside the bounds of ROW Grant No. R 01730, to facilitate operational communications along the transmission line (pp. 7, 10, Solar Partners I et al. 2008f).

The BLM and the California State Historic Preservation Officer (SHPO) concluded a consensus determination for the Hoover Dam-to-San Bernardino transmission line on October 22, 1993, as part of a consultation under Section 106 of the National Historic Preservation Act (California Office of Historic Preservation File Nos. ADOE-36-93-007-00 and BLM841127R) (confidential appendix 5.3C, BSE2007a,). The BLM and the SHPO agreed that the resource was individually eligible for inclusion in the NRHP under Criterion A due to its association with the construction of Hoover Dam, and the role of Hoover Dam in the development of the energy industry in the West (p. 9, Solar Partners I et al. 2008f). Under Title 14, California Code of Regulations, section 4851, subdivision (a)(1), the transmission line is on the CRHR as a result of the above consensus determination.

The BLM here determines that CA-SBr-10315H retains sufficient integrity and is individually eligible for inclusion on the NRHP under Criterion A. In addition, the resource is potentially eligible under Criterion C.

Energy Commission staff believes that the preponderance of the available evidence argues against the eligibility of the Hoover Dam-to-San Bernardino transmission line for the CRHR as an individual resource. The transmission line is one element of a transmission facility that now includes the transmission line, the remnants of the original 1931 telephone line (CA-SBR-12574H), microwave signal transmitters, and control mechanisms such as the transformers, switches, and circuit breakers that are integral parts of electric substations. The transmission line, the control mechanisms, and one form of communication system are each critical to the operation of the transmission facility. The facility, absent any one of the critical elements, cannot sustain the function of the facility. The Hoover Dam-to-San Bernardino transmission facility, as a composite resource, appears, in turn, to be more appropriately considered as an element of a potential Hoover Dam Historic District, one aspect of the eligibility of which would be, under CRHR Criterion 1, the association that the potential district has as the major

source of the generation and distribution of electric power for the Southwest and parts of California during the first half of the twentieth century, electric power that was critical to industrial and agricultural development, and to the urbanization of the region during that period. Absent the association that the Hoover Dam-to-San Bernardino transmission facility would have with a potential Hoover Dam Historic District, the transmission facility would not appear to be CRHR-eligible under any of the other CRHR criteria. Energy Commission staff therefore recommends that the Hoover Dam-to-San Bernardino transmission line is not eligible for listing in the CRHR as an individual or stand-alone resource, because it is only one element of a multi-element resource. Staff further recommends that the transmission line be considered one element of a single, discontiguous resource, the Hoover Dam-to-San Bernardino transmission facility, which includes, but is not limited to, the transmission line and the original 1931 telephone line, and which is also not eligible for listing in the CRHR as an individual or stand-alone resource because the resource is not historically significant absent its association with Hoover Dam. Staff provides recommendations on the CRHR eligibility of the transmission facility, as a contributing element to a potential Hoover Dam Historic District, below.

CA-SBR-12574H

CA-SBR-12574H is a dismantled telephone line and a parallel, unimproved, two-track dirt access or service road. Only a portion of the resource appears to have been recorded in the project area, an approximately 2,200-foot long segment through the northwestern quadrant of Ivanpah No. 1. The telephone line and the road trend approximately northeast to southwest. Both elements of the resource are traceable in aerial photographs east of Interstate Route 15 and out across Ivanpah Valley.

The telephone line is now a line of wooden utility pole bases that have been cut off approximately 6–12 inches above the present surface of the project area. There is an assemblage of artifacts from the downed line among the pole bases. The assemblage includes a few of the downed cedar poles, which appear to have originally been 25 feet tall with hardware consisting of metal nuts and bolts, metal brackets or plates, metal cable, wooden cross beams, and glass insulators. The insulators (McLAUGHLIN No. 19 and HEMINGRAY–42) indicate a date range for the construction of the telephone line sometime from 1920 to 1967.

The approximately ten-foot-wide, two-track dirt road is about ten feet northwest of and parallel to the telephone line. Ephemeral stream channels appear to dissect the road in a number of places along the recorded road segment.

No other artifacts, beyond the parts of the utility line, were found in association with either element of the resource (DPR 523 series forms, Fergusson 2007).

The telephone line and the dirt access road were built in 1931 under BLM ROW Grant No. R 01730 by the Interstate Telegraph Company, a subsidiary of the Nevada-California Electric Corporation, for the apparent sole purpose of facilitating private transmission line communications along the Hoover Dam-to-San Bernardino transmission line (p. 7, Solar Partners I et al. 2008f). The CRHR eligibility of the resource, the telephone line and the access road together, is considered here as a

stand-alone resource, above as a critical element of the stand-alone Hoover Dam-to-San Bernardino transmission facility, and, below as a critical element of the Hoover Dam-to-San Bernardino transmission facility, itself a contributing element of a potential Hoover Dam Historic District. Given the resource's obvious loss of integrity of design, materials, and workmanship, staff recommends that the Energy Commission, as lead agency and pursuant to Title 13, Public Resources Code, section 21084.5, determine that the portion of CA-SBR-12574H in the project area would not contribute to the CRHR eligibility of the stand-alone resource, as a whole, if it were ever found to be so eligible. The BLM concurs and agrees that the portion of CA-SBR-12574H in the project area does not contribute to the eligibility of the line, as a whole, as a stand-alone resource, to the NRHP.

Hoover Dam-to-San Bernardino Transmission Facility

The Hoover Dam-to-San Bernardino transmission facility now includes, potentially, the Hoover Dam-to-San Bernardino transmission line (CA-SBR-10315H), the remnants of the original 1931 telephone line (CA-SBR-12574H), microwave signal transmitters, and control mechanisms such as the transformers, switches, and circuit breakers that are integral parts of electric substations. To date, there is documentation of the transmission line and the portion of the original telephone line in the project area. Energy Commission staff recommends both the transmission line and the telephone line as not eligible for listing in the CRHR, as stand-alone resources, and further recommends the subject transmission facility, as a stand-alone resource, as not eligible (see above). The question remains whether the facility may be eligible for listing either in the NRHP or the CRHR as a contributing element to a potential Hoover Dam Historic District. The BLM determines that the Hoover Dam-to-San Bernardino transmission facility (CA-SBR-10315H, CA-SBR-12574H, and associated construction camps known to occur along portions of the length of the transmission line) constitutes a contributing element to a potential Hoover Dam Historic District. Energy Commission staff recommends that the transmission facility is not eligible for listing in the CRHR as a contributing element to a potential Hoover Dam Historic District, because the facility does not retain its ability to convey its historical significance. The transmission facility lacks integrity of design, materials, workmanship, and association, because one critical element of the resource, the original 1931 telephone line, has been dismantled. The sustained operation of the transmission facility would not have been possible without the telephone line, so the property is no longer able to adequately convey the sense of how it functioned during most of its apparent period of significance, 1931–1958.

CA-SBR-12575H

CA-SBR-12575H is a faint segment of an unimproved, two-track dirt road that appears to have been abandoned for a while. Only a portion of the road in the project area, an approximately 1,200-foot-long segment through the northwestern quadrant of Ivanpah No. 1, was recorded. The approximately eight-foot-wide dirt road trends roughly east-southeast to west-northwest. The western end of the road continues on out of Ivanpah No. 1 toward the Clark Mountain Range, while the eastern portion of the road becomes progressively more difficult to trace as ephemeral stream channels obliterate the road tracks. No artifacts were found in direct association with the road (p. 5.3-20, BSE2007a; p. 19 and DPR 523 series forms, Fergusson 2007).

Given that the resource cannot be associated with events that have made a significant contribution to the broad patterns of our history or with the lives of persons significant in our past, that it does not embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic values, that it has not yielded, and is not likely to yield, information important to history, and that the resource does not retain integrity of design, workmanship, feeling, or association, staff recommends that the portion of the resource in the project area would not contribute to the CRHR eligibility of the road, as a whole, if it were ever found to be so eligible. BLM determines that the site does not meet any of the criteria for eligibility for listing on the NRHP.

Summary of NRHP- or CRHR-Eligible Resources for the Ivanpah SEGS Project

There presently appears to be one cultural resource in the proposed project area that is NRHP- and CRHR-eligible, i.e., that is a historical resource for the purposes of CEQA. This is the Hoover Dam-to-San Bernardino transmission line (CA-SBR-10315H). The potential impact of the project on this resource and a proposal to mitigate that impact are developed below.

DIRECT/INDIRECT IMPACTS AND MITIGATION

In the abstract, direct impacts to cultural resources are those associated with project development, construction, and co-existence. Construction usually entails surface and subsurface disturbance of the ground, and direct impacts to archaeological resources may result from the immediate disturbance of the deposits, whether from vegetation removal, vehicle travel over the surface, earth-moving activities, excavation, or demolition of overlying structures. Construction can have direct impacts on historic standing structures when those structures must be removed to make way for new structures or when the vibrations of construction impair the stability of historic structures nearby. New structures can have direct impacts on historic structures when the new structures are stylistically incompatible with their neighbors and the setting, and when the new structures produce something harmful to the materials or structural integrity of the historic structures, such as emissions or vibrations.

Generally speaking, indirect impacts to archaeological resources are those which may result from increased erosion due to site clearance and preparation, or from inadvertent damage or outright vandalism to exposed resource components due to improved accessibility. Similarly, historic structures can suffer indirect impacts when project construction creates improved accessibility and vandalism or greater weather exposure becomes possible.

Ground disturbance accompanying construction at a proposed plant site, along proposed linear facilities, and at a proposed laydown area has the potential to directly impact archaeological resources, unidentified at this time. The potential direct, physical impacts of the proposed construction on unknown archaeological resources are commensurate with the extent of ground disturbance entailed in the particular mode of construction. This varies with each component of the proposed project. Placing the proposed plant into this particular setting could have a direct impact on the integrity of association, setting, and feeling of nearby standing historic structures.

Proposed Project—Construction Impacts and Mitigation

Identification and Assessment of Direct Impacts on Archaeological Resources and Proposed Mitigation

Archaeological Resources on the Surface of the Project Site

No NRHP- or CRHR-eligible prehistoric or historical archaeological resources are now known to be on the surface of the project site. Given the thorough investigation of the surface of the project site for the present analysis and the dearth of archaeological resources found, it appears to be highly improbable that the construction-related ground disturbance of the project would directly impact surface archaeological resources that would qualify as historical resources under CEQA.

Buried Archaeological Resources in the Project Site

No properties eligible for inclusion on the NRHP or CRHR-eligible archaeological resources are now known to be beneath the surface of the project site. On the basis of the results of the geoarchaeology study above (pp. 9–18, CH2ML2008b), it is highly improbable that the construction-related ground disturbance of the project, on the portions of the project site where deep (> 1 meter) ground disturbance would occur, would directly impact buried archaeological resources that would qualify as historical resources under CEQA.

Identification and Assessment of Direct Impacts on Ethnographic Resources

No NRHP- or CRHR-eligible ethnographic resources are known to be on the project site or in the project area of analysis. On the basis of the results of the literature and records search and the helicopter and pedestrian reconnaissance survey above and Native American consultation, to date, it presently appears unlikely that construction-related ground disturbance for the project would directly impact ethnographic resources that would qualify as historical resources under CEQA.

Identification and Assessment of Direct Impacts on Built-Environment Resources and Proposed Mitigation

One NRHP-eligible and CRHR-listed built-environment resource, the Hoover Dam to San Bernardino transmission line (CA-SBR-10315H) is on the project site. The effects of the proposed project on the subject transmission line have been found to be cumulative in character, rather than the direct result of the construction, operation, maintenance, closure, and decommissioning of the project (see “Cumulative Scenario” and “Cumulative Impacts and Mitigation” subsections, above and below). No other built-environment resources that qualify as historical resources under CEQA are known on the project site, and there is virtually no chance, given the stark visual presence of built-environment resources, that new, unknown ones will be found.

Proposed Project—Indirect Impacts

Neither the applicant nor staff has identified any indirect impacts to any CRHR-eligible resources in the project area of analysis. Staff believes, therefore, that mitigation for indirect impacts is not necessary for the proposed project.

Proposed Project—Operation Impacts and Mitigation

Staff does not believe that the operation of the proposed power plant would impact any CRHR-eligible resources in the project area of analysis. Any reasonably foreseeable task that the applicant would perform to operate the facility would not impact CRHR-eligible resources, because no such resources appear to be present on the surface of the project area of analysis and the potential presence of archaeological resources beneath the surface of the project area of analysis is thought to be negligible (see "Cultural Resources Inventory Fieldwork" subsection, above).

As staff does not anticipate the operation of the proposed power plant to impact any CRHR-eligible resources in the project area of analysis, staff does not believe that mitigation is necessary for the operation of the facility.

Proposed Project—Closure and Decommissioning Impacts and Mitigation

Staff does not believe that the closure and decommissioning of the proposed power plant would impact any CRHR-eligible resources in the project area of analysis. Any reasonably foreseeable task that the applicant would perform to close and decommission the facility would not impact CRHR-eligible resources, because no such resources appear to be present on the surface of the project area of analysis and the potential presence of archaeological resources beneath the surface of the project area of analysis is thought to be negligible (see "Cultural Resources Inventory Fieldwork" subsection, above).

As staff does not anticipate the closure and decommissioning of the proposed power plant to impact any CRHR-eligible resources in the project area of analysis, staff does not believe that mitigation is necessary for the closure and decommissioning of the facility.

No Project / No Action Alternative

In the No Project / No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan.

The results of the No Project / No Action Alternative would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project.
- The benefits of the proposed project in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

If this project is not approved, renewable projects would likely be developed on other sites in the Mojave Desert or in adjacent states as developers strive to provide

renewable power that complies with utility requirements and State/Federal mandates. For example, there are three large solar projects proposed on BLM land in Nevada within a few miles of the Ivanpah site. In addition, as of August 2009 there were 66 applications for solar projects covering 611,692 acres pending with BLM in the California Desert District. The No Project/No Action Alternative would not cause any significant impacts to Cultural Resources.

Cumulative Impacts and Mitigation

A project may contribute to a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (Cal. Code Regs., ti. 14, § 15130).

There is the potential for substantial future development in the Ivanpah Valley area and throughout the southern California desert region. The analysis of cumulative impacts here is based on data provided in the following maps and tables (see “Cumulative Scenario” section, above):

Cumulative Impacts Figure 1, Regional Renewable Applications
Cumulative Impacts Figure 2, Regional Renewable Applications (Detail)
Cumulative Impacts Figure 3, Ivanpah Valley Existing and Future/Foreseeable Projects
Cumulative Impacts Table 1, Regional Renewable Energy Projects
Cumulative Impacts Table 2, Existing Development in the Ivanpah Valley
Cumulative Impacts Table 3, Future Foreseeable Projects in the Ivanpah Valley Area.

The analysis in this section first defines the geographic area over which cumulative impacts to cultural resources could occur. The cumulative impact analysis itself describes the potential for cumulative impacts to occur as a result of the implementation of the ISEGS project along with the listed local and regional projects.

Geographic Extent

Cumulative impacts can occur if the implementation of the ISEGS project could combine with the impacts of other local or regional projects. Cumulative impacts would occur locally if ISEGS project impacts combined with the impacts of projects located within the Ivanpah Valley. Cumulative impacts could also occur as a result of the development of some of the many proposed solar and wind development projects that have been, or are anticipated to be, under consideration by the BLM and the Energy Commission in the near future. Many of these projects are located within the California Desert Conservation Area, as well as on BLM land in Nevada and Arizona.

Therefore the geographic extent for the analysis of *local* cumulative impacts is defined as the Ivanpah Valley. The proximity of cultural resources to the ISEGS project would be of interest only to the extent that such proximity would considerably affect the context or integrity of cultural resources. This geographic scope is appropriate because it is likely that cultural resources similar to those in the ISEGS project area of analysis are present throughout this area.

Regional cumulative impacts are those that could occur as a result of the implementation of future solar and wind development projects that are currently proposed on over one million acres of the California Desert Conservation Area, as well as on BLM land in Nevada and Arizona. Therefore, the geographic extent for the analysis of *regional* cumulative impacts is defined as the desert areas of southeastern California, southern Nevada, and western Arizona, as shown on Cumulative Impacts Figure 1 (Regional Renewable Applications).

Cumulative Impact Analysis

Local Projects

The construction, operation, maintenance, closure, and decommissioning of a number of projects presently proposed and under consideration in the Ivanpah Valley area would result in a significant cumulative impact on at least one known historical resource, the Hoover Dam-to-San Bernardino transmission line (CA-SBR-10315H)[13], and may further effect other cultural resources of the types now known for the ISEGS project area. The contribution of the proposed project to the effect of the proposed reconstruction by the Southern California Edison Company (SCE) of approximately 36 miles of the Eldorado leg of the Eldorado-Baker-Coolwater-Dunn Siding-Mountain Pass transmission line, the line which now includes the remaining portion of the original Hoover Dam-to-San Bernardino transmission line, would be cumulatively considerable, and the effect of the subject reconstruction on CA-SBR-10315H would be significant. The reconstruction of the Eldorado leg is found herein, for the purposes of cumulative impact analyses, to be a foreseeable future project that may occur near the proposed project (see "Cumulative Scenario" section above). The subject reconstruction would entail one portion of the Eldorado leg being removed from the proposed project area approximately northeast to the Eldorado Substation. The original proposal of the California Independent System Operator (California ISO) was to reconstruct the removed portion of the line to facilitate a higher transmission capacity of 220 kV (CH2ML2008e, pp. ii–iii). There appears to be other plans to modify the Hoover Dam-to-San Bernardino line, through the project area. The applicant has related that SCE also plans to remove the portion of the transmission line from the project area southwest to the Mountain Pass Substation and to replace it with two, double-circuit, 115-kV pole lines (CH2ML2008m, p. 6). Given that the California ISO assigns approximately 400 MW of the approximately 1,900-MW capacity of the modified transmission line to the proposed project, the contribution of the proposed project to the partial destruction of the Hoover Dam-to-San Bernardino transmission line would be approximately 21

[13] The BLM, pursuant to stipulation V.E.1 of the 2007 *State Protocol Agreement among the California State Director of the Bureau of Land Management and the California State Historic Preservation Officer and the Nevada State Historic Preservation Officer Regarding the Manner in which the Bureau of Land Management Will Meet its Responsibilities under the National Historic Preservation Act and the National Programmatic Agreement among the BLM, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers*, has determined that the status of the transmission line as individually eligible for inclusion in the NRHP, a consensus determination concluded by the BLM and the California State Historic Preservation Officer in 1993, stands. As such, the transmission line remains listed on the CRHR, notwithstanding the recommendation of Energy Commission staff to the contrary (see "Built-Environment Resources" subsection, above), and is a historical resource for the purpose of the present analysis.

percent. Staff proposes to offset this cumulatively considerable portion of the effect of the proposed transmission line reconstruction on CA-SBR-10315H through the implementation of proposed Conditions of Certification **CUL-8** and **CUL-9**, conditions which staff believes are appropriate to the scale and character of the effect of the proposed project on the subject historical resource. The mitigation proposed in Conditions of Certification **CUL-8** and **CUL-9** would consist of the Historic American Engineering Record (HAER) recordation of the tower types and the cabling system of the portion of the Hoover Dam-to-San Bernardino transmission line that traverses the project area. While the proposed mitigation would result in the recordation of significantly less than the approximate 21 percent share of the destruction to which the proposed project would contribute, staff believes that the scope of the mitigation reasonably takes into account the likelihood that the historical resource would undergo HAER recordation as a result of the NEPA analysis that the BLM would conduct in conjunction with its planning for and authorization of SCE's modifications to the Hoover Dam-to-San Bernardino transmission line. Staff also believes that the mitigation would be sufficient to compensate for any modifications to the line that would be necessary to accommodate only the proposed project if SCE were to downgrade the scale of the modifications to the line to take into account any of the other presently proposed projects withdrawing from the California ISO queue.

The construction of other projects in the same vicinity as the proposed project could affect *unknown* cultural resources of the types that the ISEGS project would affect. A large number of other projects are proposed and under consideration in the Ivanpah Valley area, and many would involve ground disturbance and visual intrusion. For example, the OptiSolar project would involve ground disturbance across thousands of acres of land adjacent to the project site, and construction of the Las Vegas regional airport would disturb many more acres. Therefore, it appears that the ISEGS project does have the potential to contribute to a cumulative impact in the Ivanpah Valley. However, project proponents for other future projects in the area may be able to avoid causing substantial adverse changes to CRHR-eligible cultural resources through deliberate project planning, or reduce such impacts to presently unknown cultural resources to less than significant by implementing mitigation measures requiring construction monitoring, evaluation of resources discovered during monitoring, and avoidance or data recovery for resources evaluated to be CRHR-eligible. Such avoidance or mitigation of potential future significant impacts to presently unknown cultural resources would render the potential contribution of the ISEGS project to cumulative impacts on such resources negligible.

Unknown, unrecorded cultural resources may be found at nearly any development site. As they are discovered, resources are recorded and information retrieved. If the nature of the resource requires it, the resource is protected. When discovered, cultural resources are treated in accordance with applicable federal and state laws and regulations as well as in compliance with the mitigation measures and permit requirements applicable to a project. It is not known what cultural resources, if any, would be affected by development of all present and future projects within the Ivanpah Valley, however, it is reasonable to assume that cultural resources exist and could be expected to be uncovered at some of these sites. As would be done during ISEGS construction, should resources be discovered during the construction of current and future projects, they would be subject to legal requirements designed to protect them,

thereby reducing the effect of impacts. Therefore ISEGS impacts, when combined with impacts from past, present and reasonably foreseeable projects would not be significant for presently unknown cultural resources.

Regional Projects

The development of urban, residential, military, and infrastructure uses of land within the geographic extent of regional cumulative impacts has likely resulted in impacts to cultural resources. Many archaeological resources occur within the California Desert Conservation Area that could be destroyed through construction activities of these renewable projects. For example, nearly 12,000 cultural resources have been identified within San Bernardino County (San Bernardino County 2007). Because only 15 percent of San Bernardino County has been surveyed for cultural resources, there is a high potential to discover previously unknown resources. If resources are impacted where the values can be fully recovered through data recovery or other recordation (photography, drawings, and descriptive history), the cumulative impact of these future projects would not be significant. However, even with mitigation of individual projects at specific sites, there would still be a loss of resources due to the large number of acres disturbed.

Buildings and structural sites throughout the desert would also be impacted by the numerous proposed renewable projects. Potential impacts would include physical disturbance or alteration directly as a result of construction activities or diminished visual character of such sites due to the presence of industrial structures. Mitigation would be implemented for each project to minimize impacts.

Construction of the solar and wind projects proposed throughout this region would result in substantial changes in the setting and feeling, and association of the areas in which they are constructed. The current design of these projects would result in a significant cumulative impact to the region. Within the desert region there are numerous traditional use areas, and lands sacred to Native Americans are present. Potential impacts would include physical disturbance or alteration directly as a result of construction activity or diminished visual character of traditional use areas due to the presence of industrial structures. If impacts to traditional use areas would occur at any individual site, mitigation would be implemented to minimize project impacts; however the potential for vast disturbance of the desert would potentially lead to a loss of resources and impacts to visual character, thereby resulting in a significant cumulative impact.

However, as discussed above, there is one built-environment resource that the construction and operation of the ISEGS project would affect, and staff's proposed conditions of certification provide for the mitigation of that impact to that resource. The ISEGS project would, therefore, have minimal potential to combine with the impacts of any of the reasonably foreseeable renewable energy projects shown on Cumulative Impacts Figure 1 and Cumulative Impacts Figure 2 to result in cumulative impacts to known cultural resources.

Unknown, unrecorded cultural resources may be found at nearly any development site. When discovered, cultural resources are treated in accordance with applicable Federal and State laws and regulations as well as in compliance with the mitigation measures

and permit requirements applicable to a project. It is not known what cultural resources, if any, would be affected by development of all present and future projects within southeastern California, southern Nevada, and western Arizona. Because, however, of the large area of proposed development (over one million acres of desert land), it is reasonable to assume that cultural resources exist and would be expected to be uncovered at some of these sites. As would be done during the construction of the ISEGS project, should resources be discovered during construction of any of the proposed solar and wind development projects, they would be subject to legal requirements designed to protect them, thereby reducing the effect of impacts. Additionally, by developing sites with solar reflective mirrors, photovoltaic panels, or wind turbines, the potential also exists for these projects to preclude the potential for discovery of unknown cultural resources. Therefore, although the discovery of unknown cultural resources can be mitigated for individual projects, the scale of future renewable energy development with the potential to disturb unknown resource or to preclude the potential for discovery of unknown discoveries would be significant, and the contribution of the ISEGS project to this cumulative impact would be cumulatively considerable.

Cumulative Impact Conclusion

The ISEGS project would, in combination with reasonably foreseeable projects, contribute to significant local cumulative impacts to at least one known historical resource, the Hoover Dam-to-San Bernardino transmission line (CA-SBR-10315H). Impacts of the ISEGS project would not have the potential to combine with impacts of past, present, and reasonably foreseeable projects to result in a significant contribution to regional cumulative impacts to other known cultural resources, or to either local or regional cumulative impacts to unknown cultural resources. Impacts of the ISEGS project would combine with impacts of proposed solar and wind development projects in southeastern California, southern Nevada, and western Arizona to result in cumulatively considerable impacts to unknown cultural resources.

COMPLIANCE WITH LORS

If the conditions of certification (below) are properly implemented, then the proposed ISEGS project would result in a less-than-significant impact on known, NRHP- and CRHR-eligible resources. The project would therefore be in compliance with all applicable state laws, ordinances, regulations, and standards (LORS) listed in Cultural Resources Table 1.

The County of San Bernardino's General Plan has broad language that declares its goal of preserving and promoting the county-wide preservation of cultural resources, but the only County cultural resources LORS with which a development project must comply, by taking specific actions, apply only to the unincorporated areas of the County. Staff's proposed conditions of certification require specific actions to promote and to effect historic preservation, and to mitigate impacts to CRHR-eligible resources in order to ensure CEQA compliance. Consequently, if ISEGS implements these conditions, its actions would be consistent with the cultural resources goals of the County of San Bernardino.

NOTEWORTHY PUBLIC BENEFITS

Staff has not identified any noteworthy public benefits associated with cultural resources that have been the result of the environmental analyses for the proposed project or that would be the result of the construction, operation, maintenance, closure, or decommissioning of the project.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

BLM and Energy Commission staff have, as of the drafting of the present document, received one comment that explicitly relates to the analysis of cultural resources. The comment is a joint submission by the Wilderness Society and the Natural Resources Defense Council, dated January 23, 2009:

> "The agencies should carefully evaluate the final results of field research to determine whether cultural resources exist in the project area. If cultural resources exist, the agencies should thoroughly analyze the impacts of the ISEGS project to those resources and develop a comprehensive impacts minimization and mitigation plan."

BLM and Energy Commission staff believe that the incorporation of the results of the Reconnaissance Survey and ISEGS-01 Evaluation Protocols (see "September, 2008 Helicopter and Pedestrian Reconnaissance Survey" and "Investigation to Evaluate Archaeological Site ISEGS-01" subsections, above) into this FSA completely address the above joint Wilderness Society and Natural Resources Defense Council comment.

CONCLUSIONS AND RECOMMENDATIONS

This cultural resources analysis concludes that the ISEGS project would have no significant direct or indirect impacts on known or unknown, NRHP- or CRHR-eligible archaeological, ethnographic, or built-environment resources, with implementation of proposed Conditions of Certification **CUL-1** through **CUL-7** and **CUL-10**.

With the adoption and implementation of staff's proposed Conditions of Certification **CUL-8** and **CUL-9**, staff can conclude that the cumulative effect of the proposed project on the one presently known NRHP-eligible and CRHR-listed resource, the Hoover Dam-to-San Bernardino transmission line (CA-SBR-10315H), would be rendered less than cumulatively considerable. Staff therefore recommends that the Commission adopt these conditions.

Staff further recommends that the Commission adopt the following additional cultural resources Conditions of Certification, **CUL-1** through **CUL-7**, and **CUL-10**. These measures are intended to facilitate the identification and assessment of previously unknown archaeological resources encountered during construction-related ground disturbance and to mitigate any significant impacts from the project on any newly found resources assessed as NRHP- or CRHR-eligible. To accomplish this, the conditions provide for the hiring of a Cultural Resources Specialist and archaeological monitors, for cultural resources awareness training for construction workers, for the archaeological

and Native American monitoring of ground-disturbing activities, in particular situations, for the recovery of data from NRHP- or CRHR-eligible discovered archaeological deposits, for the writing of a technical archaeological report on all archaeological activities and findings, and for the curation of recovered artifacts and other data. When properly implemented and enforced, staff believes that these conditions of certification would reduce to less than significant any impacts to previously unknown cultural resources encountered during construction or operation. Additionally, with the adoption and implementation of these conditions, the ISEGS project would be in conformity with all applicable LORS.

PROPOSED CONDITIONS OF CERTIFICATION

CUL-1 Prior to the start of ground disturbance (includes "preconstruction site mobilization;" "construction ground disturbance;" and "construction grading, boring, and trenching," as defined in the General Conditions for this project), the project owner shall obtain the services of a Cultural Resources Specialist (CRS), and one or more alternate CRSs, if alternates are needed. The CRS shall manage all consultation, monitoring, mitigation, curation, and reporting activities required in accordance with the Conditions of Certification (Conditions). The CRS may elect to obtain the services of Cultural Resource Monitors (CRMs) and other technical specialists, if needed, to assist in monitoring, mitigation, and curation activities. The project owner shall ensure that the CRS makes recommendations regarding the eligibility to the National Register of Historic Places (NRHP) and the California Register of Historical Resources (CRHR) of any cultural resources that are newly discovered or that may be affected in an unanticipated manner. No ground disturbance shall occur prior to CPM approval of the CRS, unless specifically approved by the BLM's Authorized Officer and the CPM. Approval of a CRS may be denied or revoked for non-compliance on this or other projects.

CULTURAL RESOURCES SPECIALIST

The resumes for the CRS and alternate(s) shall include information demonstrating to the satisfaction of the BLM's Authorized Officer and the CPM that their training and background conform to the U.S. Secretary of Interior Guidelines, as published in the Code of Federal Regulations, 36 CFR Part 61. In addition, the CRS shall have the following qualifications:

1. The CRS's qualifications shall be appropriate to the needs of the project and shall include a background in anthropology, archaeology, history, architectural history, or a related field; and
2. At least three years of archaeological or historic, as appropriate, resource mitigation and field experience in California.

The resume of the CRS shall include the names and telephone numbers of contacts familiar with the work of the CRS on referenced projects, and demonstrate that the CRS has the appropriate education and experience to accomplish the cultural resource tasks that must be addressed during ground disturbance, grading, construction, and operation.

CULTURAL RESOURCES MONITORS

CRMs shall have the following qualifications:

1. a BS or BA degree in anthropology, archaeology, historical archaeology or a related field and one year experience monitoring in California; or
2. an AS or AA degree in anthropology, archaeology, historical archaeology or a related field, and four years experience monitoring in California; or
3. enrollment in upper division classes pursuing a degree in the fields of anthropology, archaeology, historical archaeology or a related field, and two years of monitoring experience in California.

CULTURAL RESOURCES TECHNICAL SPECIALISTS

The resume(s) of any additional technical specialists, e.g., historical archaeologist, historian, architectural historian, and/or physical anthropologist, shall be submitted to the BLM's Authorized Officer and the CPM for approval.

Verification:

1. At least 45 days prior to the start of ground disturbance, the project owner shall submit the resume for the CRS, and alternate(s), if desired, to the BLM's Authorized Officer and the CPM for review and approval.
2. At least 10 days prior to a termination or release of the CRS, or within 10 days after the resignation of a CRS, the project owner shall submit the resume of the proposed new CRS to the BLM's Authorized Officer and the CPM for review and approval. At the same time, the project owner shall also provide to the approved new CRS the AFC and all cultural documents, field notes, photographs, and other cultural materials generated by the project. If there is no alternate CRS in place to conduct the duties of the CRS, a previously approved monitor may serve in place of a CRS so that construction may continue up to a maximum of 3 days without a CRS. If cultural resources are discovered, then construction will remain halted until there is a CRS or alternate CRS to make a recommendation regarding significance.
3. At least 20 days prior to ground disturbance, the CRS shall provide a letter naming anticipated CRMs for the project and stating that the identified CRMs meet the minimum qualifications for cultural resource monitoring required by this Condition. If additional CRMs are obtained during the project, the CRS shall provide additional letters to the BLM's Authorized Officer and the CPM identifying the CRMs and attesting to the qualifications of the CRMs, at least five days prior to the CRMs beginning on-site duties.
4. At least 10 days prior to beginning tasks, the resume(s) of any additional technical specialists shall be provided to the BLM's Authorized Officer and the CPM for review and approval.

5. At least 10 days prior to the start of ground disturbance, the project owner shall confirm in writing to the BLM's Authorized Officer and the CPM that the approved CRS will be available for onsite work and is prepared to implement the cultural resources Conditions.

CUL-2 Prior to the start of ground disturbance, if the CRS has not previously worked on the project, the project owner shall provide the CRS with copies of the AFC, data responses, and confidential cultural resources reports for the project. The project owner shall also provide the CRS, the BLM's Authorized Officer, and the CPM with maps and drawings showing the footprint of the power plant and all linear facilities. Maps shall include the appropriate USGS quadrangles and a map at an appropriate scale (e.g., 1:2000 or 1" = 200') for plotting cultural features or materials. If the CRS requests enlargements or strip maps for linear facility routes, the project owner shall provide copies to the CRS and CPM. The BLM's Authorized Officer and the CPM shall review submittals and, in consultation with the CRS, approve those that are appropriate for use in cultural resources planning activities. No ground disturbance shall occur prior to CPM approval of maps and drawings, unless specifically approved by the BLM's Authorized Officer and the CPM.

If construction of the project would proceed in phases, maps and drawings, not previously provided, shall be submitted prior to the start of each phase. Written notification identifying the proposed schedule of each project phase shall be provided to the CRS and CPM.

At a minimum, the CRS shall consult weekly with the project construction manager to confirm area(s) to be worked during the next week, until ground disturbance is completed, and the project owner shall ensure that the project construction manager is available for such weekly consultations.

The project owner shall notify the CRS and CPM of any changes to the scheduling of the construction phases. No ground disturbance shall occur prior to CPM approval of maps and drawings, unless specifically approved by the BLM's Authorized Officer and the CPM.

Verification:

1. At least 40 days prior to the start of ground disturbance, the project owner shall provide the AFC, data responses, and confidential cultural resource documents to the CRS, if needed, and the subject maps and drawings to the CRS and CPM. The BLM's Authorized Officer and the CPM will review submittals in consultation with the CRS and approve maps and drawings suitable for cultural resources planning activities.
2. If there are changes to any project related-footprint, revised maps and drawings shall be provided at least 15 days prior to start of ground disturbance and construction for those changes.

3. If project construction is phased, if not previously provided, the project owner shall submit the subject maps and drawings 15 days prior to each phase.

4. On a weekly basis during ground disturbance, a current schedule of anticipated project activity shall be provided to the CRS and CPM by letter, email, or fax.

5. Within five days of identifying changes, the project owner shall provide written notice of any changes to scheduling of construction phase.

CUL-3 Prior to the start of ground disturbance, the project owner shall submit the Cultural Resources Monitoring and Mitigation Plan (CRMMP), as prepared by or under the direction of the CRS, to the BLM's Authorized Officer and the CPM for review and approval. The CPM shall provide the project owner with a model CRMMP to adapt for project use. The CRMMP shall identify general and specific measures to minimize potential impacts to sensitive cultural resources. Implementation of the CRMMP shall be the responsibility of the CRS and the project owner. Copies of the CRMMP shall reside with the CRS, alternate CRS, each monitor, and the project owner's on-site construction manager. No ground disturbance shall occur prior to CPM approval of the CRMMP, unless specifically approved by the BLM's Authorized Officer and the CPM.

The CRMMP shall include, but not be limited to, the following elements and measures:

1. The following statement included in the Introduction: "Any discussion, summary, or paraphrasing of the Conditions in this CRMMP is intended as general guidance and as an aid to the user in understanding the Conditions and their implementation. The Conditions, as written in the Commission Decision, shall supersede any summarization, description, or interpretation of the Conditions in the CRMMP. The Cultural Resources Conditions of Certification from the Commission Decision are contained in Appendix A."

2. A proposed general research design that includes a discussion of archaeological research questions and testable hypotheses specifically applicable to the local prehistory and history of the project area, and a discussion of artifact collection, retention/disposal, and curation policies as related to the research questions formulated in the research design. The research design shall specify that the preferred treatment strategy for any buried archaeological deposits is avoidance. A mitigation plan shall be prepared for any NRHP-eligible resource (as determined by the BLM's Authorized Officer) or any CRHR-eligible resource (as determined by the CPM), impacts to which cannot be avoided. A prescriptive treatment plan may be included in the CRMMP for limited data types.

3. Specification of the implementation sequence and the estimated time frames needed to accomplish all project-related tasks during the ground disturbance and post-ground–disturbance analysis phases of the project.

4. Identification of the person(s) expected to perform each of the tasks, their responsibilities, and the reporting relationships between project construction management and the mitigation and monitoring team.

5. A description of the manner in which Native American observers or monitors will be included, the procedures to be used to select them, and their role and responsibilities.

6. A description of all impact avoidance measures (such as flagging or fencing), to prohibit or otherwise restrict access to sensitive resource areas that may be found during construction and/or operation and may subsequently need to be avoided, and identification of the areas where these measures are to be implemented. The description shall address how these measures would be implemented and how long they would be needed to protect the resources from project-related effects.

7. A statement that all cultural resources encountered shall be recorded on a DPR form 523 and mapped and photographed. In addition, all archaeological materials collected as a result of the archaeological investigations (survey, testing, and data recovery) shall be curated in accordance with the State Historical Resources Commission's "Guidelines for the Curation of Archaeological Collections," into a retrievable storage collection in a public repository or museum.

8. A statement that the project owner will pay all curation fees for artifacts recovered and for related documentation produced during cultural resources investigations conducted for the project. The project owner shall identify three possible curation facilities that could accept cultural resources materials resulting from project activities.

9. A statement that the CRS has access to equipment and supplies necessary for site mapping, photographing, and recovering any cultural resource materials that are encountered during ground disturbance and that cannot be treated prescriptively.

10. A description of the contents and format of the Cultural Resource Report (CRR), which shall be prepared according to ARMR Guidelines.

Verification:

1. Upon approval of the CRS proposed by the project owner, the CPM will provide to the CRS an electronic copy of the model CRMMP.

2. At least 30 days prior to the start of ground disturbance, the project owner shall submit the subject CRMMP to the BLM's Authorized Officer and the CPM for review and approval. Ground disturbance may not commence until the CRMMP is approved, unless specifically approved by the BLM's Authorized Officer and the CPM.

3. At least 30 days prior to the start of ground disturbance, a letter shall be provided to the BLM's Authorized Officer and the CPM indicating that the project owner agrees to pay curation fees for any materials collected as a result of the archaeological investigations (survey, testing, data recovery).

CUL-4 The project owner shall submit the Cultural Resources Report (CRR) to the BLM's Authorized Officer and the CPM for approval. The CRR shall be written by or under the direction of the CRS and shall be provided in the ARMR format. The CRR shall report on all field activities related to the implementation of the CRMMP including dates, times and locations, findings, samplings, and analyses. All survey reports, Department of Parks and Recreation (DPR) 523 forms, and additional research reports not previously submitted to the California Historic Resource Information System (CHRIS) and the State Historic Preservation Officer (SHPO) shall be included as an appendix to the CRR.

If the project owner requests a suspension of ground disturbance and/or construction activities, then a draft CRR that covers all cultural resources activities associated with the project shall be prepared by the CRS and submitted to the BLM's Authorized Officer and the CPM for review and approval on the same day as the suspension/extension request. The draft CRR shall be retained at the project site in a secure facility until ground disturbance and/or construction resumes or the project is withdrawn. If the project is withdrawn, then a final CRR shall be submitted to the BLM's Authorized Officer and the CPM for review and approval at the same time as the withdrawal request.

Verification:

1. Within 90 days after completion of ground disturbance (including landscaping), the project owner shall submit the CRR to the BLM's Authorized Officer and the CPM for review and approval. If any reports have previously been sent to the CHRIS, then receipt letters from the CHRIS or other verification of receipt shall be included in an appendix.
2. Within 90 days after completion of ground disturbance (including landscaping), the project owner shall provide to the BLM's Authorized Officer and the CPM a copy of an agreement with, or other written commitment from, a curation facility that meets the standards stated in the California State Historical Resources Commission's *Guidelines for the Curation of Archaeological Collections*, to accept cultural materials, if any, from this project. Any agreements concerning curation will be retained and available for audit for the life of the project.
3. Within 10 days after CPM approval of the CRR, the project owner shall provide documentation to the BLM's Authorized Officer and the CPM that copies of the CRR have been provided to the SHPO, the CHRIS, the curating institution, if archaeological materials were collected, and to the Chairperson(s) of any Native American groups requesting copies of project-related reports.
4. Within 30 days after requesting a suspension of construction activities, the project owner shall submit a draft CRR to the BLM's Authorized Officer and the CPM for review and approval.

CUL-5 Prior to and for the duration of ground disturbance, the project owner shall provide Worker Environmental Awareness Program (WEAP) training to all new workers within their first week of employment at the project site and on the linear facilities. The training shall be prepared by the CRS, may be conducted by any member of the archaeological team, and may be presented in the form of a video. The CRS shall be available (by telephone or in person) to answer questions posed by employees. The training may be discontinued when ground disturbance, including landscaping, is completed. The training shall include:

1. A discussion of applicable laws and penalties under the law;
2. Samples or visuals of artifacts that might be found in the project vicinity;
3. A discussion of what such artifacts may look like when partially buried, or wholly buried and then freshly exposed;
4. A discussion of what prehistoric and historical archaeological deposits look like at the surface and when exposed during construction, and the range of variation in the appearance of such deposits;
5. Instruction that the CRS, alternate CRS, and CRMs have the authority to halt construction in the area of a discovery to an extent sufficient to ensure that the resource is protected from further impacts, as determined by the CRS;
6. Instruction that employees are to halt work on their own in the vicinity of a potential cultural resources discovery and shall contact their supervisor and the CRS or CRM, and that redirection of work would be determined by the construction supervisor and the CRS;
7. An informational brochure that identifies reporting procedures in the event of a discovery;
8. An acknowledgement form signed by each worker indicating that they have received the training; and
9. A sticker that shall be placed on hard hats indicating that environmental training has been completed.

No ground disturbance shall occur prior to implementation of the WEAP program, unless such activities are specifically approved by the BLM's Authorized Officer and the CPM.

Verification:

1. At least 30 days prior to the beginning of ground disturbance, the CRS shall provide the training program draft text and graphics and the informational brochure to the BLM's Authorized Officer and the CPM for review and approval, and the CPM will provide to the project owner a WEAP Training Acknowledgement form for each WEAP-trained worker to sign.

2. On a monthly basis, the project owner shall provide in the Monthly Compliance Report (MCR) the WEAP Training Acknowledgement forms of persons who have completed the training in the prior month and a running total of all persons who have completed training to date.

CUL-6 The project owner shall ensure that construction is immediately halted should anyone discover buried archaeological materials on the project site or linear facilities (Discovery). Archaeological materials may include, but are not limited to, such items as whole or fragmentary flaked or ground stone tools, stone flaking debris, discolored, fire-altered rock, animal bone, charcoal, ash, discolored, burned earth, rocks and minerals not common to the project site, and fragments of ceramic, glass, or metal. In the event of such a Discovery, the project owner shall ensure the immediate notification of the CRS, who shall either evaluate the NRHP and CRHR eligibility of the Discovery, in person, on the project site, or supervise the evaluations that a CRM or an appropriate cultural resources technical specialist would make of the historical significance of the Discovery, also in person, on the project. The recommendations of significance shall be substantiated by and reported to the BLM's Authorized Officer and the CPM by the CRS. Redirection of ground disturbance shall be accomplished under the direction of the construction supervisor, in a manner agreed to by the CRS.

In the event cultural resources that are over 50 years of age or that may be considered NRHP- or CRHR-eligible are found, or impacts to such resources can be anticipated, construction shall be halted or redirected in the immediate vicinity of the Discovery sufficient to ensure that the resource is protected from further impacts. The halting or redirection of construction shall remain in effect until either the CRS, a CRM, or appropriate cultural resources technical specialist has made evaluations of the historical significance of the Discovery, and all of the following have also occurred:

1. The CRS has notified the project owner, and the BLM's Authorized Officer and the CPM have been notified within 24 hours of the Discovery, or by Monday morning if the cultural resources Discovery occurs between 8:00 AM on Friday and 8:00 AM on Sunday morning, including a description of the Discovery (or changes in character or attributes), the action taken (i.e. work stoppage or redirection), recommendations of eligibility, and recommendations for mitigation of any cultural resources Discoveries, whether or not a determination of significance has been made.
2. The CRS has ensured completion of field notes, measurements, and photography for a DPR 523 primary form. The "Description" entry of the 523 form shall include a recommendation on the significance of the find. The project owner shall submit completed forms to the BLM's Authorized Officer and the CPM.
3. The CRS, the project owner, and the BLM's Authorized Officer and the CPM have conferred, and the BLM's Authorized Officer and the CPM have concurred with the recommended eligibility of the Discovery and approved the CRS's proposed data recovery, if any, including the curation of the

artifacts, or other appropriate mitigation; and any necessary data recovery and mitigation have been completed.

4. The CRS, the BLM's Authorized Officer, and the CPM have conferred, and the BLM's Authorized Officer and the CPM have determined whether the Discovery reveals new information about the subsurface archaeological character of the project site that warrants the initiation of monitoring for portions of the project site.

5. When the BLM's Authorized Officer and the CPM make a determination that a Discovery does reveal new information about the subsurface archaeological character of the project site that warrants the initiation of monitoring for portions of the project site, the BLM's Authorized Officer and the CPM shall provide notification, by letter or e-mail, to the project owner and the CRS, where on the project site monitoring shall be necessary and why, and notification that **CUL-7** shall be implemented for the subject portions of the project site.

Verification:

1. At least 30 days prior to the start of ground disturbance, the project owner shall provide the BLM's Authorized Officer, the CPM, and the CRS with a letter confirming that the CRS, alternate CRS, and CRMs have the authority to halt construction activities in the vicinity of a cultural resources Discovery, and that the project owner shall ensure that the CRS notifies the BLM's Authorized Officer and the CPM within 24 hours of a Discovery, or by Monday morning if the cultural resources Discovery occurs between 8:00 AM on Friday and 8:00 AM on Sunday morning.

2. Completed DPR form 523s shall be submitted to the BLM's Authorized Officer and the CPM for review and approval no later than 24 hours following the notification of the BLM's Authorized Officer and the CPM, or 48 hours following the completion of data recordation/recovery, whichever is more appropriate for the subject cultural material.

CUL-7 If there is a discovery of archaeological material, and after the BLM's Authorized Officer and the CPM notify the project owner and the CRS that the initiation of monitoring is necessary for portions of the project site or linear facilities, the project owner shall ensure that the CRS, alternate CRS, or CRMs shall monitor full time on the portions of the project site and linear facilities which the BLM's Authorized Officer and the CPM may specify, and ground disturbance full time on the portions of the laydown areas or other ancillary areas which the BLM's Authorized Officer and the CPM may also specify, to ensure there are no impacts to further undiscovered resources and to ensure that newly found resources are not further impacted in an unanticipated manner.

Full-time archaeological monitoring for this project shall be the archaeological monitoring of all earth-moving activities on the portions of the construction site or the linear facility routes which the BLM's Authorized Officer and the CPM may specify for as long as the activities are ongoing. Full-time archaeological

monitoring shall require one monitor per active earthmoving machine working in archaeologically sensitive areas, as determined by the CRS in consultation with the BLM's Authorized Officer and the CPM. If an excavation area is too large for one monitor to effectively observe the soil removal, one or more additional monitors shall be retained to observe the area.

In the event that the CRS determines that the current level of monitoring is not appropriate in certain locations, a letter or e-mail detailing the justification for changing the level of monitoring shall be provided to the BLM's Authorized Officer and the CPM for review and approval prior to any change in the level of monitoring.

The research design in the CRMMP shall govern the collection, treatment, retention/disposal, and curation of any archaeological materials encountered.

On forms provided by the CPM, CRMs shall keep a daily log of any monitoring and other cultural resource activities and any instances of non-compliance with the Conditions and/or applicable LORS. Copies of the daily logs shall be provided to the BLM's Authorized Officer and the CPM by the CRS as directed by the BLM's Authorized Officer and the CPM. The CRS shall use these logs to compile a monthly summary report on the progress or status of cultural resources-related activities. If there are no monitoring activities, the summary report shall specify why monitoring has been suspended. The CRS or alternate CRS shall report daily to the BLM's Authorized Officer and the CPM on the status of cultural resources-related activities at the project site, unless reducing or ending daily reporting is requested by the CRS and approved by the BLM's Authorized Officer and the CPM.

The CRS, at his or her discretion, or at the request of the BLM's Authorized Officer or the CPM, may informally discuss cultural resource monitoring and mitigation activities with Energy Commission technical staff.

Cultural resources monitoring activities are the responsibility of the CRS. Any interference with monitoring activities, removal of a monitor from duties assigned by the CRS, or direction to a monitor to relocate monitoring activities by anyone other than the CRS shall be considered non-compliance with these Conditions.

Upon becoming aware of any incidents of non-compliance with the Conditions and/or applicable LORS, the CRS and/or the project owner shall notify the BLM's Authorized Officer and the CPM by telephone or e-mail within 24 hours. The CRS shall also recommend corrective action to resolve the problem or achieve compliance with the Conditions. When the issue is resolved, the CRS shall write a report describing the issue, the resolution of the issue, and the effectiveness of the resolution measures. This report shall be provided in the next MCR for the review of the BLM's Authorized Officer and the CPM.

A Native American monitor shall be obtained to monitor ground disturbance in areas where Native American artifacts may be discovered. Informational lists of concerned Native Americans and Guidelines for monitoring shall be obtained from the Native American Heritage Commission. Preference in selecting a

monitor shall be given to Native Americans with traditional ties to the area that shall be monitored.

Verification:

1. At least 30 days prior to the start of ground disturbance, the CPM will provide to the CRS an electronic copy of the form to be used as a daily monitoring log.
2. Daily, the CRS shall provide a statement that "no cultural resources over 50 years of age were discovered" to the BLM's Authorized Officer and the CPM as an e-mail or in some other form acceptable to the BLM's Authorized Officer and the CPM. If the CRS concludes that daily reporting is no longer necessary, a letter or e-mail providing a detailed justification for the decision to reduce or end daily reporting shall be provided to the BLM's Authorized Officer and the CPM for review and approval at least 24 hours prior to reducing or ending daily reporting.
3. On a monthly basis, while monitoring is on-going, the project owner shall include in each MCR a copy of the monthly summary report of cultural resources-related monitoring prepared by the CRS. Copies of daily logs shall be retained by the project owner and made available for audit by the BLM's Authorized Officer and the CPM.
4. At least 24 hours prior to implementing a proposed change in monitoring level, documentation justifying the change shall be submitted to the BLM's Authorized Officer and the CPM for review and approval.

CUL-8 Prior to the dismantling, by any party, of any portion of the Hoover Dam-to-San Bernardino transmission line (CA-SBR-10315H) located with the boundaries of the project site, the project owner shall obtain the services of an architectural historian. The project owner shall provide the BLM's Authorized Officer and the CPM with the name and resume of the architectural historian. No ground disturbance shall occur prior to CPM approval of the architectural historian, unless specifically approved by the BLM's Authorized Officer and the CPM.

The resume for the architectural historian shall include names and telephone numbers of contacts familiar with the architectural historian's work and all information needed to demonstrate that the architectural historian has the following qualifications:

1. meets the Secretary of Interior's Professional Standards for architectural history;
2. has at least three years experience in recording twentieth-century industrial structures; and
3. has completed at least one recordation project within the past five years involving coordination with the National Park Service's Heritage Documentation Program (HDP).

Verification:

1. At least 90 days prior to the dismantling of any portion of the Hoover Dam-to-San Bernardino transmission line located within the boundaries of the project site, the project owner shall submit the name and resume of the selected architectural historian to the BLM's Authorized Officer and the CPM for review and approval.

2. At least 75 days prior to the dismantling of any portion of the Hoover Dam-to-San Bernardino transmission line located within the boundaries of the project site, the project owner shall confirm in writing to the BLM's Authorized Officer and the CPM that the approved architectural historian is available for onsite work and provide a date by which the architectural historian will undertake the HAER-type documentation of the tower types and the cabling system of the portion of the Hoover Dam-to-San Bernardino transmission line located within the boundaries of the project site.

CUL-9 Prior to the dismantling, by any party, of any portion of the Hoover Dam-to-San Bernardino transmission line (CA-SBR-10315H) located within the boundaries of the project site, the project owner shall ensure that the approved architectural historian prepares HAER-type documentation of the historic context and historic setting of the resource, and recordation of those physical parts of the Hoover Dam-to-San Bernardino transmission line that are located within the boundaries of the project site. The project owner shall ensure that the architectural historian consults with the HABS/HAER Coordinator in the Pacific West Regional Office of the HDP, in Oakland, and complies with the Coordinator's guidance on the extent and content of documentation appropriate for the Hoover Dam-to-San Bernardino transmission line, as a historical resource under CEQA and as a resource eligible for inclusion in the National Register of Historic Places, and on the format and materials to be used in the documentation. No dismantling of the Hoover Dam-to-San Bernardino transmission line located within the boundaries of the project area shall occur prior to the completion, by the architectural historian, of the recording, in the field, of the historic setting and the portion of the line located within the boundaries of the project site, and the submission to and approval by the BLM's Authorized Officer and the CPM of the draft HAER-type documentation of the Hoover Dam-to-San Bernardino transmission line, unless specifically allowed by the BLM's Authorized Officer and the CPM.

Verification:

1. At least 60 days prior to the dismantling, by any party, of any portion of the Hoover Dam-to-San Bernardino transmission line located within the boundaries of the project site, the project owner shall submit to the BLM's Authorized Officer and the CPM a letter or memorandum from the architectural historian detailing the scope of the HDP-recommended documentation of the resource.

2. At least 30 days prior to the dismantling, by any party, of any portion of the Hoover Dam-to-San Bernardino transmission line located within the boundaries of the project site, the project owner shall provide a copy of the

draft HAER-type documentation of the resource to the BLM's Authorized Officer and the CPM for review and approval.

3. Within 90 days after completion of ground disturbance (including landscaping) the project owner shall include in an appendix to the CRR copies of the transmittal letters for the submission of copies of the final HAER-type documentation of the portion of the Hoover Dam-to-San Bernardino transmission line located within the boundaries of the project site to the California State Library and to at least two local libraries in San Bernardino County, and a copy of the letter of acceptance of the final HAER documentation by the Library of Congress, if accepted by that repository.

4. Alternately, at least 150 days prior to the dismantling, by any party, of any portion of the Hoover Dam-to-San Bernardino transmission line located within the boundaries of the project site, the project owner may submit to the BLM's Authorized Officer and the CPM, for review and approval, a copy of final HAER-type documentation of the portion of the Hoover Dam-to-San Bernardino transmission line located within the boundaries of the project site produced by any party, that meets HAER-type standards. If the project owner chooses this alternative, within 90 days after completion of ground disturbance (including landscaping), the project owner shall include in an appendix to the CRR copies of the transmittal letters for the submission of copies of the alternative final HAER-type documentation to the California State Library and to at least two local libraries in San Bernardino County.

CUL-10 If fill soils must be acquired from a non-commercial borrow site or disposed of to a non-commercial disposal site, unless less-than-five-year-old surveys of these sites for archaeological resources are documented to and approved by the BLM's Authorized Officer and the CPM, the CRS shall survey the borrow and/or disposal site(s) for cultural resources and record on DPR 523 forms any that are identified. When the survey is completed, the CRS shall convey the results and recommendations for further action to the project owner, the BLM's Authorized Officer, and the CPM, who will determine what, if any, further action is required. If the BLM's Authorized Officer and the CPM determine that significant archaeological resources that cannot be avoided are present at the borrow site, all these conditions of certification shall apply. The CRS shall report on the methods and results of these surveys in the CRR.

Verification:

1. As soon as the project owner knows that a non-commercial borrow site and/or disposal site will be used, he/she shall notify the CRS and CPM and provide documentation of previous archaeological survey, if any, dating within the past five years, for CPM approval.

2. In the absence of documentation of recent archaeological survey, **at least 30 days prior** to any soil borrow or disposal activities on the non-commercial borrow and/or disposal sites, the CRS shall survey the site/s for archaeological resources. The CRS shall notify the project owner, the BLM's Authorized Officer, and the CPM of the results of the cultural resources survey, with recommendations, if any, for further action.

CULTURAL RESOURCES ACRONYM GLOSSARY

IVANPAH SOLAR ENERGYGENERATING SYSTEM

AFC	Application for Certification
ARMR	Archaeological Resource Management Report
CEQA	California Environmental Quality Act
CHRIS	California Historical Resources Information System
Conditions	Conditions of Certification
CRHR	California Register of Historical Resources
CRM	Cultural Resources Monitor
CRMMP	Cultural Resources Monitoring and Mitigation Plan
CRR	Cultural Resource Report
CRS	Cultural Resources Specialist
DPR 523	Department of Parks and Recreation cultural resources inventory form
FSA	Final Staff Assessment
LORS	laws, ordinances, regulations, and standards
MCR	Monthly Compliance Report
MLD	Most Likely Descendent
NAHC	Native American Heritage Commission
NRHP	National Register of Historic Places
OHP	Office of Historic Preservation
PSA	Preliminary Staff Assessment
SHPO	State Historic Preservation Officer
Staff	Energy Commission cultural resources technical staff

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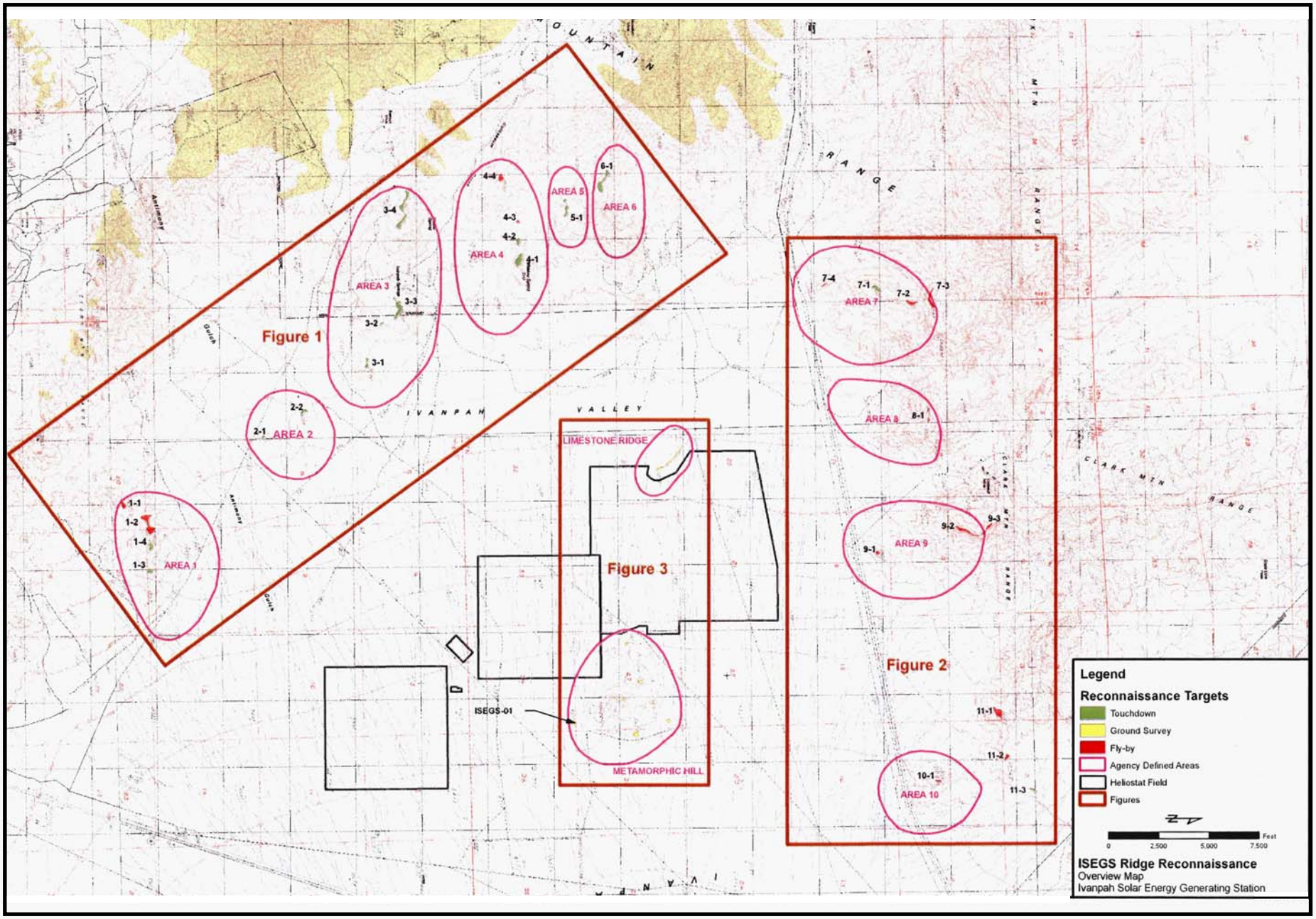
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CULTURAL RESOURCES - FIGURE 1

ISEGS - Reconnaissance Survey Areas

OCTOBER 2009

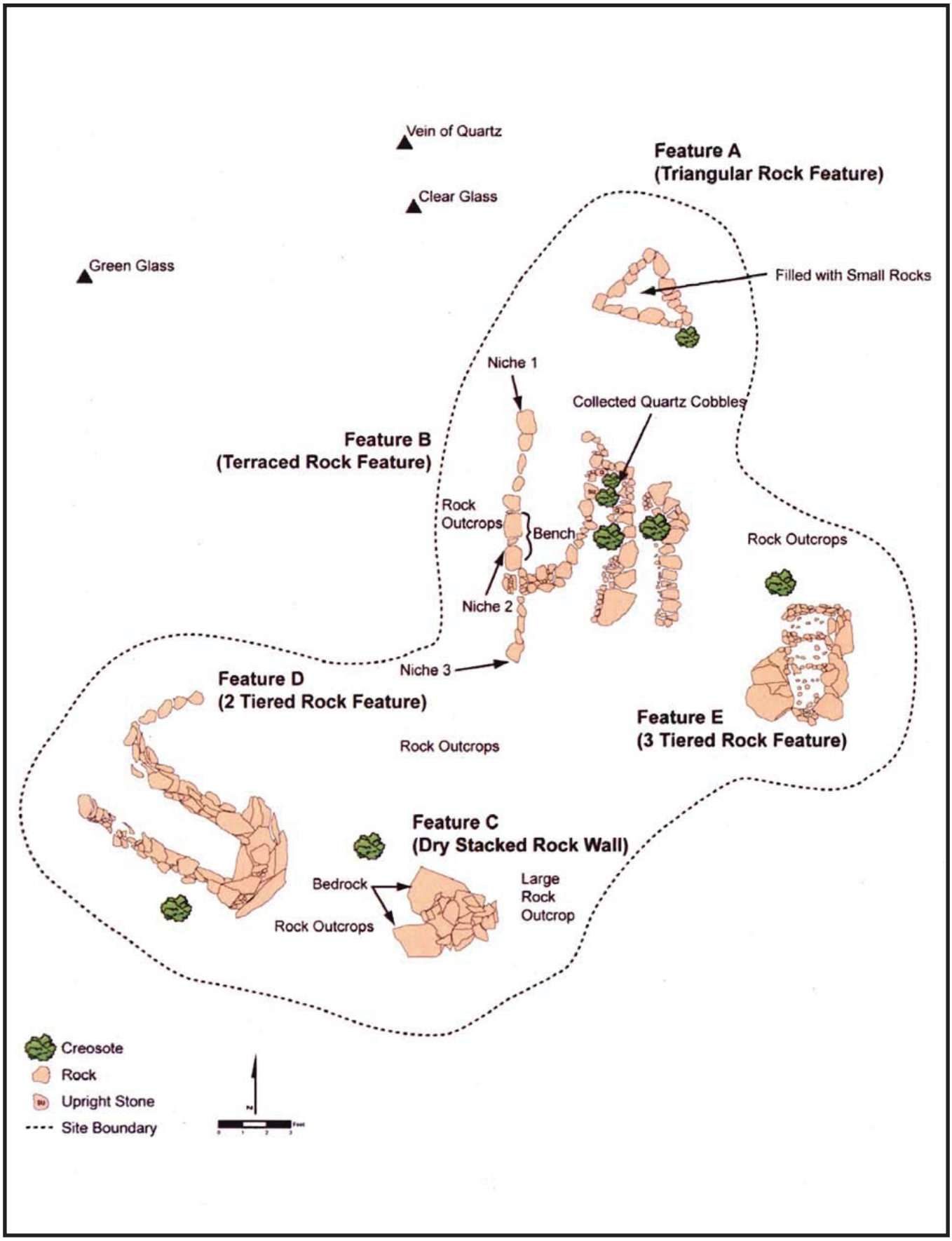


CULTURAL RESOURCES

U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009

SOURCE: CH2MHILL

CULTURAL RESOURCES - FIGURE 2
ISEGS - Archaeological Sketch Map of ISEGS-01



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SOURCE: CH2MHILL

CULTURAL RESOURCES - PLATE 1

ISEGS - Looking WSW across Ivanpah No.2



OCTOBER 2009

CULTURAL RESOURCES

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SOURCE: Mike McGuirt, California Energy Commission

CULTURAL RESOURCES - PLATE 2

ISEGS - Looking SW across ISEGS-01



OCTOBER 2009

CULTURAL RESOURCES

U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009

SOURCE: Mike McGuirt, California Energy Commission

HAZARDOUS MATERIALS MANAGEMENT

Prepared by Geoff Lesh, PE and Rick Tyler

SUMMARY OF CONCLUSIONS

U.S. Bureau of Land Management (BLM) and Energy Commission staff (hereafter jointly referred to as staff) have evaluated the proposed Ivanpah Solar Electric Generating System (ISEGS) project, and subject to adoption of staff's proposed mitigation measures, conclude that hazardous materials use at the proposed ISEGS would not present a significant CEQA or NEPA impact on the public or environment. With adoption of the proposed conditions of certification, the proposed project would comply with all applicable laws, ordinances, regulations, and standards (LORS). Conditions of Certification referred to herein serve the purpose of both the Energy Commission's Conditions of Certification for purposes of CEQA and BLM's Mitigation Measures for purposes of NEPA.

INTRODUCTION

The purpose of this **HAZARDOUS MATERIALS MANAGEMENT** section of this Final Staff Assessment/Draft Environmental Impact Statement (FSA/DEIS) is to determine if the proposed ISEGS could potentially cause significant impacts on the public from the use, handling, storage, or transportation of hazardous materials at the proposed project site. If significant adverse impacts on the public are identified, Energy Commission staff must evaluate facility design alternatives and additional mitigation measures to reduce those impacts to the extent feasible.

This analysis does not address the potential exposure of workers to hazardous materials used at the proposed project site. Employers must inform employees of hazards associated with their work and provide those employees with special protective equipment and training to reduce the potential for health impacts from the handling of hazardous materials. The **WORKER SAFETY AND FIRE PROTECTION** section of this document describes the protection of workers from those risks.

For this analysis, staff examines plausible potential loss of containment incidents (spills) for the hazardous materials to be used at the proposed facility. The worst case plausible event, regardless of cause, is considered, and analyzed to see whether the risk to local populations is significant. Hazardous material handling and usage procedures are designed to reduce the likelihood of a spill, to reduce its potential size, and to prevent or reduce the potential migration of a spill off site to the extent that there won't be significant off-site impacts. These measures look at potential direct contact from runoff of spills, air-borne plume concentrations, and the potential for spills to mix with runoff water and be carried offsite. Generally, staff seeks to confirm that the applicant has proposed secondary containment basins for containing hazardous material liquids, and that volatile chemicals would have a restricted exposure to the atmosphere after capture. Containment basins are designed to be able to hold the contents of a full tank plus the potential rainfall from a 25-year storm without any loss of containment. In the event of a spill, the spilled material, along with any mixed-in water and any

contaminated soils, would then be placed into containers and processed and disposed of as required by regulations.
Hazardous materials such as mineral and lubricating oils, corrosion inhibitors, herbicides, and acids and bases to control pH would be present at the proposed project site. Hazardous materials used during the construction phase include gasoline, diesel fuel, motor oil, lubricants, and small amounts of solvents and paint. No acutely toxic hazardous materials would be used on-site during construction. None of these materials pose a significant potential for off-site impacts as a result of the quantities on-site, their relative toxicity, their physical states, and/or their environmental mobility.

Although no natural gas is stored, the project would involve the handling of moderate amounts of natural gas. Natural gas poses some risk of both fire and explosion. The solar heat used in the boiler (steam) process would be supplemented by burning natural gas to heat a partial load steam boiler when solar conditions are insufficient.
Each power plant within the project would include a small package, natural gas-fired start-up boiler to provide additional heat for plant start-up and during temporary cloud cover. Natural gas would be supplied to the site through a six-mile long distribution pipeline ranging from 4 to 6 inches in diameter. From the Kern River Gas Transmission pipeline, the new pipeline would extend 0.5 miles south to the northern edge of Ivanpah 3. The ROW area required for this section of the pipeline would be 75 feet wide and 0.5 miles long. The line would then run east along the northern edge, and then south along the eastern edge, of Ivanpah 3 to a metering station near the southeast corner of Ivanpah 3. From there, a supply line would extend northwest into the Ivanpah 3 power block. The main pipeline would continue along the eastern edge of Ivanpah 2 to another metering station at its southeastern corner. Again, a branch supply line would extend northwestwards into the center of the Ivanpah 2 power block. From that station, the pipeline would follow the paved access road from Colosseum Road past the administration/warehouse building to the Ivanpah 1 power block. The extensions of the pipeline into the power blocks would be located within the project fenceline. However, the sections of pipeline along the northern boundary of Ivanpah 3, and then the eastern boundaries of Ivanpah 3 and 2, would be located outside of the fenced heliostat area, in order to allow access to the pipeline for maintenance.

A tap metering station of approximately 100 feet by 150 feet in area would be located at the Kern River Gas Transmission Line. The tap station would measure and record gas volumes. Facilities would be installed at the tap station to regulate the gas pressure, to remove any liquids or solid particles, and facilitate the use of pigs for pipeline inspection and cleaning In addition to the tap station, separate metering sets would be installed for each of the power plant sites. The three metering sets would measure and record gas volumes. As part of the Optimized Project Design, the location of the proposed gas line was re-routed along the west side of Ivanpah 2 and 3 to provide the Southwest Gas Company access to the line for service/repair work (CH2ML2008g).

The ISEGS would also require the transportation of certain liquid and solid hazardous materials to the facility. This document addresses all potential impacts associated with the use, storage, and transport of hazardous materials.

LAWS, ORDINANCES, REGULATION, AND STANDARDS

The following federal, state, and local laws and policies apply to the protection of public health and hazardous materials management. Staff's analysis examines the project's compliance with these requirements.

HAZARDOUS MATERIALS MANAGEMENT Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
The Superfund Amendments and Reauthorization Act of 1986 (42 USC §9601 et seq.)	Contains the Emergency Planning and Community Right To Know Act (also known as SARA Title III).
The Clean Air Act (CAA) of 1990 (42 USC 7401 et seq. as amended)	Establishes a nationwide emergency planning and response program, and imposes reporting requirements for businesses that store, handle, or produce significant quantities of extremely hazardous materials.
The CAA Section on Risk Management Plans (42 USC §112(r)	Requires states to implement a comprehensive system to inform local agencies and the public when a significant quantity of such materials is stored or handled at a facility. The requirements of both SARA Title III and the CAA are reflected in the California Health and Safety Code, section 25531, et seq.
49 CFR 172.800	Requires that the suppliers of hazardous materials prepare and implement security plans in accordance with U.S. Department of Transportation (DOT) regulations.
49 CFR Part 1572, Subparts A and B	Requires that suppliers of hazardous materials ensure that their hazardous material drivers comply with personnel background security checks.
The Clean Water Act (CWA) (40 CFR 112)	Aims to prevent the discharge or threat of discharge of oil into navigable waters or adjoining shorelines. Requires a written spill prevention, control, and countermeasures (SPCC) plan to be prepared for facilities that store oil that could leak into navigable waters.
Title 49, Code of Federal Regulations, Part 190	Outlines gas pipeline safety program procedures.
Title 49, Code of Federal Regulations, Part 191	Addresses the transportation of natural and other gases by pipeline. Requires preparation of annual reports, incident reports, and safety-related condition reports. Also requires operators of pipeline systems to notify the U.S. Department of Transportation

	DOT) of any reportable incident by telephone and submit a follow-up written report within 30 days.
Title 49, Code of Federal Regulations, Part 192	Addresses transportation of natural and other gases by pipeline: Requires minimum federal safety standards, specifies minimum safety requirements for pipelines, and includes material selection, design requirements, and corrosion protection. The safety requirements for pipeline construction vary according to the population density and land use that characterize the surrounding land. This part also contains regulations governing pipeline construction, which must be followed for Class 2 and Class 3 pipelines, and requirements for preparing a pipeline integrity management program.
6 CFR Part 27	The CFATS (Chemical Facility Anti-Terrorism Standard) regulation of the U.S. Department of Homeland Security (DHS) that requires facilities that use or store certain hazardous materials to submit information to the DHS so that a vulnerability assessment can be conducted to determine what certain specified security measures shall be implemented.
State	
California Health and Safety Code, section 25531 to 25543.4	The California Accidental Release Program (Cal-ARP) requires the preparation of a Risk Management Plan (RMP) and Off-site Consequence Analysis (OCA) and submittal to the local Certified Unified Program Authority (CUPA) for approval.
Title 8, California Code of Regulations, Section 5189	Requires facility owners to develop and implement effective safety management plans to ensure that large quantities of hazardous materials are handled safely. While these requirements primarily provide for the protection of workers, they also indirectly improve public safety and are coordinated with the RMP process.
Title 8, California Code of Regulations, Section 5189	Sets forth requirements for design, construction, and operation of the vessels and equipment used to store and transfer ammonia. These sections generally codify the requirements of several industry codes including the American Society for Material Engineering (ASME) Pressure Vessel Code, the American National Standards Institute (ANSI) K61.1, and the National Boiler and Pressure Vessel Inspection Code. These codes apply to anhydrous ammonia but are also used to design storage facilities for aqueous ammonia.
California Health and Safety Code, Section 41700	Requires that “No person shall discharge from any source whatsoever such quantities of air contaminants or other material which causes injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause injury or damage to business or property.”
California Safe	Prevents certain chemicals that cause cancer and reproductive

Drinking Water and Toxic Enforcement Act (Proposition 65)	toxicity from being discharged into sources of drinking water.
LOCAL	
	San Bernardino County does not have additional LORS that apply to Hazardous Materials Handling, but administers the State of California programs as the CUPA.

The San Bernardino County Fire Department (SBCFD) acts as the Certified Unified Program Authority (CUPA), and is responsible for reviewing Hazardous Materials Business Plans. With regard to seismic safety issues, the proposed ISEGS site is located in Seismic Risk Zone 4. The construction and design of buildings and vessels storing hazardous materials would meet the seismic requirements of the Uniform Building Code (BSE2007a, section 5.5.2.4).

SETTING

Several characteristics of an area in which a project is located affect its potential for an accidental release of a hazardous material. These include:

- local meteorology;
- terrain characteristics; and
- location of population centers and sensitive receptors relative to the project.

METEOROLOGICAL CONDITIONS

Meteorological conditions, including wind speed, wind direction, and air temperature, affect both the extent to which accidentally released hazardous materials would be dispersed into the air and the direction in which they would be transported. This affects the potential magnitude and extent of public exposure to such materials, as well as their health risks. When wind speeds are low and the atmosphere is stable, dispersion is severely reduced and can lead to increased localized public exposure.

Recorded wind speeds and ambient air temperatures are described in the Air Quality section (6.3.2) and Appendix G.1 of the Application for Certification (AFC) (BSE2007a).

TERRAIN CHARACTERISTICS

The location of elevated terrain is often an important factor in assessing potential exposure. An emission plume from an accidental release may impact high elevations before it impacts lower elevations. The topography of the ISEGS site (like its immediately surrounding areas) is essentially flat but sloping from west to east with approximately 1.7% grade at about 3,000 feet above sea level. At approximately three miles to the west, the slope terminates in a ridge at about 5,700 feet above sea level. Because of the nature of the surrounding area, the terrain above stack height is not of concern for the project. Due to the local terrain slope, runoff from the local area, as well as any uncaptured liquid runoff from the site, would tend to flow in an easterly direction.

LOCATION OF EXPOSED POPULATIONS AND SENSITIVE RECEPTORS

The general population includes many sensitive subgroups that may be at greater risk from exposure to emitted pollutants. These sensitive subgroups include the very young, the elderly, and those with existing illnesses. In addition, the location of the population in the area surrounding a project site may have a large bearing on health risk. There are no sensitive receptors within a 6-mile radius of the project vicinity (BSE2007a, section 5.9.3). The nearest residence to ISEGS is in Primm, Nevada, five miles northeast of the site (BSE2007a, figure 5.9-1).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

Staff reviewed and assessed the potential for the transportation, handling, and use of hazardous materials to impact the surrounding community. All chemicals and natural gas were evaluated. Staff's analysis examines the potential impacts on all members of the population including the young, the elderly, and people with existing medical conditions that may make them more sensitive to the adverse effects of hazardous materials. In order to accomplish this goal, staff utilizes the most current acceptable public health exposure levels (both acute and chronic) to protect the public from the effects of an accidental chemical release.

In order to assess the potential of released hazardous materials traveling off-site and affecting the public, staff analyzed several aspects of the proposed use of materials at the facility. Staff recognizes that some hazardous materials must be used at power plants. Therefore, staff conducted its analysis by focusing on the choice and amount of chemicals to be used, the manner in which the applicant would use the chemicals, the manner by which it would be transported to the facility and transferred to facility storage tanks, and the way in which the applicant plans to store those materials on-site.

Staff reviewed the applicant's proposed engineering and administrative controls for hazardous material use. Engineering controls are physical or mechanical systems such as storage tanks or automatic shut-off valves that can prevent a spill of hazardous material from occurring, or that can limit the spill to a small amount or confine it to a small area. Administrative controls are rules and procedures that workers must follow to help either prevent accidents or keep them small if they do occur. Both engineering and administrative controls can act as either methods of prevention or methods of response and minimization. In both cases, the goal is to prevent a spill from moving off-site and harming the public.

Staff reviewed and evaluated the proposed use of hazardous materials, as described by the applicant (BSE2007a, section 5.5). Staff's assessment followed the five steps listed below:

- Step 1: Staff reviewed the chemicals and amounts proposed for on-site use, as listed in Table 5.5-3 of the AFC and determined the need and appropriateness of

their use. Only those that are needed and appropriate are allowed to be used. If staff feels that a safer alternative chemical can be used, staff would recommend or require its use, depending upon the impacts posed.

- Step 2: Those chemicals, proposed for use in small amounts or whose physical state is such that there is virtually no chance that a spill would migrate off the site and impact the public, were removed from further assessment.
- Step 3: Measures proposed by the applicant to prevent spills were reviewed and evaluated. These included engineering controls such as automatic shut-off valves and different size transfer-hose couplings and administrative controls such as worker training and safety management programs.
- Step 4: Measures proposed by the applicant to respond to accidents were reviewed and evaluated. These measures also included engineering controls such as catchment basins and methods to keep vapors from spreading, and administrative controls such as training emergency response crews.
- Step 5: Staff analyzed the theoretical impacts on the public of a worst-case spill of hazardous materials even with the mitigation measures proposed by the applicant. When mitigation methods proposed by the applicant are sufficient, no further mitigation is recommended. If the proposed mitigation is not sufficient to reduce the potential for adverse impacts to an insignificant level, staff would propose additional prevention and response controls until the potential for causing harm to the public is reduced to an insignificant level. It is only at this point that staff can recommend that the project be allowed to use hazardous materials.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Proposed Project

Small Quantity Hazardous Materials

In conducting this analysis, staff determined in Steps 1 and 2 that most of the proposed materials, although present at the proposed facility, pose a minimal potential for off-site impacts since they would be stored in either solid form or in small quantities, have low mobility, low vapor pressure, or low levels of toxicity. These hazardous materials, which were eliminated from further consideration, are discussed briefly below.

During the construction phase of the project, the only hazardous materials proposed for use include paint, cleaners, solvents, gasoline, diesel fuel, motor oil, welding gases, and lubricants. Any impact of spills or other releases of these materials would be limited to the site because of the small quantities involved, the infrequent use and hence reduced chances of release, and/or the temporary containment berms used by contractors. Petroleum hydrocarbon-based motor fuels, mineral oil, lube oil, and diesel fuel all have very low volatility and would represent limited off-site hazards, even in larger quantities.

During operations, hazardous chemicals such as cleaning agents, lube oil, sulfuric acid, sodium hydroxide, ammonium hydroxide, diesel fuel and other various chemicals (see

Hazardous Materials Appendix A for a list of all chemicals proposed to be used and stored at ISEGS) would be used and stored on-site and represent limited off-site hazard due to their small quantities, low volatility, and/or low toxicity.

After removing from consideration those chemicals that pose no risk of off-site impact in Steps 1 and 2, staff continued with Steps 3, 4, and 5 to review the remaining hazardous material: natural gas.

Large Quantity Hazardous Materials

Natural Gas

Natural gas poses a fire and/or possible explosion risk because of its flammability. Natural gas is composed mostly of methane, but it also contains ethane, propane, nitrogen, butane, isobutene, and isopentane. It is colorless, odorless, tasteless, and lighter than air. Natural gas can cause asphyxiation when methane's concentration exceeds 90%. Methane is flammable when mixed in air at concentrations of 5-14%, which is also its detonation range. Natural gas therefore poses a risk of fire and/or explosion if a release were to occur under certain specific conditions. However, it should be noted that, due to its tendency to disperse rapidly (Lees 1998), natural gas is less likely to result in an unconfined vapor cloud explosion than many other fuel gases such as propane or liquefied petroleum gas although an unconfined vapor cloud of natural gas can explode under certain conditions (as demonstrated by the natural gas explosion in Belgium in July 2004).

While natural gas would be used in significant quantities, it would not be stored on-site. It would be delivered via an existing underground pipeline that runs within a half-mile of the northern perimeter of the ISEGS site. The risk of a fire and/or explosion on-site can be reduced to insignificant levels through adherence to applicable codes and the development and implementation of effective safety management practices. The National Fire Protection Association (NFPA 85A) requires the use of double block and bleed valves for gas shut-off and automated combustion controls. These measures would significantly reduce the likelihood of an explosion in gas-fired equipment. The Safety Management Plan proposed by the applicant would address both the handling and use of natural gas and significantly reduce the potential for equipment failure due to either improper maintenance or human error.

Mitigation

Staff believes that this project's use of hazardous materials poses no significant risk but only if mitigation measures are used. These mitigation measures are discussed in this section. The potential for accidents resulting in the release of hazardous materials is greatly reduced by the implementation of a Safety Management Program, which includes both engineering and administrative controls. Elements of facility controls and the safety management plan are summarized below.

Engineering Controls

Engineering controls help prevent accidents and releases (spills) from moving off-site and impacting the community by incorporating engineering safety design criteria into the project's design. Engineering safety features proposed by the applicant include:

- Usage of secondary containment areas surrounding each of the hazardous materials storage areas, designed to contain accidental releases during storage;
- Physical separation of stored chemicals in isolated containment areas, separated by a noncombustible partition in order to prevent the accidental mixing of incompatible materials, which may in turn cause the formation and release of toxic gases or fumes.

Administrative Controls

Administrative controls help prevent accidents and releases (spills) from moving off-site and impacting the community by establishing worker training programs and process safety management programs.

A Worker Health and Safety Program would be prepared by the applicant and include (but not be limited to) the following elements (see the **WORKER SAFETY/FIRE PROTECTION** section in this analysis for specific regulatory requirements):

- Worker training on chemical hazards, health and safety issues, and hazard communication;
- Procedures to ensure the proper use of personal protective equipment;
- Safety operating procedures for the operation and maintenance of systems that use hazardous materials;
- Fire safety and prevention; and
- Emergency response actions including facility evacuation, hazardous material spill cleanup, and fire prevention.

At ISEGS, the project owner would be required to designate an individual who would have the responsibility and authority to ensure a safe and healthful workplace. This project health and safety official would oversee the health and safety program and would have the authority to halt any action or modify any work practice in order to protect the workers, facility, and the surrounding community in the event that the health and safety program is violated.

Staff proposes Condition of Certification **HAZ-1** ensures that no hazardous material would be used at the facility except as listed in the AFC and reviewed for appropriateness, unless there is prior approval by BLM's Authorized Officer and the Energy Commission Compliance Project Manager (CPM). Staff reviewed the chemicals and amounts proposed for on-site use, as listed in Table 5.5-3 of the AFC and determined the need and appropriateness of their use. **HAZ-1** also requires changes to the allowed list of hazardous materials and their maximum amounts as listed in **Hazardous Materials Appendix A** to be approved by BLM's Authorized Officer and

the CPM. Only those that are needed and appropriate would be allowed to be used. If staff feels that a safer alternative chemical can be used, staff would recommend or require its use, depending upon the impacts posed.

A Hazardous Materials Business Plan (HMBP) would also be prepared by the project owner that would incorporate state requirements for the handling of hazardous materials (BSE2007a, section 5.5.6.4.1). Staff proposes Condition of Certification **HAZ-2** which ensures that the HMBP, which includes the Inventory and Site Map, Emergency Response Plan and Owner/Operator Identification, and Employee Training would be provided to the SBCFD so that SBCFD can better prepare emergency response personnel for handling emergencies which could occur at the facility. In accordance with Condition of Certification **HAZ-3**, the project owner would also be responsible to develop and implement a Safety Management Plan for delivery of liquid hazardous materials. The plan would include procedures, protective equipment requirements, training and a checklist. It would also include a section describing all measures to be implemented to prevent mixing of incompatible hazardous materials. This plan would be applicable during construction, commissioning, and operation of ISEGS.

On-site Spill Response

In order to address spill response, the facility would prepare and implement an emergency response plan which includes information on hazardous materials contingency and emergency response procedures, spill containment and prevention systems, personnel training, spill notification, on-site spill containment, prevention equipment and capabilities, etc. Emergency procedures would be established which include evacuation, spill cleanup, hazard prevention, and emergency response.

A Spill Prevention Control and Countermeasure Plan (SPCC) is required by Federal Regulations (see LORS above) and would be prepared for the petroleum-containing hazardous materials.

The San Bernardino County HazMat Team is currently based at Fire Station No. 78, in Fontana, California, which is located approximately 175 miles from the project site. The San Bernardino County HazMat Team response time to a hazmat emergency call from ISEGS is approximately 3 hours (Crawford 2008).

Staff concludes that, given the remote location, the hazardous material response time is acceptable, and that the San Bernardino County HazMat Team is adequately trained and equipped to respond to an emergency at ISEGS in a timely manner. The remote location lengthens the response but, at the same time, eliminates the risk of off-site consequences to the public.

Transportation of Hazardous Materials

Containerized hazardous materials including sulfuric acid, and cleaning chemicals, would be transported to the facility via truck. While many types of hazardous materials would be transported to the site, previous modeling of spills involving much larger quantities of more toxic materials, (aqueous ammonia and 93% sulfuric acid) - two

hazardous materials that would be used, stored, and transported at the proposed power plant – has demonstrated that minimal airborne concentrations would occur at short distances from the spill.

During construction and operation of ISEGS, staff believes that minimal amounts and types of hazardous materials (paint, cleaners, solvents, gasoline, diesel fuel, motor oil, lubricants, 20% sulfuric acid, and welding gases in standard-sized cylinders) do not pose a significant risk of either spills or public impacts along any transportation route. Staff therefore does not recommend a specific route.

Liquid hazardous materials can be released during a transportation accident, and the extent of their impact in the event of a release would depend on the location of the accident and the rate of vapor dispersion from the surface of the spilled pool. The likelihood of an accidental release during transport is dependent upon three factors:

- The skill of the tanker truck driver;
- The type of vehicle used for transport; and
- Accident rates.

To address this concern, staff evaluated the risk of an accidental transportation release in the project area. Staff's analysis focused on the project area after the delivery vehicle leaves the main Interstate highway (I-15). Staff believes it is appropriate to rely upon the extensive regulatory program that applies to shipment of hazardous materials on California Highways to ensure safe handling in general transportation (see the Federal Hazardous Materials Transportation Law 49 USC §5101 et seq, the U.S. Department of Transportation Regulations 49 CFR Subpart H, §172-700, and the California DMV Regulations on Hazardous Cargo). These regulations also address issues of driver competence. See AFC section 6.13.1 for additional information on regulations governing the transportation of hazardous materials.

Seismic Issues

The possibility exists that an earthquake could cause the failure of a hazardous materials storage tank. A quake could also cause the failure of the secondary containment system (berms and dikes), as well as electrically controlled valves and pumps. The failure of all these preventive control measures might then result in a vapor cloud of hazardous materials that could move off-site and impact residents and workers in the surrounding community. The effects of the Loma Prieta earthquake of 1989, the Northridge earthquake of 1994, and the earthquake in Kobe, Japan, in January 1995, heighten concerns about earthquake safety.

Information obtained after the January 1994 Northridge earthquake showed that some damage was caused to several large and small storage tanks at the water treatment system of a cogeneration facility. The tanks with the greatest damage, including seam leakage, were older tanks, while newer tanks sustained lesser damage with displacements and attached line failures. Therefore, staff conducted an analysis of the codes and standards, which should be followed to adequately design and build storage tanks and containment areas that could withstand a large earthquake. Staff also reviewed the impacts of the February 2001 Nisqually earthquake near Olympia,

Washington, a state with similar seismic design codes as California. No hazardous materials storage tanks were impacted by this quake. Referring to the sections on **GEOLOGIC RESOURCES AND HAZARDS** and **FACILITY DESIGN** in the AFC, staff notes that the proposed facility would be designed and constructed to the applicable standards of the 2007 California Building Code for Seismic Zone 4 (BSE2007a, section 5.4.2, Table 5.4-1). Therefore, on the basis of occurrences at Northridge with older tanks and the lack of failures during the Nisqually earthquake with newer tanks, staff determined that tank failures during seismic events are not likely and do not represent a significant risk to the public.

Site Security

ISEGS proposes to use hazardous materials where special site security measures should be developed and implemented to prevent unauthorized access. US EPA published a *Chemical Accident Prevention Alert* regarding site security (EPA 2000a), the U.S. Department of Justice published a special report on Chemical Facility Vulnerability Assessment Methodology (US DOJ 2002), the North American Electric Reliability Corporation (NERC) published *Security Guidelines for the Electricity Sector* in 2002 (NERC 2002), and the U.S. Department of Energy published a draft *Vulnerability Assessment Methodology for Electric Power Infrastructure* in 2002 (DOE 2002). The energy generation sector is one of 14 areas of critical Infrastructure listed by the U.S. Department of Homeland Security. On April 9, 2007, the U.S Department of Homeland Security published, in the Federal Register (6 CFR Part 27), an Interim Final Rule requiring facilities that use or store certain hazardous materials to conduct vulnerability assessments and implement certain specified security measures. This rule was implemented with the publication of Appendix A, the list of chemicals, on November 2, 2007. Staff believes that all power plants under the jurisdiction of the Energy Commission should implement a minimum level of security consistent with the guidelines listed here.

In order to ensure that this facility (or a shipment of hazardous material) is not the target of unauthorized access, staff's proposed conditions of certification **HAZ-4** and **HAZ-5** address both Construction Security and Operations Security Plans. These plans would require the implementation of site security measures that are consistent with both the above-referenced documents and Energy Commission guidelines.

The goal of these conditions of certification is to provide the minimum level of security for power plants needed to protect California's electrical infrastructure from malicious mischief, vandalism, or domestic/foreign terrorist attacks. The level of security needed for this power plant is dependent upon the threat imposed, the likelihood of an adversarial attack, the likelihood of success in causing a catastrophic event, and the severity of consequences of that event.

In order to determine the level of security, the Energy Commission staff used an internal vulnerability assessment decision matrix modeled after the U.S. Department of Justice Chemical Vulnerability Assessment Methodology (July 2002), the NERC 2002 guidelines, the U.S. Department of Energy VAM-CF model, and U.S. Department of Homeland Security regulations published in the Federal Register (Interim Final Rule 6

CFR Part 27). Staff determined that ISEGS would fall into the “low vulnerability” category, so staff proposes that certain security measures be implemented but does not propose that the project owner conduct its own vulnerability assessment.

These security measures include perimeter fencing and breach detectors, possibly guards, alarms, site access procedures for employees and vendors, site personnel background checks, and law enforcement contact in the event of a security breach. Site access for vendors would be strictly controlled. Consistent with current state and federal regulations governing the transport of hazardous materials, hazardous materials vendors would have to maintain their transport vehicle fleets and employ only drivers who are properly licensed and trained. The project owner would be required, through its contractual language with vendors, to ensure that vendors supplying hazardous materials strictly adhere to the U.S. DOT requirements that hazardous materials vendors prepare and implement security plans per 49 CFR 172.800 and ensure that all hazardous materials drivers are in compliance with personnel background security checks per 49 CFR Part 1572, Subparts A and B. BLM’s Authorized Officer and the CPM may authorize modifications to these measures, or may require additional measures in response to additional guidance provided by the U.S. Department of Homeland Security, the U.S. Department of Energy, or NERC, after consultation with appropriate law enforcement agencies and the applicant.

Facility Closure and Decommissioning

The requirements for handling of hazardous materials remain in effect until such materials are removed from the site, regardless of facility closure. Therefore, the facility owners are responsible for continuing to handle such materials in a safe manner, as required by applicable laws. In the event that the facility owner abandons the facility in a manner that poses a risk to surrounding populations, staff would coordinate with the California Office of Emergency Services, San Bernardino County Fire Department, and the California Department of Toxic Substances Control (DTSC) to ensure that any unacceptable risk to the public is eliminated. Funding for such emergency action as well as site removal, rehabilitation and revegetation activities would be available from a performance bond required of the applicant by BLM in accordance with Condition of Certification **LAND-1**.

No Project/No Action Alternative

As the use of hazardous materials at the proposed project would have no significant impacts off-site, there would be no significant impact on the public resulting from their use. Thus, the No Project/No Action alternative would not avoid or lessen any significant impacts compared to the proposed project.

CUMULATIVE IMPACTS AND MITIGATION

Staff considered the potential for impacts due to a simultaneous release of any of the hazardous chemicals from the proposed ISEGS with other existing or foreseeable nearby facilities as listed in the **Cumulative Scenario** section. Because of the small amounts of the hazardous chemicals to be stored at the facility, Staff determined that there was no possibility of producing an offsite impact. Because of this determination, and the additional fact that there are no nearby facilities using large amounts of

hazardous chemicals, there is little (if any) possibility that vapor plumes would mingle (combine) to produce an airborne concentration that would present a significant risk.

COMPLIANCE WITH LORS

Staff concludes that construction and operation of ISEGS would be in compliance with all applicable LORS for both long-term and short-term project impacts in the area of hazardous materials management.

NOTEWORTHY PUBLIC BENEFITS

Staff has not identified any noteworthy public benefits associated with the use of hazardous materials at the proposed project.

PUBLIC AND AGENCY COMMENTS ON THE PSA

Basin and Range Watch (BRW) provided comments in their letter dated January 31, 2009 which are presented as individual comments followed by staff's response.

Comment #1: What impact due to potential worker exposure to hazardous materials might be expected upon local communities and their medical services?

Staff's Response #1: The **Worker Safety and Fire Protection** section of this EIS/FSA covers worker safety requiring compliance with State and Federal OSHA regulations including potential exposure to hazardous materials. The chemicals to be used at ISEGS during construction and operations are commonly used in industrial and power plant environments. While there may be occasional industrial injuries, staff concludes that they would not cause a significant impact on local medical services.

Comment #2: What are the impacts due to transporting hazardous materials on local communities?

Staff's Response #2: Staff's hazardous materials transportation surveys have found that the risk of a loss of containment accident is very low. The US-DOT, California DMV and CHP regulate and enforce transportation methods, equipment, licensing, and routes. Staff believes it is appropriate to rely upon the extensive regulatory program that regulates the shipment of hazardous materials on California's highways.

Comment #3: What impacts might hazardous materials usage have on local flora and fauna?

Staff's Response #3: Most hazardous chemicals used would be in the power blocks of each power plant. The power blocks are located in the center of each power plant, thus would be most distant from site fence lines and project boundaries. Applicant's proposed controls and procedures, combined with staff's proposed conditions of certification, make it very unlikely that there would be any significant

impact outside the fence line. Around-the-site fencing would exclude protected species such as the desert tortoise from the site.

Comment #4: What protocols would be used for heavy-metal-containing wastes that are spilled during construction or operation?

Staff's Response #4: If any heavy-metal-containing wastes are spilled, the Hazardous Materials Business Plan, emergency action plan, and EPA-approved hazardous waste handling and clean-up protocols would be used per EPA requirements (see **Waste Management** section).

Comment #5: How would herbicide spraying be controlled to prevent harming desert habitats?

Staff's Response #5: Applicant's plans call for trimming most on-site vegetation to a height of 12-18 inches, and applying herbicide only as needed for access and transportation. Vegetation around the power blocks would be eliminated. Staff's proposed Condition of Certification WS-6 (see the **Worker Safety** section) requires the applicant to implement a Best Management Practices for storage and application of herbicides.

CONCLUSIONS

Staff's evaluation of the proposed project (with proposed mitigation measures) indicates that hazardous material use, storage, and transportation would not pose a significant impact with respect to CEQA or NEPA. Staff's analysis also shows that there would be no significant cumulative impact. With adoption of the proposed conditions of certification, the proposed project would comply with all applicable LORS. Other proposed conditions of certification address the issues of site security matters.

Staff recommends that the Energy Commission impose the proposed conditions of certification, presented below, to ensure that the project is designed, constructed, and operated in compliance with applicable LORS, and would protect the public from significant risk of exposure to an accidental release of hazardous materials. If all mitigation proposed by the applicant and by staff are implemented, the use, storage, and transportation of hazardous materials would not present a significant risk to the public.

Staff concludes that there is insignificant potential for hazardous materials release to have significant impact beyond the facility boundary, and therefore concludes there is also insignificant potential for significant impact to the environment. For any other potential impacts upon the environment, including vegetation, wildlife, air, soils, and water resulting from hazardous materials usage and disposal at the proposed facility, the reader is referred to the **Biology**, the **Air Quality**, the **Soil and Water**, and the **Waste Management** sections of this FSA/DEIS.

Staff proposes six conditions of certification, some of which are mentioned in the text (above), and listed below. **HAZ-1** ensures that no hazardous material would be used at the facility except as listed in the AFC, unless there is prior approval by the Energy

Commission Compliance Project Manager. **HAZ-2** ensures that local emergency response services are notified of the amounts and locations of hazardous materials at the facility, **HAZ-3** requires the development of a Safety Management Plan that addresses the delivery of all liquid hazardous materials during the construction, commissioning, and operation of the project would further reduce the risk of any accidental release not specifically addressed by the proposed spill prevention mitigation measures, and further prevent the mixing of incompatible materials that could result in the generation of toxic vapors. Site security during both the construction and operation phases is addressed in **HAZ-4** and **HAZ-5. HAZ-6** ensures that the applicant complies with all Federal LORS regarding use, management, spills, and reporting of hazardous materials on Federal lands.

MITIGATION MEASURES/PROPOSED CONDITIONS OF CERTIFICATION

HAZ-1 The project owner shall not use any hazardous materials not listed in **Hazardous Materials Appendix A**, below, or in greater quantities than those identified by chemical name in **Hazardous Materials Appendix A,** unless approved in advance by the BLM's Authorized Officer and Compliance Project Manager (CPM).

Verification: The project owner shall provide to BLM's Authorized Officer and the CPM in the Annual Compliance Report, a list of hazardous materials contained at the facility.

HAZ-2 The project owner shall concurrently provide a Hazardous Materials Business Plan to the Hazardous Materials Division of the County of San Bernardino Fire Department, BLM's Authorized Officer and the CPM for review. After receiving comments from the Hazardous Materials Division of the County of San Bernardino Fire Department, BLM's Authorized Officer and the CPM, the project owner shall reflect all received recommendations in the final documents. If no comments are received from the county within 30 days of submittal, the project owner may proceed with preparation of final documents upon receiving comments from BLM's Authorized Officer and the CPM. . Copies of the final Hazardous Materials Business Plan shall then be provided to the Hazardous Materials Division of the County of San Bernardino Fire Department for information and to the BLM's Authorized Officer and CPM for approval.

Verification: At least 60 days prior to receiving any hazardous material on the site for commissioning or operations, the project owner shall provide a copy of a final Hazardous Materials Business Plan to BLM's Authorized Officer and the CPM for approval.

HAZ-3 The project owner shall develop and implement a Safety Management Plan for delivery of liquid hazardous materials. The plan shall include procedures, protective equipment requirements, training and a checklist. It shall also include a section describing all measures to be implemented to prevent

mixing of incompatible hazardous materials. This plan shall be applicable during construction, commissioning, and operation of the power plant.

Verification: At least sixty (60) days prior to the delivery of any liquid hazardous material to the facility, the project owner shall provide a Safety Management Plan as described above to BLM's Authorized Officer and the CPM for review and approval.

HAZ-4 At least thirty (30) days prior to commencing construction, a site-specific Construction Site Security Plan for the construction phase shall be prepared and made available to BLM's Authorized Officer and the CPM for review and approval. The Construction Security Plan shall include the following:

1. Perimeter security consisting of fencing enclosing the construction area;
2. Security guards;
3. Site access control consisting of a check-in procedure or tag system for construction personnel and visitors;
4. Written standard procedures for employees, contractors and vendors when encountering suspicious objects or packages on-site or off-site;
5. Protocol for contacting law enforcement, BLM's Authorized Officer and the CPM in the event of suspicious activity or emergency; and
6. Evacuation procedures.

Verification: At least thirty (30) days prior to commencing construction, the project owner shall notify BLM's Authorized Officer and the CPM that a site-specific Construction Security Plan is available for review and approval.

HAZ-5 The project owner shall prepare a site-specific Operation Security Plan for the operational phase and shall be made available to BLM's Authorized Officer and the CPM for review and approval. The project owner shall implement site security measures addressing physical site security and hazardous materials storage. The level of security to be implemented shall not be less than that described below (as per NERC 2002).

The Operation Security Plan shall include the following:

1. Permanent full perimeter fence or wall, at least eight feet high around the Power Block and Solar Field;
2. Main entrance security gate, either hand operable or motorized;
3. Evacuation procedures;
4. Protocol for contacting law enforcement, BLM's Authorized Officer and the CPM in the event of suspicious activity or emergency;
5. Written standard procedures for employees, contractors and vendors when encountering suspicious objects or packages on-site or off-site;

6. a. A statement (refer to sample, attachment “A”) signed by the project owner certifying that background investigations have been conducted on all project personnel. Background investigations shall be restricted to ascertain the accuracy of employee identity and employment history, and shall be conducted in accordance with state and federal law regarding security and privacy;

   b. A statement(s) (refer to sample, attachment “B”) signed by the contractor or authorized representative(s) for any permanent contractors or other technical contractors (as determined by BLM’s Authorized Officer and the CPM after consultation with the project owner) that are present at any time on the site to repair, maintain, investigate, or conduct any other technical duties involving critical components (as determined by BLM’s Authorized Officer and the CPM after consultation with the project owner) certifying that background investigations have been conducted on contractor personnel that visit the project site.

7. Site access controls for employees, contractors, vendors, and visitors;

8. Closed Circuit TV (CCTV) monitoring system, recordable, and viewable in the power plant control room and security station (if separate from the control room) capable of viewing, at a minimum, the main entrance gate; and

9. Additional measures to ensure adequate perimeter security consisting of either:

   a. Security guard present 24 hours per day, seven days per week, **OR**

   b. Power plant personnel on-site 24 hours per day, seven days per week and **all** of the following:

      1) The CCTV monitoring system required in number 8 above shall include cameras that are able to pan, tilt, and zoom (PTZ), have low-light capability, are recordable, and are able to view 100% of the perimeter fence, the outside entrance to the control room, and the front gate from a monitor in the power plant control room; **AND**

      2) Perimeter breach detectors **or** on-site motion detectors.

The project owner shall fully implement the security plans and obtain BLM’s Authorized Officer and CPM approval of any substantive modifications to the security plans. BLM’s Authorized Officer and the CPM may authorize modifications to these measures, or may require additional measures, such as protective barriers for critical power pant components (e.g., transformers, gas lines, compressors, etc.) depending on circumstances unique to the facility or in response to industry-related standards, security concerns, or additional guidance provided by the U.S. Department of Homeland Security,

the U.S. Department of Energy, or the North American Electrical Reliability Council, after consultation with appropriate law enforcement agencies and the applicant.

Verification: At least 30 days prior to the initial receipt of hazardous materials on-site, the project owner shall notify BLM's Authorized Officer and the CPM that a site-specific Operations Site Security Plan is available for review and approval. In the Annual Compliance Report, the project owner shall include a statement that all current project employee and appropriate contractor background investigations have been performed, and updated certification statements are appended to the Operations Security Plan. In the Annual Compliance Report, the project owner shall include a statement that the Operations Security Plan includes all current hazardous materials transport vendor certifications for security plans and employee background investigations.

HAZ-6 The holder (project owner) shall comply with all applicable Federal laws and regulations existing or hereafter enacted or promulgated. In any event, the holder(s) shall comply with the Toxic Substances Control Act of 1976, as amended (15 U.S.C. 2601, et seq.) with regard to any toxic substances that are used, generated by or stored on the right-of-way or on facilities authorized under this right-of-way grant. (See 40 CFR, Part 702-799 and especially, provisions on polychlorinated biphenyls, 40 CFR 761.1-761.193.) Additionally, any release of toxic substances (leaks, spills, etc.) in excess of the reportable quantity established by 40 CFR, Part 117 shall be reported as required by the Comprehensive Environmental Response, Compensation and Liability Act of 1980, Section 102b

Verification: A copy of any report required or requested by any Federal agency or State government as a result of a reportable release or spill of any toxic substances shall be furnished to BLM's Authorized Officer and the CPM concurrent with the filing of the reports to the involved Federal agency or State government.

SAMPLE CERTIFICATION (Attachment "A")

Affidavit of Compliance for Project Owners

I, _____
(Name of person signing affidavit)(Title)

do hereby certify that background investigations to ascertain the accuracy of the identity and employment history of all employees of

_____
(Company Name)

for employment at

_____
(Project name and location)

have been conducted as required by the U.S. Bureau of Land Management Right-of-Way and California Energy Commission Decision for the above- named project.

_____
(Signature of Officer or Agent)

Dated this _____ day of _____, 20 _____.

THIS AFFIDAVIT OF COMPLIANCE SHALL BE APPENDED TO THE PROJECT SECURITY PLAN AND SHALL BE RETAINED AT ALL TIMES AT THE PROJECT SITE FOR REVIEW BY BLM's AUTHORIZED OFFICER AND THE CALIFORNIA ENERGY COMMISSION COMPLIANCE PROJECT MANAGER.

SAMPLE CERTIFICATION (Attachment "B")

Affidavit of Compliance for Contractors

I, _____
(Name of person signing affidavit)(Title)

do hereby certify that background investigations to ascertain the accuracy of the identity and employment history of all employees of

_____
(Company Name)

for contract work at

_____
(Project name and location)

have been conducted as required by the U.S. Bureau of Land Management Right-of-Way and California Energy Commission Decision for the above- named project.

_____
(Signature of Officer or Agent)

Dated this _____ day of _____, 20 _____.

THIS AFFIDAVIT OF COMPLIANCE SHALL BE APPENDED TO THE PROJECT SECURITY PLAN AND SHALL BE RETAINED AT ALL TIMES AT THE PROJECT SITE FOR REVIEW BY BLM's AUTHORIZED OFFICER AND THE CALIFORNIA ENERGY COMMISSION COMPLIANCE PROJECT MANAGER.

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Hazardous Materials
Appendix A

Hazardous Materials Proposed for Use At the ISEGS Power Project

September 2009

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Hazardous Materials Appendix A

Hazardous Materials Proposed for Use at ISEGS

Trade Name	Chemical Name	CAS Number	Application	Maximum Quantity Onsite
Antiscalant (Permatreat PC-391)	Not Available	None	Antiscalant for boiler and steam turbine	70 gal
Cleaning chemicals/detergents	Various	None	Periodic cleaning of steam turbine	100 gal
Diesel No. 2	Oil	None	Fuel for fire pump engine/generators	9,000 gal
Hydraulic oil	Oil	None	High-pressure turbine starting system, turbine control valve actuators	500 gal
Lubrication oil	Oil	None	Lubricate rotating equipment (e.g., steam turbine bearings)	30,000 gal
Mineral insulating oil	Oil	8012-95-1	Transformers/switchyard	105,000 gal
Oxygen scavenger (Cortrol OS5607)	Carbonic Dyhdrazide	497-18-7	Oxygen scavenger for boiler cleaning solution and steam-water cycle	170 gal
Phosphate Treatment (Optisperse HP3100)	Sodium Hydroxide	1310-73-2	Phosphate treatment for boiler internal treatment	62 gal
Sodium Hydroxide Solution	Sodium hydroxide (30%)	1310-73-2	pH Control	170 gal
Steam Condensate Treatment (Steamate NA1321)	Ammonium Hydroxide	1336-21-6	Condensate and feedwater pH control	300 gal
Sulfuric Acid	Sulfuric acid (20%)	7664-93-9	pH control	670 gal
Lead Acid Batteries (Sulfuric Acid and Lead) size of batteries approx 10cm x 5cm x 7cm	Sulfuric acid (10%-30%) Lead (45-60%)	7664-93-9 7439-92-1	Electrical power	272,000 batteries
Sulfur hexafluoride	Sulfur hexafluoride	2551-62-4	Switchyard/switchgear devices	200 lb

a. Source: BSE2007a, Tables 5.5-3, 5.5-4

LAND USE

Prepared by Amanda Stennick

SUMMARY OF CONCLUSIONS

The U.S. Bureau of Land Management (BLM) and Energy Commission staff (hereafter jointly referred to as staff) have reviewed the proposed project in light of the California Environmental Quality Act (CEQA) Guidelines' and the National Environmental Policy Act's (NEPA) criteria for a significant land use impact. The criteria include an assessment of whether a proposed project will conflict with any applicable land use plan. The key land use plan affecting this project is the BLM's California Desert Conservation Area (CDCA) Plan of 1980, as amended (BLM 1980). In the CDCA Plan, the location of the proposed Ivanpah Solar Electric Generating System (ISEGS) facility includes land that is classified as Multiple-Use Class L (Limited Use). The Plan states that solar power facilities may be allowed within Limited Use areas after NEPA requirements are met. This Environmental Impact Statement acts as the mechanism for complying with those NEPA requirements.

Because solar power facilities are an allowable use of the land as it is classified in the CDCA Plan, the proposed action does not conflict with the Plan. However, the Plan also requires that newly proposed power facilities that are not already included within the Plan be added to the Plan through the Plan Amendment process. The ISEGS facility is not currently included within the Plan, and therefore a Plan Amendment is required to include the facility as a recognized element with the Plan. The proposed Plan Amendment, and the corresponding analysis of the proposed Plan Amendment with respect to the analysis requirements contained within Chapter 7 of the Plan, is provided within Section A of this Environmental Impact Statement. The amendment decision would occur after publication of the Final Environmental Impact Statement.

Approximately 50 percent of the land area for Ivanpah 1, 2, and 3 and the administrative complex/logistics area are located within existing Utility Corridors D and BB. The land area for Ivanpah 3 would cover approximately 60% of the 2-mile width of Corridor D. Although the proposed ISEGS facility would result in limiting the available area within Corridor D, future linear facilities could still be placed in the remaining portion of this corridor.

Impacts of the ISEGS project would combine with impacts of present and reasonably foreseeable projects to result in a contribution to cumulative impacts in the Ivanpah Valley area related to land use which would be significant with respect to CEQA as well as NEPA significance criteria in 40 CFR 1508.27. Impacts of the ISEGS project would also combine with the potential impacts of reasonably foreseeable renewable energy projects in the southern California Mojave desert to result in significant and unmitigable regional cumulative impacts related to land use. .

In addition, staff concludes that the project would not conform with some of the applicable goals and policies of the San Bernardino General Plan Conservation and Open Space Elements as follows:

1. Conservation Element Goal D/CO 1, calling for preservation of scenic vistas in the County. Staff found that the project would have adverse effects on scenic vistas.

2. Open Space Element Goal OS 5, calling for the County to maintain and enhance the visual character of scenic routes in the County; and Policy OS 5.2, which states that "Development along scenic corridors will be required to demonstrate through visual analysis that proposed improvements are compatible with the scenic qualities present." The visual analysis of the project found that it would not be compatible with the scenic qualities present in the viewshed of portions of Highway I-15 designated as a County scenic route.

Conditions of Certification referred to herein serve the purpose of both the Energy Commission's Conditions of Certification for purposes of CEQA and BLM's Mitigation Measures for purposes of NEPA.

INTRODUCTION

The land use analysis of the Ivanpah Solar Electric Generating System (ISEGS) Application for Certification (07-AFC-5) focuses on the project's consistency with the land use laws, ordinances, regulations standards, plans and policies, and the project's compatibility with existing and planned land uses. In general, a power plant and its related facilities have the potential to create land use impacts if they create unmitigated noise, dust, public health hazard or nuisance, traffic, or visual impacts. These individual resource areas are discussed in separate sections of this document. A power plant would also create a significant impact if it converts prime or unique farmland or farmland of statewide importance to non-agricultural uses. Because the power plant site and associated linear project features are located on public land managed by the BLM, the project will require federal environmental review before BLM can issue a right-of-way grant allowing the use of public land.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The following table contains all applicable land use laws, ordinances, regulations, and standards.

LAND USE Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal Bureau of Land Management	California Desert Conservation Area (CDCA) Plan Northern and Eastern Mojave (NEMO) Desert Management Plan Code of Federal Regulations Title 40; § 1508.27 Code of Federal Regulations Title 43; §1610.5-3, 2800 Federal Land Policy and Management Act (1976)
State	There are no state land use LORS for this project
Local	San Bernardino County General Plan San Bernardino County 2007 Development Code

SETTING

The Ivanpah Valley area has approximately 37,280 acres of land bounded by the Mojave National Preserve at Nipton Road on the south and southwest, a power line road parallel to and south of Interstate 15 (I-15) across Ivanpah Dry Lake on the northwest and north, and the Nevada border on the east. It is also adjacent to the Stateline and Mesquite Wilderness Areas. The easternmost portion of the valley includes extensive private land, and is undergoing substantial development at the Nevada border. This development includes casinos and associated hotels, restaurants, a golf course and other tourist attractions. Future development in the area would include solar facilities and a commercial service airport (Southern Nevada Supplemental Airport) north of Primm, Nevada.

The proposed ISEGS project would be located in the Mojave Desert, in San Bernardino County, 3.1 miles west of the California/Nevada border on public land managed by the BLM. The project would be west of Ivanpah Dry Lake, north of I-15. The project would be located entirely on public land and would be under federal jurisdiction. There are no schools, day-care facilities, convalescent centers, or hospitals within the immediate vicinity of the project study area. The project study area does include land that is designated for use as Utility Corridors (Corridors D and BB) in the CDCA Plan. The town of Primm, Nevada (population 436), is located about 4.5 miles northeast of the project site. Edwards Air Force Base is located 145 miles west-southwest of the site.

Interstate 15 provides access from southern California to Nevada. I-15 is located to the east of the project area and crosses into Nevada approximately 4 miles northeast of the project site. State Route (SR) 164 intersects I-15 just south of the project area. The I-15 Yates Well Road northbound and southbound off-ramps provide access to the project site by way of Colosseum Road, an existing road that is paved to the Primm Valley Golf Club, but unpaved the remainder of its length. Primm Valley Golf Club is located about 0.5 mile east of the Ivanpah 1 site boundary. The golf course is affiliated with the Primm Valley Casino Resorts located in Las Vegas, Nevada and is a public course.

The Ivanpah Dry Lake is located approximately 1.6 miles east of the project site and covers approximately 35 square miles. This area is open to non-motorized vehicles and

is a popular destination for recreational activities such as land sailing, archery, and kite buggies. The area also provides diverse recreational and scenic opportunities for off-highway vehicle use.

Proposed Project Description

The applicant proposes to develop the ISEGS project in three phases that are designed to generate a total of 400 megawatts (MW) of electricity. The first two phases of the project, Ivanpah 1 and 2 are designed to provide 100 MW of electricity and the third phase, Ivanpah 3, is designed to provide 200 MW of electricity. The 100 MW phases, Ivanpah 1 and 2, would each occupy approximately 914 acres and 921 acres respectively; the 200 MW phase, Ivanpah 3, would require occupy approximately 1,837 acres. All three phases would be developed on contiguous property, sharing an administration building, an operation and maintenance building and a substation within a common logistics area between Ivanpah 1 and 2 that would also be used for construction laydown and staging activities. The proposed project would cause permanent disturbance of about 3,713 acres, temporary disturbance of 321 acres, and including the existing transmission line corridor of about 39 acres within the Construction Logistics area, ISEGS would utilize about 4,073 acres (6.4 square miles) of federal land managed by BLM (CH2ML 2009f).

In addition to use the proposed right-of-way area, the applicant proposes some project-related activities to occur outside of the project fence, on land not included within the proposed right-of-way area. As presented in the applicant's Revised Project Description, a variety of project-related activities must be conducted outside of the project security fence, including:

- Inspection and maintenance of security fence and tortoise exclusion fence;
- Underground utility repairs;
- Installation of new underground pipeline;
- Maintenance of drainage systems, including removal of debris and sediment; and
- Installation of new stormwater drainage systems (CH2ML 2009f).

In addition to these activities, a roadway would need to be maintained outside of the project fence to allow vehicle and equipment access for these activities. The Revised Project Description does not define specific locations or acreages for these activities. Instead, it states that some activities, such as installation of new stormwater drainage systems, could disturb greater than one acre, with no upward bound placed on the projected disturbance.

Throughout most of the proposed right-of-way area, the applicant proposes that the security and tortoise exclusion fence be inset from the right-of-way boundary to allow access for these activities. These inset distances range from 65 feet where natural gas pipeline is buried to 12 feet in areas without pipeline. However, there are certain portions of the proposed facility where the security fence is proposed to be coincident with the right-of-way boundary. This includes the entire perimeter of Ivanpah 1, and the southern and western edge of Ivanpah 3. In these areas, all of the described maintenance and repair activities would have to occur on lands that are not included

within the proposed right-of-way grant. In addition, the total area of disturbance that would occur as a result of these activities is not defined. The potential area of disturbance associated with new stormwater drainage systems is defined as “one acre or more”. Since the buffer distance between the security fence and the right-of-way boundary in other areas is as low as 12 feet, the development of stormwater drainage systems that exceed one acre in size would likely extend outside of the right-of-way boundary (CH2ML2009e, Drainage, Erosion and Sediment Control Plan Figure 15 – Access Roadway Plan).

The ISEGS project would deliver power from Ivanpah 1, 2 and 3 via three separate 115-kilovolt (kV) transmission generation tie lines to a new Ivanpah substation that would be owned and operated by Southern California Edison (SCE) and located in the common construction logistics area between Ivanpah 1 and 2. Ivanpah 1 would initially be interconnected to an existing SCE 115kV transmission line at Ivanpah substation. Following upgrade of the existing 115-kV transmission line to double circuit 220 kV, Ivanpah 2 and 3, and ultimately Ivanpah 1 would be interconnected to SCE’s 220 kV transmission line at Ivanpah substation that would pass through the site in a northeast/southwest right-of-way. The new substation and the 220-kV upgrades would benefit ISEGS and other proposed interconnection customers in the region. SCE has filed an application for a Certificate of Public Convenience and Necessity from the California Public Utilities Commission (CPUC) for the transmission line upgrade. They have also filed an application for a right-of-way (ROW) from the BLM. The CPUC will serve as the lead agency for CEQA compliance for the approximately five-mile portion of the transmission line work within California. BLM will serve as the lead agency for National Environmental Policy Act compliance (CH2ML 2009f).

The applicant has defined the study area as the area within 1 mile of the project site boundary and within 0.25 mile of the centerline of proposed linear facilities. All project power plants, the substation, the administration/warehouse building, and the linear facilities are within the site boundary (minor exceptions are noted below). Please refer to the **Project Description** section of this document for further discussion of this topic. Other aspects of the ISEGS include the following:

- A small segment of water line that goes from the two wells to the northwest of Ivanpah 1 into the site;
- An administration and maintenance complex located within the logistics area between Ivanpah 1 and 2, near the entrance to the Ivanpah 1 power plant;
- A new 6-mile-long, 4- to 6-inch natural gas distribution pipeline that provides natural gas from the Kern River Gas Transmission (KRGT) line to each of the project sites;. From the Kern River Gas Transmission pipeline, the new pipeline would extend 0.5 miles south to the northern edge of Ivanpah 3. The ROW area required for this section of the pipeline would be 75 feet wide and 0.5 miles long. The line would then run east along the northern edge, and then south along the eastern edge, of Ivanpah 3 to a metering station near the southeast corner of Ivanpah 3. From there, a supply line would extend northwest into the Ivanpah 3 power block. The main pipeline would continue along the eastern edge of Ivanpah 2 to another metering station at its southeastern corner. Again, a branch supply line will extend northwestwards into the center of the Ivanpah 2 power block. From that station, the pipeline would follow

the paved access road from Colosseum Road past the administration/warehouse building to the Ivanpah 1 power block. The extensions of the pipeline into the power blocks would be located within the project fenceline. However, the sections of pipeline along the northern boundary of Ivanpah 3, and then the eastern boundaries of Ivanpah 3 and 2, would be located outside of the fenced heliostat area, in order to allow access to the pipeline for maintenance.

- Shared access roads, including a portion of the perimeter road on the southern and western edge of Ivanpah 2; and
- Temporary construction and laydown yard areas (CH2ML 2009f).

Land Use Table 2 gives the land use and general plan designations for each project component.

LAND USE Table 2
Existing Land Uses and General Plan Designations

Project Component	Existing Land Uses	Land Management or General Plan Land Use and Zoning Designations
Site Vicinity	SCE 115kV transmission line is located adjacent to the site boundary in a southwest to northeast orientation. The Kern River Gas Transmission Company line is located less than a half mile from the Ivanpah 3 boundary. Both utilities are within designated Utility Corridors for major utilities.	**BLM** Multiple-Use Class L Limited Use Designated Utility corridor **San Bernardino County General Plan and Development Code Land Use Zones** Resource Conservation (RC)
ISEGS Site	The project site is mostly undeveloped, vacant land. Existing transmission lines cross the project site in a southwest to northeast orientation between Ivanpah 1 and Ivanpah 2. These transmission lines exist within Utility Corridor BB, a two-mile wide corridor approved in the CDCA Plan for use for transmission lines, pipelines, and other linear utilities. The project site also covers portions of Utility Corridor D. Colosseum Road passes through the southeast portion of Ivanpah 2 and travels in a west to southwesterly direction. Unpaved dirt roads also cross the project site, some of which are located adjacent to the transmission lines. No additional development is present on the site.	**BLM** Multiple-Use Class L Limited Use Designated Utility corridor **San Bernardino County General Plan and Development Code Land Use Districts** Resource Management District and Resource Conservation (RC)
Gas Line	Onsite and offsite gas lines are located on structurally undeveloped land. The Ivanpah 1 gas line would cross under existing transmission lines. The gas lines would cross an existing unpaved road.	**BLM** Multiple-Use Class L Limited Use **San Bernardino County General Plan and Development Code Land Use Districts** Resource Management District and Resource Conservation (RC)
Transmission Lines	Onsite and offsite transmission lines would be located for the most part within the site boundary, those linears that extend outside of the site boundary are located within existing rights-of-way.	**BLM** Multiple-Use Class L Limited Use **San Bernardino County– General Plan and Development Code Land Use Districts** Resource Management District and Resource Conservation (RC)

Source: Ivanpah AFC

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

The analysis of proposed project effects must comply with both CEQA and NEPA requirements given the respective power plant licensing and land jurisdictions of the California Energy Commission and U.S. Bureau of Land Management (BLM). CEQA requires that the significance of individual effects be determined by the Lead Agency; however, the use of specific significance criteria is not required by NEPA.

Because this document is intended to meet the requirements of both NEPA and CEQA, the methodology used for determining environmental impacts of the proposed project, includes a consideration of guidance provided by both laws.

CEQA requires a list of criteria that are used to determine the significance of identified impacts. A significant impact is defined by CEQA as "a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project" (State CEQA Guidelines Section 15382).

In comparison, NEPA states that "'Significantly' as used in NEPA requires considerations of both context and intensity…" (40 CFR 1508.27). Therefore, thresholds serve as a benchmark for determining if a project action will result in a significant adverse environmental impact when evaluated against the baseline. NEPA requires that an EIS is prepared when the proposed federal action (project) as a whole has the potential to "significantly affect the quality of the human environment."

Thresholds for determining significance in this section are based on Appendix G of the CEQA Guidelines (CCR 2006) and performance standards or thresholds identified by the Energy Commission staff. In addition, staff's evaluation of the environmental effects of the proposed project on land uses (i.e., those listed below) includes an assessment of the context and intensity of the impacts, as defined in the NEPA implementing regulations 40 CFR Part 1508.27.

Federal/NEPA

Under federal law, BLM is responsible for processing requests for rights-of-way to authorize the projects and associated transmission lines and other appurtenant facilities to be constructed and operated on land it manages. In processing the applications, BLM must comply with NEPA and with Title 40, Code of Federal Regulations (CFR), § 1508.27, which requires that potential impacts be evaluated for significance, as defined and used in NEPA with consideration given to both context and intensity. BLM must also comply with 43 CFR §1610.5 Resource Management Plan that requires the proposed project to conform to an approved plan, which in this case is the CDCA Plan. BLM right-of-way regulations that govern the issuance of right-of-way grants are found at 43 CFR 2800. The land area included within the proposed right-of-way grant includes land designated as Multiple-Use Class L (Limited Use) within the CDCA Plan. The Plan allows the construction of solar power projects within Class L areas. However, BLM would have to amend the CDCA Plan to identify the specific use of this land for the ISEGS facility prior to approving the right-of-way grant.

Under BLM regulations under 43 CFR 2805, the right-of-way grant would authorize project activities only on the described lands included within the boundaries of the grant.

Conduct of project-related activities on land which is not included within the right-of-way grant boundaries would be considered a substantial deviation and would require supplemental authorization in the form of an amendment to the right-of-way grant. Unauthorized disturbances outside the right-of-way would constitute trespass as identified in 43 CFR 2808, and would be considered to be a significant impact under NEPA.

State/CEQA

Significance criteria used in this document are based on the CEQA Guidelines and performance standards or thresholds identified by the Energy Commission staff, based on applicable LORS and utilized by other governmental regulatory agencies. An impact may be considered significant if the project results in:

- Conversion of Farmland.
    - Converts Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, as shown on the maps pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency and the USDA Natural Resources Conservation Service Web Soil Survey, to non-agricultural uses.
    - Conflicts with existing zoning for agricultural use, or a Williamson Act Contract.
    - Involves other changes in the existing environment which, due to their location or nature could result in conversion of farmland to nonagricultural use.
- Physical disruption or division of an established community.
- Conflict with any applicable habitat conservation plan or natural community conservation plan.
- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction, or that would normally have jurisdiction over the project. This includes, but is not limited to, a General Plan, community or specific plan, local coastal program, airport land use compatibility plan, or zoning ordinance.
- Individual environmental effects which, when considered with other impacts from the same project or in conjunction with impacts from other closely related past, present, and reasonably foreseeable future projects, are considerable or compound or increase other environmental impacts.

A power plant and its related facilities may also be incompatible with existing or planned land uses, resulting in potentially significant impacts if they create unmitigated noise, dust, public health or safety hazard or nuisance; result in adverse traffic or visual impacts; or preclude, interfere with, or unduly restrict existing or future uses.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Proposed Project

U.S. Bureau of Land Management

In accordance with 43 CFR §1610.5-3, all actions on public lands must be in conformance with applicable BLM land use plans. Any proposals or actions determined not to be in conformance with these plans would require the analysis of a land use plan

amendment. The CDCA Plan states, “Sites associated with power generation or transmission not identified in the Plan will be considered through the Plan Amendment process. Because the existing BLM CDCA Plan does not specifically identify the ISEGS facility, BLM would have to amend the CDCA plan prior to approving the proposed right-of-way grant. The amendment decision would be part of the BLM Record of Decision for the issuance of a right-of-way grant and would occur after the Final Environmental Impact Statement. Prior to issuance of any right of way grant, the project owner would be required to submit a final Plan(s) of Development that describes in detail the construction, operation, maintenance, and termination of the right-of-way and its associated improvements and/or facilities in accordance with Condition of Certification **LAND-1**. **LAND-1** would also require the project owner to establish a bond for removal of all improvements and restoration of the right-of-way upon site closure.

As presented in the applicant’s Revised Project Description (CH2MHILL 2009f), some project-related activities would occur outside of the proposed boundaries of the right-of-way grant. The acreage associated with these activities, and their technical scope, is not currently defined. In some areas (the perimeter in Ivanpah 1 and the southern and western boundaries of Ivanpah 3), all activities proposed to occur outside of the security fence would occur outside of the proposed right-of-way grant. In other areas, a buffer between the security fence and the right-of-way boundary is proposed, but may not be large enough to accommodate some of the described activities (such as new stormwater drainage structures). This use of land that is not authorized under the proposed right-of-way grant could not be considered without a supplemental analysis and subsequent amended right-of-way grant. Because the extent of proposed uses outside the boundaries of the right-of-way is not defined, and are not included within the right-of-grant application, unauthorized use of these lands would constitute a significant land use impact under NEPA. In addition, impacts on other resources associated with the proposed activities on these lands are not evaluated within the FSA/DEIS. Therefore, unauthorized use of the lands may have additional significant impacts that cannot currently be evaluated. To mitigate and address these potential impacts, **LAND-2** is proposed as a Condition of Certification to ensure that all proposed project activities occur within the boundaries of the right-of-way grant.

Conversion of Farmland

Based on the applicant’s review of aerial photographs and field surveys and staff’s independent review, there are no agricultural uses or properties within one mile of the proposed project site that are identified as Unique Farmland, or Farmland of Statewide Importance; there are no lands mapped as Important Farmlands, as defined for the Farmland Mapping and Monitoring Program (California Department of Conservation, 2004). No land within one mile of the proposed project site is subject to the restrictions of a Williamson Act contract.

Neither the construction nor operation of the proposed project would result in any impacts to existing agricultural operations or foreseeable future agricultural use. Therefore, the proposed project would not result in the conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to a non-agricultural use or conflict with existing agricultural zoning or Williamson Act contracts. The project would have no impact with respect to farmland conversion. The project study area is part of

the existing BLM Clark Mountain Allotment Grazing Lease. An analysis of impacts related to the Clark Mountain Allotment is addressed under the **Livestock Grazing** section.

Physical Division of an Existing Community

The project would not physically divide an established community because the power plant project site and linear features would be located on undeveloped public lands in unincorporated San Bernardino County and would not be located within or near an established community. Neither the size nor the nature of the project would result in a physical division or disruption of an established community, no new physical barriers would be created by the project.

As discussed in the applicant's response to data request 44, 18 vehicle trails run through the proposed project site and three would be impacted by the project. To allow continued use and access of these trails, the applicant has proposed to reroute the three trails, including one trail that serves as an access to a mining claim (CH2ML2008b Figure DR44-1 and Table DR44-1). A complete analysis of vehicle trails, potential impacts, and proposed mitigation is provided in the **Recreation** section.

Because the applicant has agreed to reroute three trails, staff concludes that the ISEGS would not create new physical barriers and would not block existing roadways or pathways.

Conflict with any Applicable Habitat or Natural Community Conservation Plan

The project site is in the general area addressed by the United States Fish and Wildlife Service (USFWS) Desert Tortoise Recovery Plan and Critical Habitat designation. The recovery plan describes a strategy for recovery and delisting of the desert tortoise. Please refer to the **Biological Resources** section of this document for a thorough discussion of the project's potential impacts on biological resources and compliance with the Desert Tortoise Recovery Plan and Critical Habitat.

Conflict with any Applicable Land Use Plan, Policy, or Regulation

The California Desert Conservation Area Plan

The California Desert Conservation Area (CDCA) was designated by Congress in 1976 through the Federal Land Policy and Management Act (FLPMA) and covers 25 million acres of land. For lands under the jurisdiction of the BLM, land use planning guidance for the area is found in the CDCA Plan of 1980, as amended. The FLPMA provides that the public lands in the California desert be managed within the framework of a program of multiple use and sustained yield, and the maintenance of environmental quality.

The ISEGS site includes areas in the CDCA that are designated Multiple Use Class L (Limited Use). According to BLM's CDCA, MUC L protects sensitive, natural, scenic, ecological, and cultural resource values. Public lands designated MUC L are managed to provide lower-intensity, carefully controlled multiple use of resources while ensuring that sensitive values (cultural, scenic, biological resource) are not significantly diminished. The CDCA Plan identifies the following guidelines (permitted uses) for MUC L lands in relation to the proposed ISEGS project:

- Solar facilities may be allowed after NEPA requirements are met;
- Distribution Facilities - New distribution facilities may be allowed and will be placed underground where feasible except where this would have greater impacts than a surface facility and within existing rights-of-way where available;

The Energy Production and Utility Corridors Element of the CDCA Plan includes the full implementation of a network of planning corridors to meet the projected utility needs to the year 2000, the identification of environmental constraints and siting procedures, and the identification of potential sites for geothermal development, wind energy parks, and power plants. Sixteen planning corridors were identified in the CDCA Plan, and the proposed ISEGS site is located near the junction of, and partially overlaps, two designated Utility Corridors (D and BB). The corridors are intended to include new electrical transmission lines of 161 kV or above, all pipelines with diameters greater than 12 inches, cables for interstate communications, and major aqueducts or canals for inter-basin transfers of water. The corridors vary in width from two to five miles.

Approximately 50 percent of the land area for Ivanpah 1, 2, and 3 and the administrative complex/logistics area are located within existing Utility Corridors D and BB. The land area for Ivanpah 3 would cover approximately 60% of the 2-mile width of Corridor D. Although the proposed ISEGS facility would result in limiting the available area within Corridor D, future linear facilities could still be placed in the remaining portion of this corridor.

For a short distance, Utility Corridor BB is split into a northern and southern portion, and the ISEGS site sits within the area between the southern and northern portions. The northern portion of corridor BB passes between Ivanpah 1 and 2, and the southern portion of Utility Corridor BB passes just south of Ivanpah 1. Construction of Ivanpah 1 would cover a small fraction (less than 5%) of the southern portion of Utility Corridor BB, and would not substantially limit future use of this portion of the corridor for other purposes. However, construction of Ivanpah 1, 2, and the construction logistics area would cover 100% of the two-mile width of the northern portion of Utility Corridor BB. This may result in eliminating potential future uses of this portion of Utility Corridor BB for linear right-of-way projects because buried or overhead utilities could not be constructed across heliostat fields without removing heliostats. It is possible that provision could be made for future linear right-of-way grants through the ISEGS logistics area without disturbing heliostat fields, but such a grant would be limited by the narrow width available within the corridor at that location, and by the need to avoid disturbance of the new Ivanpah Substation and ISEGS administrative facilities. Staff considers the 100% loss of Utility Corridor BB as attributable to ISEGS to be an adverse direct impact; however, that impact is less than significant since there would be some remaining opportunity to route future utility lines through the construction logistics area in Corridor BB and through remaining portions of Corridor D. It is foreseeable that several of the other potential generators in the vicinity of the Ivanpah Substation may need to locate generation tie lines into the Ivanpah Substation and this is achievable given the layout and temporary nature of most of the facilities in the construction logistics area.

As stated in the CDCA Plan, all land use actions and resource management activities on public lands within a MUC must meet the guidelines given for that Class. MUC

Guidelines for Distribution Facilities sited on MUC L lands provides that new distribution systems may be allowed and will be placed underground where feasible except where this would have a detrimental effect on the environment than surface alignment. In addition, new distribution facilities should be placed within existing rights-of-way where they are reasonably available.

As stated earlier, solar facilities may be allowed after NEPA requirements are met and BLM would have to issue a right-of-way grant to allow the proposed use on federally managed lands. However, development of the proposed project would generally preclude all of the existing uses on the 4,073 acres of affected public land designated as Multiple-Use Classes L.

The project's compliance with the CDCA Plan is further addressed in the **Biological, Cultural, Livestock Grazing, Recreation**, **and Visual Resources** sections of this FSA/DEIS.

San Bernardino County

As a response to recent applications for energy facilities on land in San Bernardino County managed by the BLM, San Bernardino County and the BLM have entered into a Memorandum of Understanding (MOU) (BLM Agreement No. 08-223). The purpose of the MOU is to establish an efficient and cooperative process for conducting environmental reviews of proposed projects located on BLM lands situated in San Bernardino County. Under the terms of the MOU, the BLM acts as the NEPA lead agency and the county acts as the CEQA lead agency. In cases where a project is a thermal energy project (50 MW or greater) the Energy Commission acts as the CEQA lead agency and the county acts as a cooperating agency. Because of the NEPA and CEQA requirements for the ISEGS project, Energy Commission staff has included a review of the applicable San Bernardino County land use LORS.

The ISEGS project would be located within San Bernardino County's Desert Region of the General Plan. The Desert Planning Region includes a significant portion of the Mojave Desert and contains 93 percent of land in the county. The San Bernardino County General Plan identifies the community's land use, transportation, environmental, economic, and social goals and policies as they relate to land use and development, forms the basis for local government decision-making, provides residents with opportunities to participate in the planning and decision-making processes of their community, and informs residents, developers, decision-makers, and other cities and counties of the rules that guide development within the community.

San Bernardino County has incorporated a one map approach to the general plan land use designations and zoning districts that allows the use of a single map showing both general plan land use designations and zoning classifications and assures consistency between both. These combined classifications are referred to as Land Use Zoning Designations in the General Plan and Land Use Zoning Districts in the County Development Code. The San Bernardino Development Code implements the San Bernardino General Plan by classifying and regulating the uses of land and structures within unincorporated San Bernardino County, preserving and protecting the county's important agricultural, cultural, natural, open space and scenic resources, and

protecting and promoting the public health, safety, and general welfare of residents and businesses in the county.

The Development Code provides standards and guidelines for the orderly growth and development of the county and its distinct communities, conserves and protects important agriculture, cultural, natural, open space and scenic resources, creates a comprehensive and stable pattern of land uses upon which to plan transportation, water supply, sewerage, energy, drainage/flood control and other public facilities and utilities, encourages appropriate uses of land to avoid undue concentration of population, and ensures compatibility between different types of development and land use. The Development Code identifies the ISEGS site as Resource Conservation (RC). Resource Conservation comprises the majority of the designated land uses in the county and covers over 1 million acres, or about 1,500 square miles of land. Most of the land within this designation is publicly owned (federal and state) and includes national parks, military bases, conservation areas, and lands owned by other federal and state agencies.

The RC land use zoning district provides sites for open space, and recreational, commercial and industrial activities including the following: residential uses, agricultural activities, mining, resource protection, offices, cemeteries, kennels, public safety, single-family homes on very large parcels, broadcasting facilities, electric power generation, transportation facilities, wind energy facilities, wireless communication facilities, similar and temporary structures, and special events. All of these uses are either allowed or subject to permit approval from the county. Prohibited uses in this district include: indoor

commercial entertainment, golf courses, schools, except for trade schools, sports or entertainment assemblies, homeless shelters, bed and breakfast inns, and solid waste disposal facilities.

Staff's determination of the proposed project's consistency with applicable land use LORS is summarized in **Land Use Table 3.**

LAND USE Table 3
Applicable Federal and Local LORS Consistency

LORS	Goals/Objectives/Policy	Consistency Determination
California Desert Conservation Area Plan (CDCA)	The CDCA plan is the land use guide for management of public lands and resources within the CDCA. Public lands designated MUC L are managed to provide lower-intensity, carefully controlled multiple use of resources while ensuring that sensitive values (cultural, scenic, biological resource) are not significantly diminished.	**Consistent**. The CDCA Plan allows for use of Multiple-Use Class L and M lands for solar power projects after NEPA requirements are met, and once the facility is identified as an element of the Plan through the Plan Amendment process. This Environmental Impact Statement acts as the mechanism for meeting NEPA requirements, and also provides the analysis required to support a Plan Amendment identifying the facility within the Plan.
San Bernardino County General Plan Applicable Conservation and Open Space Elements Goals, Objectives, Programs	GOAL CO-8: The County will minimize energy consumption and promote safe energy extraction, uses and systems to benefit local regional and global environmental goals.	**Consistent.** Development of the project would result in a renewable (solar) source of energy that would avoid for the most part the consumption of fossil fuel natural resources for power production, and thereby comply with these goals and policies. The project would help the state meet its goals for renewable electricity generation.
	CO 8.1: Maximize the beneficial effects and minimize the adverse effects associated with the siting of major energy facilities. The County will site energy facilities equitably in order to minimize net energy use and consumption of natural resources, and avoid inappropriately burdening certain communities. Energy planning should conserve energy and reduce peak load demands, reduce natural resource consumption, minimize environmental impacts, and treat local communities fairly in providing energy efficiency programs and locating energy facilities	**Consistent**. The project would avoid burdening communities and would reduce natural gas consumption through use of renewable power.
	CO 8.3: Assist in efforts to develop	**Consistent**. The project would

	alternative energy technologies that have minimum adverse effect on the environment, and explore and promote newer opportunities for the use of alternative energy sources.	assist the county in promoting an alternative energy project.
	CO 9.2: The County will work with utilities and generators to maximize the benefits and minimize the impacts associated with siting major energy facilities. It will be the goal of the County to site generation facilities in proximity to end-users in order to minimize net energy use and natural resource consumption, and avoid inappropriately burdening certain communities.	**Consistent**. Development of the project would result in an alternative (solar) source of energy, located outside existing communities that would minimize the use of non-renewable natural resources.
	GOAL D/CO 1. Preserve the unique environmental features and natural resources of the Desert Region, including native wildlife, vegetation, water and scenic vistas. POLICIES	**Inconsisten**t. The proposed project would intrude into scenic vistas in the Clark Mountains and would require removal of approximately 4 square miles of vegetation.
	D/CO 1.2 Require future land development practices to be compatible with the existing topography and scenic vistas, and protect the natural vegetation.	**Inconsistent.** The project would not be compatible with existing scenic vistas, and would not substantially protect the natural vegetation.
	OS 5.1 Features meeting the following criteria will be considered for designation as scenic resources: a. A roadway, vista point, or area that provides a vista of undisturbed natural areas. b. Includes a unique or unusual feature that comprises an important or dominant portion of the viewshed (the area within the field of view of the observer). c. Offers a distant vista that provides relief from less attractive views of nearby features (such as views of mountain backdrops from urban areas).	**Inconsistent**. The project would not maintain or enhance the visual character of the views on I-15 within its viewshed.
	OS 5.2 Define the scenic corridor on either side of the designated route, measured from the outside edge of the right-of-way, trail, or path. Development along scenic corridors will be required to demonstrate through visual analysis that proposed improvements are compatible with the scenic qualities present.	**Inconsistent.** Visual analysis of the project concluded that the proposed project would not retain the existing scenic qualities of the viewshed.

	OS 5.3 The County desires to retain the scenic character of visually important roadways throughout the County. A “scenic route” is a roadway that has scenic vistas and other scenic and aesthetic qualities that over time have been found to add beauty to the County. Therefore, the County designates the following routes as scenic highways and applies all applicable policies to development on these routes (see Figures 2-4A through 2-4C of the Circulation and Infrastructure Background Report): OS 5.3 The County desires to retain the scenic character of visually important roadways throughout the County. A “scenic route” is a roadway that has scenic vistas and other scenic and aesthetic qualities that over time have been found to add beauty to the County. Therefore, the County designates the following routes as scenic highways and applies all applicable policies to development on these routes (see Figures 2-4A through 2-4C of the Circulation and Infrastructure Background Report): (MULTIPLE REGIONS): c. *Interstate 15 from the junction with Interstate 215 northeast to the Nevada state line*, excepting those areas within the Barstow Planning Area and the community of Baker where there is commercial /industrial development; those portions within the Yermo area from Ghost Town Road to the East Yermo Road overcrossing on the south side only and from First Street to the East Yermo Road overcrossing on the north side; and all incorporated areas.	

Proposed Project – Closure and Decommissioning

Following the operational life of 50 years, the project owner would perform site closure activities to meet federal and state requirements for the rehabilitation and revegetation of the project site after decommissioning. The procedures to be used for project decommissioning and restoration are defined in the Applicant’s Draft Closure, Revegetation, and Rehabilitation Plan (CH2ML2009q). Under this plan, the applicant proposes that all aboveground structures and facilities would be removed to a depth of three feet below grade, and removed offsite for recycling or disposal. Concrete, piping, and other materials existing below three feet in depth would be left in place. Areas that had been graded would be restored to original contours.

Similar to project construction and facility operations, decommissioning would be performed in accordance with plans and mitigation measures that would assure the project conforms with applicable LORS and would avoid significant adverse impacts. Upon decommissioning, no further discretionary actions would be required by the Energy Commission or the BLM. It is possible that after on-site rehabilitation and revegetation have occurred, the land may be used again for multiple uses such as mining, grazing, recreation, or open space.

NO PROJECT/NO ACTION ALTERNATIVE

In the No Project/No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan.

The results of the No Project / No Action Alternative would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project.
- The benefits of the proposed project in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

If this project is not approved, renewable projects would likely be developed on other sites in the Mojave Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are three large solar projects proposed on BLM land in Nevada within a few miles of the Ivanpah site and one solar project proposed on lands in California immediately east of ISEGS. In addition as of August 2009, there are currently 66 applications for solar projects covering 611,692 acres pending with BLM in the California Desert District.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

The following letters (Sierra Club's California/Nevada Regional Conservation Desert Committee January 7, 2007 letter; US Department of the Interior National Park Service's March 11, 2008 letter; and National Parks Conservation Association April 28, 2008 letter) were received in response to the Notice of Intent (NOI) to prepare an Environmental Impact Statement/Final Staff Assessment (EIS/FSA) for the ISEGS. These letters included comments on visual, recreational, and biological resources, air quality, and water. Staff has addressed the comments concerning the cumulative effects of existing and foreseeable developments pertaining to land use in the **Cumulative Impacts** section.

CUMULATIVE IMPACTS

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental

effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (California Code Regulation, Title 14, section 15130). NEPA states that cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR §1508.7).

There is the potential for substantial future development in the Ivanpah Valley area and throughout the southern California desert region. Analysis of cumulative impacts is based on data provided in the maps and tables in the **Cumulative Scenario** section of this document.

- Cumulative Scenario Figure 1, Regional Renewable Applications
- Cumulative Scenario Figure 2, Regional Renewable Applications (Detail)
- Cumulative Scenario Figure 3, Ivanpah Valley Existing and Future/Foreseeable Projects
- Cumulative Scenario Table 1, Renewable Energy Projects
- Cumulative Scenario Table 2, Existing Projects in the Ivanpah Valley
- Cumulative Scenario Table 3, Future Foreseeable Projects in the Ivanpah Valley Area.

The analysis in this section first defines the geographic area over which cumulative impacts related to land use could occur. The cumulative impact analysis itself describes the potential for cumulative impacts to occur as a result of implementation of the ISEGS project along with the listed local and regional projects.

Geographic Extent

Cumulative impacts would occur locally if ISEGS project impacts combined with impacts of projects located within the Ivanpah Valley. Cumulative impacts could also occur as a result of development of some of the many proposed solar and wind development projects that have been or are expected to be under consideration by the BLM and the Energy Commission in the near future. Many of these projects are located within the California Desert Conservation Area, as well as on BLM land in Nevada and Arizona. Local cumulative impacts would occur if ISEGS project impacts combined with impacts of projects located within the Ivanpah Valley. Due to the extent of other projects in this area, there exists the potential for local cumulative impacts. The Ivanpah region itself is currently experiencing rapid development, both in California and in Nevada, which will likely result in new residential, commercial, and industrial land uses (see **Cumulative Scenario Figure 3** and **Table 2** - **Existing and Future Foreseeable Projects**. New development affects existing land uses (i.e., open space, recreation, low-density uses) within the project vicinity.

Regional cumulative impacts could occur as a result of implementation of the ISEGS project in conjunction with future solar and wind development projects that are currently proposed on over one million acres of the California Desert Conservation Area, as well as on BLM land in Nevada and Arizona. Therefore, cumulative impacts are also

evaluated for the desert areas of southeastern California, southern Nevada, and western Arizona, as shown on **Cumulative Scenario Figure 1** -**Regional Renewable Applications**.

Cumulative Impact Analysis

Local Projects

The ISEGS project would not physically divide an established community or contribute to division of a community. The ISEGS project area would cover portions of Utility Corridors D and BB. To protect the public interest, BLM must optimize the use of utility corridors to best accommodate multiple existing and future projects, minimize adverse environmental impacts, and minimize duplication or proliferation of similar facilities. The establishment of the ISEGS project along with other future foreseeable projects, such as the 4,160-acre FirstSolar photovoltaic project immediately east of ISEGS, could conflict with or eliminate other future uses in the designated Utility Corridors D and BB.

Development of the ISEGS project would preclude and in some cases, unduly restrict existing and future multiple uses such as recreation, wildlife habitat, livestock grazing, and open space on 4,073 acres of public land designated MUC L. Land use impacts of the ISEGS project, when combined with impacts of the other foreseeable projects, the most significant of which include the FirstSolar photovoltaic project, the Primm Solar Generating Plant proposed on 2,500 acres south of Primm, Nevada, two wind power projects proposed on 2,330 and 3,360 acres sites on Mountain Pass, and the Southern Nevada Supplemental Airport proposed on 5,934 acres and having a 17,000-acre sphere of influence, would result in significant unmitigable cumulative land use impacts within the Ivanpah Valley. Please refer to **Cumulative Scenario Tables 2** - **Existing Projects in the Ivanpah Valley** and **3** - **Future Foreseeable Projects in the Ivanpah Valley Area** for a comprehensive list of existing and future local projects.

Regional Projects

The CEQA analysis of cumulative effects for land use includes consideration of the numerous solar and wind development applications in the southern California, Arizona, and Nevada Mojave Desert. The list of pending applications in Table 1 of the Cumulative Scenario is indicative of the interest in public lands for renewable energy generation at a regional level. Renewable solar and wind projects have also been proposed on public lands in Nevada and Arizona. The likelihood of these wind applications being constructed is quite small. Of the 61 wind applications in the California Desert District, only five of the applications are for wind development; the remaining proposals are for site testing and monitoring. BLM's experience is that a small percentage of applications for site testing, have resulted in wind development proposals. In regards to the solar applications filed with BLM in California, only approximately 10% of the proponents have prepared acceptable detailed Plans of Development required by BLM to begin a NEPA analysis. Although it is not likely that all of the future solar and wind development projects proposed in the region would be constructed, it is reasonable to assume that some of them will. The regional loss of additional land base currently available for multiple use management for renewable energy projects is expected to be highly controversial and would result in significant cumulative impacts to land use.

Cumulative Impact Conclusion

Impacts of the ISEGS project when combined with impacts of past, present, and reasonably foreseeable projects in the Ivanpah Valley would result in significant and unmitigable local cumulative land use impacts.

Impacts of the ISEGS project when combined with impacts of future renewable energy projects currently proposed in the southern California Mojave desert would result in significant and unmitigable cumulative land use impacts.

COMPLIANCE WITH LORS

In accordance with Title 43, Code of Federal Regulations §1610.5-3, all actions on public lands must be in conformance with applicable BLM land use plans. Any proposals or actions determined not to be in conformance with these plans would require the analysis of a land use plan amendment. Although the CDCA Plan allows the construction of solar power plant projects within Multiple-Use Classes L, it also requires that new projects that are not currently included within the plan be added to the Plan through the Plan Amendment process. Therefore, this Environmental Impact Statement also acts as the mechanism for analyzing a Plan Amendment that adds the ISEGS facility to the Plan. The Plan Amendment decision would be part of the BLM Record of Decision for the issuance of a right-of-way grant, and would occur after publication of the Final Environmental Impact Statement.

The proposed project, as described in the applicant's Revised Project Description (CH2ML 2009f), would not comply with BLM right-of-way regulations in 43 CFR 2800. As currently proposed, the project would include a variety of activities on public lands that are not included within the right-of-way grant. To address this, **LAND-2** is proposed as a Condition of Certification to ensure that all proposed project activities occur within the boundaries of the right-of-way grant.

The project would not conform with some of the applicable goals and policies of the San Bernardino County General Plan Conservation and Open Space Elements as follows:

1. Conservation Element Goal D/CO 1, calling for preservation of scenic vistas in the County. Staff found that the project would have adverse effects on scenic vistas.

2. Open Space Element Goal OS 5, calling for the County to maintain and enhance the visual character of scenic routes in the County; and Policy OS 5.2, which states that "Development along scenic corridors will be required to demonstrate through visual analysis that proposed improvements are compatible with the scenic qualities present." The visual analysis of the project found that it would not be compatible with the scenic qualities present in the viewshed of portions of Highway I-15 designated as a County scenic route.

CONCLUSIONS

BLM and CEC Staff conclude that the proposed project is in conformance with the CDCA plan of 1980, as amended, and with Title 43, Code of Federal Regulations §1610.5-3. Staff considers the 50% loss of Utility Corridor BB as attributable to ISEGS to be an adverse direct impact that is less than significant since there would be some remaining opportunity to route future utility lines through Corridor D. Staff also determines that the ISEGS project would contribute to significant and unavoidable cumulative land use impacts in the Ivanpah Valley attributable to the loss of public lands for other uses, which would be significant with respect to CEQA as well as NEPA significance criteria in 40 CFR 1508.27. When combined with impacts of the future solar and wind development projects that are currently proposed in the southern California Mojave desert, regional impacts of the ISEGS project to land use would be cumulatively significant and unavoidable.

In addition, staff concludes that the project would not conform with some of the applicable goals and policies of the San Bernardino General Plan Conservation and Open Space Elements as discussed in Land Use Table 3.

Should the Energy Commission and the BLM approve the project, the following measures are recommended as conditions of certification and approval.

MITIGATION MEASURES/PROPOSED CONDITIONS OF CERTIFICATION

LAND-1 The project owner shall obtain a Right-of-Way Grant (ROW Grant) from the Bureau of Land Management (BLM). Among the conditions for obtaining the ROW grant, the applicant shall provide the following:

A. Prior to issuance of any right of way grant, the project owner shall submit a final Plan(s) of Development that describes in detail the construction, operation, maintenance, and termination of the right-of-way and its associated improvements and/or facilities. The project owner shall construct, operate, and maintain the facilities, improvements, and structures within this right-of-way in strict conformity with the final approved Plan of Development. The degree and scope of these plans will vary depending upon (1) the complexity of the right-of-way or its associated improvements and/or facilities, (2) the anticipated conflicts that require mitigation, and (3) additional technical information required by BLM's Authorized Officer and the CPM. The plans will be reviewed, and if appropriate, modified by the project owner until acceptable, and approved by BLM's Authorized Officer and the CPM. An approved Plan of Development shall be made a part of the right-of-way grant. Any relocation, additional construction, or use that is not in accord with the approved Plan(s) of Development, shall not be initiated without the prior written approval of BLM's Authorized Officer and the CPM.

B. A bond, acceptable to BLM's Authorized Officer, shall be furnished by the project owner prior to the issuance of a Notice to Proceed with construction or at such earlier date as may be specified by BLM's Authorized Officer. The amount of this bond shall be determined by BLM's Authorized Officer. This bond must be maintained in effect until removal of improvements and restoration of the right-of-way have been accepted by BLM's Authorized Officer and the CPM.

Verification: At least 30 days prior to the start of construction and prior to any Notice to Proceed with construction issued by BLM's Authorized Officer and the CPM, the project owner shall provide BLM's Authorized Officer and the CPM with documentation of the following:

A. BLM's ROW Grant and final approved Plan of Development;

B. The bond satisfactory to BLM's Authorized Officer;

C. Certification that the project owner acknowledges that the ISEGS development and all related construction, operation, maintenance and closure activities are to be conducted in conformance with the approved Plan of Development and within the approved ROW boundaries for the life of the project.

LAND-2 The applicant's Project Description and associated construction plans shall be revised to allow a minimum 20-foot buffer between the security and tortoise exclusion fence, and the proposed ROW boundary. Once the fencing is constructed, all inspection, monitoring, and maintenance activities required outside of the fencing will occur on lands included within this buffer area and ROW boundaries. Should project activities requiring the use of an area larger than the buffer be required (such as installation of new drainage structures one acre or more in size), the project owner shall make application to BLM for a Temporary Use Permit (TUP) or additional ROW Grant, and to the Energy Commission for a license amendment prior to conducting any activities. Authorization of a TUP or additional ROW Grant may require additional environmental evaluation pursuant to the National Environmental Policy Act and the California Environmental Quality Act.

Verification: At least 60 days prior to the start of construction, the project owner shall provide BLM's Authorized Officer and the CPM with a revised project description and construction plans specifying the inclusion of the buffer zone within the ROW boundaries. The project owner shall also provide BLM's Authorized Officer and the CPM with certification acknowledging that the ISEGS development and all related construction, operation, maintenance and closure activities are to be conducted within the ROW boundaries for the life of the project.

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NOISE AND VIBRATION

Prepared by Steve Baker

SUMMARY OF CONCLUSIONS

U.S. Bureau of Land Management (BLM) and Energy Commission staff (hereafter jointly referred to as staff) conclude that the Ivanpah Solar Electric Generating System (ISEGS) can be built and operated in compliance with all applicable noise and vibration laws, ordinances, regulations, and standards and, if built in accordance with the conditions of certification proposed below, would produce no CEQA or NEPA significant adverse noise impacts on people within the affected area, either direct, indirect, or cumulative. Conditions of Certification referred to herein serve the purpose of both the Energy Commission's Conditions of Certification for purposes of CEQA and BLM's Mitigation Measures for purposes of NEPA.

INTRODUCTION

The construction and operation of any power plant creates noise, or unwanted sound. The character and loudness of this noise, the times of day or night at which it is produced, and the proximity of the facility to sensitive receptors combine to determine whether the facility would meet applicable noise control laws and ordinances and whether it would cause significant adverse environmental impacts. In some cases, vibration may be produced as a result of power plant construction practices, such as blasting or pile driving. The groundborne energy of vibration has the potential to cause structural damage and annoyance.

The purpose of this analysis is to identify and examine the likely noise and vibration impacts from the construction and operation of the ISEGS and to recommend procedures to ensure that the resulting noise and vibration impacts would be adequately mitigated to comply with applicable laws, ordinances, regulations, and standards (LORS) and to avoid creation of significant adverse noise or vibration impacts. For an explanation of technical terms and acronyms employed in this section, please refer to **NOISE Appendix A** immediately following.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

NOISE Table 1
Laws, Ordinances, Regulations, and Standards

Applicable Law	Description
Federal (OSHA): 29 U.S.C. § 651 et seq.	Protects workers from the effects of occupational noise exposure
State (Cal/OSHA): Cal. Code Regs., tit. 8, §§ 5095–5099	Protects workers from the effects of occupational noise exposure
Local	
San Bernardino County General Plan Noise Element	Establishes noise limits as specified in the Development Code (below)
San Bernardino County Development Code, Ch. 83.01	Establishes property line noise limits for various receiving uses. Exempts construction noise during certain hours. Establishes vibration limits.

FEDERAL

Under the Occupational Safety and Health Act of 1970 (29 USC § 651 et seq.), the Department of Labor, Occupational Safety and Health Administration (OSHA) has adopted regulations designed to protect workers against the effects of occupational noise exposure (29 CFR § 1910.95). These regulations list permissible noise exposure levels as a function of the amount of time during which the worker is exposed (see **NOISE Appendix A, Table A4** immediately following this section). The regulations further specify a hearing conservation program that involves monitoring the noise to which workers are exposed, assuring that workers are made aware of overexposure to noise, and periodically testing the workers' hearing to detect any degradation.

There are no federal laws governing off-site (community) noise.

The only guidance available for evaluation of power plant vibration is guidelines published by the Federal Transit Administration (FTA) for assessing the impacts of groundborne vibration associated with construction of rail projects. These guidelines have been applied by other jurisdictions to assess groundborne vibration of other types of projects. The FTA-recommended vibration standards are expressed in terms of the "vibration level," which is calculated from the peak particle velocity measured from groundborne vibration. The FTA measure of the threshold of perception is 65 VdB,[1] which correlates to a peak particle velocity of about 0.002 inches per second (in/sec). The FTA measure of the threshold of architectural damage for conventional sensitive structures is 100 VdB, which correlates to a peak particle velocity of about 0.2 in/sec.

[1] VdB is the common measure of vibration energy.

STATE

California Government Code section 65302(f) encourages each local governmental entity to perform noise studies and implement a noise element as part of its General Plan. In addition, the California Office of Planning and Research has published guidelines for preparing noise elements, which include recommendations for evaluating the compatibility of various land uses as a function of community noise exposure.

The California Occupational Safety and Health Administration (Cal/OSHA) has promulgated Occupational Noise Exposure Regulations (Cal. Code Regs., tit. 8, §§ 5095–5099) that set employee noise exposure limits. These standards are equivalent to the federal OSHA standards (see the **Worker Safety and Fire Protection** section of this document, and **NOISE Appendix A, Table A4**).

LOCAL

San Bernardino County General Plan Noise Element

The San Bernardino County General Plan Noise Element establishes noise performance standards for stationary sources. These limits are those specified in the San Bernardino County Development Code (below).

San Bernardino County Development Code

Chapter 83.01 of the San Bernardino County Development Code sets noise performance standards for noise from stationary noise sources measured at the boundaries of noise-sensitive land uses. These limits are reproduced here as **NOISE Table 2**.

NOISE Table 2: Noise Standards for Stationary Noise Sources

Noise Level (dBA L_{eq})		
Receiving Land Use Category	7:00 a.m. to 10:00 p.m.	**10:00 p.m. to 7:00 a.m.**
Residential	55	45
Professional Services	55	55
Other Commercial	60	60
Industrial	70	70

Source: COSB 2007b, Ch. 83.01, Table 83-2

Construction noise is exempt from these limits between the hours of 7:00 a.m. and 7:00 p.m. except Sundays and federal holidays (COSB 2007b, § 83.01.080[g][3]).

Vibration is limited to that which cannot be felt without the aid of instruments at or beyond the lot line, and that which does not produce a particle velocity greater than or equal to 0.2 inches per second at the lot line (COSB 2007b, § 83.01.090[a]). Construction vibration is exempt from this limit between the hours of 7:00 a.m. and 7:00 p.m. except Sundays and federal holidays (COSB 2007b, § 83.01.090[c][2]).

Note that, since the project will be built on federally owned land, these San Bernardino County LORS do not apply. They are listed here solely as guidelines.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

California Environmental Quality Act

The California Environmental Quality Act (CEQA) requires that significant environmental impacts be identified and that such impacts be eliminated or mitigated to the extent feasible. Section XI of Appendix G of CEQA Guidelines (Cal. Code Regs., tit. 14, App. G) sets forth some characteristics that may signify a potentially significant impact. Specifically, a significant effect from noise may exist if a project would result in:

1. exposure of persons to, or generation of, noise levels in excess of standards established in the local General Plan or noise ordinance or applicable standards of other agencies;

2. exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;

3. substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project; or

4. substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

The California Energy Commission (Energy Commission) staff, in applying item 3 above to the analysis of this and other projects, has concluded that a potential for a significant noise impact exists where the noise of the project plus the background exceeds the background by 5 dBA or more at the nearest sensitive receptor, including those receptors that are considered minority population.

Staff considers it reasonable to assume that an increase in background noise levels up to 5 dBA in a residential setting is insignificant; an increase of more than 10 dBA is considered significant. An increase between 5 and 10 dBA should be considered adverse, but may be either significant or insignificant, depending on the particular circumstances of the case.

Factors to be considered in determining the significance of an adverse impact as defined above include:

1. the resulting combined noise level;[2]

2. the duration and frequency of the noise;

3. the number of people affected;

[2] For example, a noise level of 40 dBA would be considered quiet in many locations. A noise limit of 40 dBA would be consistent with the recommendations of the California Model Community Noise Control Ordinance for rural environments and with industrial noise regulations adopted by European jurisdictions. If the project would create an increase in ambient noise no greater than 10 dBA at nearby sensitive receptors, and the resulting noise level would be 40 dBA or less, the project noise level would likely be insignificant.

4. the land use designation of the affected receptor sites; and

5. public concern or controversy as demonstrated at workshops or hearings or by correspondence.

Noise due to construction activities is usually considered to be insignificant in terms of CEQA compliance if:

- the construction activity is temporary;
- use of heavy equipment and noisy activities is limited to daytime hours; and
- all industry-standard noise abatement measures are implemented for noise-producing equipment.

Staff uses the above method and threshold to protect the most sensitive populations, including the minority population.

SETTING

The ISEGS would be constructed on 4,073 acres of federally owned land administered by the BLM in San Bernardino County. The site lies approximately 4.5 miles southwest of Primm, Nevada and 3.1 miles west of the Nevada border, in an area designated compatible with solar energy development in the California Desert Conservation Area Plan. The Primm Valley Golf Club lies approximately 0.5 mile northeast of the eastern boundary of Ivanpah I. The applicant expects that construction of ISEGS would take place in three phases in the following order, which is subject to change: 100-MW Ivanpah 1 and shared facilities for maintenance would occupy 914 acres of the southern portion of the site; 100-MW Ivanpah 2 would occupy another 921 acres north of Ivanpah 1; and 200-MW Ivanpah 3 would occupy 1,836 acres of the northern portion of the site. All three phases would share an administration building, an operation and maintenance building, and a substation, which would be located in the Logistics Area between Ivanaph 1 and 2. The Logistics Area as proposed for both permanent use and temporary use during construction, and other project roads and the natural gas pipeline alignment north of Ivanpah 3, would require an additional area of approximately 402 acres (BSE 2007a, AFC §§ 1.1, 1.2, 1.3, 1.5, 2.1, 2.2.1, 2.5.2, 5.6.3.1, 5.7.1; CH2ML2008g).

The project vicinity consists of BLM-managed open space (BSE 2007a, AFC § 5.7.4). The nearest human occupancy is the Primm Valley Golf Club.

Ambient Noise Monitoring

Ambient noise monitoring was not required for the ISEGS project, since Energy Commission regulations require such monitoring only when facilities where quiet is an important attribute of the environment would be impacted by the project (20 CCR, Chapter 5, Article 6, Appendix B, § [g][4][A]). The community of Primm, Nevada, 4.5 miles distant, is too far from ISEGS to be significantly impacted by project noise. The Primm Valley Golf Club golf course is considered a less noise-sensitive land use.

DIRECT IMPACTS AND MITIGATION

Noise impacts associated with the project can be created by short-term construction activities and by normal long-term operation of the power plant.

Proposed Project - Construction Impacts and Mitigation

Construction noise is usually considered a temporary phenomenon. Construction of the ISEGS is expected to last a total of 48 months (BSE 2007a, AFC § 1.4). While this is considerably longer than is typical for a power plant, construction noise would not likely cause annoyance; see below.

Proposed Project - Compliance with Laws, Ordinances, Regulations, and Standards

Construction of an industrial facility such as a power plant is typically noisier than permissible under usual noise ordinances. In order to allow the construction of new facilities, construction noise during certain hours of the day is commonly exempt from enforcement by local ordinances. The San Bernardino County Development Code exempts all construction noise from numerical noise limits between 7:00 a.m. and 7:00 p.m. Monday through Saturday (see **NOISE Table 2**, above). Even though this LORS does not apply to construction on federal land, the applicant commits to complying with this restriction (BSE 2007a, AFC § 5.7.7.3). Staff proposes Condition of Certification **NOISE-6**, below, to ensure that noisy construction would be limited to these hours.

Proposed Project - CEQA Impacts

Power Plant Site

To evaluate construction noise impacts, staff typically compares the projected noise levels to the ambient. Since construction noise typically varies continually with time, it is most appropriately measured by, and compared to, the L_{eq} (energy average) metric. In the case of ISEGS, however, since the nearest potential sensitive noise receptors are so distant, such comparison is not required.

Construction noise may be expected to reach levels 34 dBA L_{eq} in Primm (BSE 2007a, Table 5.7-6). Such a noise level would generally be unnoticeable in a typical community environment and would represent an insignificant impact. Further, the projected levels are conservative, based on surveys of construction equipment taken 30 years ago. Modern construction equipment is quieter, so actual noise levels should be less than predicted. Since noisy construction work would be restricted to daytime hours, staff believes it would be unnoticeable in Primm.

Construction noise could reach levels of 50 dBA L_{eq} at the golf course (BSE 2007a, Table 5.7-6 and staff calculations). Such levels would not likely be annoying to golfers; therefore, no significant adverse impact would be expected.

In the event that actual construction noise should annoy anyone, staff proposes Conditions of Certification **NOISE-1** and **NOISE-2**, which would establish a notification

process to make people aware of the project, and a noise complaint process that would require the applicant to resolve any problems caused by noise from the project.

Linear Facilities

Linear facilities would include 5.3 miles of natural gas pipeline, a pipeline to supply well water, and electrical transmission lines interconnecting to the new Southern California Edison Ivanpah substation. With the exception of 0.5 mile of gas pipeline and 570 feet of water line, all linears would lie within the project site, so their construction noise impacts would be similar to those of the power plant itself (BSE 2007a, AFC §§ 1.2, 1.5, 2.1, 2.2.2, 2.2.6, 2.2.7, 4.1, 5.7.1). Limiting noisy construction to daytime hours should provide adequate mitigation of impacts. To ensure compliance with this restriction, staff proposes Condition of Certification **NOISE-6**, below.

Pile Driving

The applicant has not yet determined whether pile driving would be required, but predicts that the noise from pile driving could be expected to reach nearly 50 dBA at Primm, a distance of 4.5 miles (BSE 2007a, AFC Table 5.7-6). This level would likely not prove annoying during the daytime. Pile driving noise could also approach 58 dBA at the golf course. Again, this level would likely not prove annoying to golfers. To ensure that pile driving noise does not cause annoyance, staff proposed Condition of Certification **NOISE-6**, below, to limit pile driving to the hours between 7:00 a.m. and 7:00 p.m.

Steam Blows

Typically, the loudest noise encountered during construction, inherent in building any project incorporating a steam turbine, is created by the steam blows. After erection and assembly of the feed water and steam systems, the piping and tubing that comprise the steam path have accumulated dirt, rust, scale, and construction debris such as weld spatter, dropped welding rods, and the like. If the plant were started up without thoroughly cleaning out these systems, all this debris would find its way into the steam turbine, quickly destroying the machine.

In order to prevent this, before the steam system is connected to the turbine, the steam line is temporarily routed to the atmosphere. Traditionally, high pressure steam is then raised in the boiler or a temporary boiler and allowed to escape to the atmosphere through the steam piping. This flushing action, referred to as a *high pressure steam blow*, is quite effective at cleaning out the steam system. A series of short steam blows, lasting two or three minutes each, is performed several times daily over a period of two or three weeks. At the end of this procedure, the steam lines are connected to the steam turbine, which is then ready for operation. Alternatively, high pressure compressed air can be substituted for steam.

High pressure steam blows, if unsilenced, can typically produce noise levels as high as 129 dBA at a distance of 50 feet; this would amount to roughly 95 dBA at the Primm Valley Golf Course and roughly 76 dBA at Primm, Nevada. With a silencer installed on the steam blow piping, noise levels are commonly attenuated to 89 dBA at 50 feet; this would yield approximately 55 dBA at the golf course and 36 dBA at Primm.

No LORS would prohibit the noise from an unsilenced high pressure steam blow, but the San Bernardino County Development Code, were it applicable, would limit such noisy construction work to the hours between 7:00 a.m. and 7:00 p.m. This level of noise, however, would be extremely annoying at the golf course and would likely be extremely annoying in Primm. A silenced blow would not likely be annoying at the golf course and would likely be unnoticeable in Primm.

A newer, quieter steam blow process, referred to as *low pressure steam blow* and marketed under names such as QuietBlow™ or Silentsteam™, has become popular. This method utilizes lower pressure steam or compressed air over a continuous period of approximately 36 hours. Resulting noise levels reach about 80 dBA at 100 feet; such a process would yield noise levels at the golf course of approximately 52 dBA and 33 dBA at Primm.

Nighttime noise from a low pressure continuous steam blow at Primm would not likely disturb people trying to sleep and would not constitute a significant impact. Nighttime noise at the golf course is irrelevant and thus could not cause a significant impact.

The applicant submitted comments on staff's PSA (CH2ML 2009a, Comment 100) requesting more flexibility in controlling noise from steam blows. Specifically, the applicant requested that steam blows be allowed to produce noise levels at the golf course of 60 dBA, and at Primm of 55 dBA daytime and 45 dBA nighttime. Staff finds this request reasonable, and has modified proposed Condition of Certification **NOISE-7** accordingly.

In order to ensure that steam blow noise would not produce significant adverse impacts, staff has proposed Condition of Certification **NOISE-7** below.

Vibration

The only construction operation likely to produce vibration that could be perceived off site would be pile driving, should it be employed. Vibration attenuates rapidly; it is likely that no vibration would be perceptible at any appreciable distance from the project site. Staff therefore believes there would be no significant impacts from construction vibration.

Worker Effects

The applicant has acknowledged the need to protect construction workers from noise hazards and has recognized those applicable LORS that would protect construction workers (BSE 2007a, AFC § 5.7.5.2.1). To ensure that construction workers would, in fact, be adequately protected, staff has proposed Condition of Certification **NOISE-3**, below.

Proposed Project - Operation Impacts and Mitigation

The primary noise sources of the ISEGS include the steam turbine generators, boiler feed pumps, transformers, the auxiliary boilers, and the air-cooled condenser fans (BSE 2007a, AFC Table 5.7-7). Staff compares the projected noise with applicable LORS. In addition, staff evaluates any increase in noise levels at sensitive receptors due to the project in order to identify any significant adverse impacts.

The applicant proposes to mitigate power plant noise by specifying and purchasing major plant equipment that conforms to OSHA guidelines. That is, noise levels from such equipment would not exceed 85 to 90 dBA at a distance of 3 feet in order to protect workers' hearing. With such mitigation, the applicant predicts that noise from the operating power plant would not exceed 30 dBA in Primm and 55 dBA at the golf course (BSE 2007a, AFC § 5.7.5.3.2; Table 5.7-7).

Compliance with LORS

Project operating noise in Primm is predicted not to exceed 30 dBA L_{eq}. This figure is considerably quieter than required by the San Bernardino County LORS, which would limit project noise in Primm to 55 dBA during the daytime and 45 dBA at night (see **NOISE Table 2**, above). Even though these limits do not apply since the project would be built on federally owned land, staff proposes Condition of Certification **NOISE-4**, below, to ensure compliance.

Plant operating noise is likewise predicted not to exceed 55 dBA at the golf course. As discussed above, no numerical LORS limits apply. Nevertheless, this noise level can be best compared to the San Bernardino County Development Code limit for "Other Commercial" land uses, or 60 dBA day or night (see **NOISE Table 2**, above). Staff's proposed Condition of Certification **NOISE-4**, below, would ensure compliance.

CEQA Impacts

Power plant noise is unique. Essentially, a power plant operates as a steady, continuous, broadband noise source, unlike the intermittent sounds that comprise the majority of the noise environment. As such, power plant noise contributes to, and becomes part of, the background noise level, or the sound heard when most intermittent noises cease. Where power plant noise is audible, it tends to define the background noise level. For this reason, staff typically compares the projected power plant noise to the existing ambient background (L_{90}) noise levels at the affected sensitive receptors. If this comparison identifies a significant adverse impact, then feasible mitigation must be incorporated in the project to reduce or remove the impact.

In many cases, a power plant is intended to operate around the clock for much of the year. The applicant explains, however, that the ISEGS would operate only during the daytime hours, typically 14 hours per day, when sufficient solar insolation is available (BSE 2007a, AFC §§ 1.2, 2.1, 2.2.2, 2.2.16, 5.7.5.3). Staff typically evaluates project noise emissions by comparing them to the nighttime ambient background level; this assumes the potential for annoyance due to power plant noise is greatest at night when residents are trying to sleep. Nighttime ambient noise levels are typically lower than the daytime levels; differences of 5 to 10 dBA are common. Staff believes it is prudent to average the lowest nighttime hourly background noise level values to arrive at a reasonable baseline for comparison with the project's predicted noise level.

As discussed above, since the ISEGS is not expected to impact any sensitive noise receptors, an ambient noise survey was neither required nor conducted. Therefore, the usual method of evaluating noise impacts must be modified. As discussed above, the project is expected to produce noise levels in Primm, the nearest sensitive noise receptor, of 30 dBA L_{eq}. This level is below what one would expect in any urban daytime

environment, no matter how small the town (Primm's population is 436) (BSE 2007a, AFC § 5.7.4). Since the project would not operate at night, it could not produce noise impacts in Primm during the nighttime except potentially from mirror washing. To ensure this predicted noise level would not be exceeded, staff proposes Condition of Certification **NOISE-4**, below.

Tonal Noises

One possible source of annoyance would be strong tonal noises. Tonal noises are individual sounds (such as pure tones) that, while not louder than permissible levels, stand out in sound quality. The applicant plans to avoid the creation of annoying tonal (pure-tone) noises by balancing the noise emissions of various power plant features during plant design (BSE 2007a, AFC § 5.7.5.3.3). To ensure that tonal noises would not cause annoyance, staff proposes Condition of Certification **NOISE-4**, below.

Linear Facilities

All water and gas piping lie underground and would be silent during operation. Noise effects from the electrical interconnection line typically do not extend beyond the right-of-way easement of the line and would thus be inaudible to any receptors (BSE 2007a, AFC § 5.7.5.3.5).

Vibration

Vibration from an operating power plant could be transmitted by two chief means; through the ground (groundborne vibration) and through the air (airborne vibration).

The operating components of the ISEGS plant would consist of high-speed steam turbine generators and various pumps and fans. All of these pieces of equipment must be carefully balanced in order to operate; permanent vibration sensors would be attached to the turbines and generators. Based on experience with numerous previous projects employing similar equipment, Energy Commission staff believes that groundborne vibration from the ISEGS would be undetectable by any likely receptor. Although the San Bernardino County Development Code's limit on vibration is not applicable to this project on federal land, the ISEGS would be in compliance.

Airborne vibration (low frequency noise) can rattle windows and objects on shelves and can rattle the walls of lightweight structures. None of the project equipment is likely to produce low frequency noise; this makes it highly unlikely that the ISEGS would cause perceptible airborne vibration effects.

Worker Effects

The applicant has acknowledged the need to protect plant operating and maintenance workers from noise hazards and has committed to comply with applicable LORS (BSE 2007a, AFC § 5.7.5.3.1). Signs would be posted in areas of the plant with noise levels exceeding 85 dBA (the level that OSHA recognizes as a threat to workers' hearing), and hearing protection would be required. To ensure that plant operation and maintenance workers would, in fact, be adequately protected, Energy Commission staff has proposed Condition of Certification **NOISE-5**, below.

Proposed Project – Closure and Decommissioning Impacts and Mitigation

In the future, upon closure of the ISEGS, all operational noise from the project would cease, and no further adverse noise impacts from operation of the ISEGS would be possible. The remaining potential temporary noise source would be the dismantling of the structures and equipment and any site restoration work that may be performed. Since this noise would be similar to that caused by the original construction, it can be treated similarly. That is, noisy work could be performed during daytime hours, with machinery and equipment properly equipped with mufflers. Any noise LORS that were in existence at that time would apply. Applicable conditions of certification included in the Energy Commission decision would also apply unless modified.

NO PROJECT/NO ACTION ALTERNATIVE

In the No Project / No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan.

The results of the No Project / No Action Alternative would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project.
- The benefits of the proposed project in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

If this project is not approved, renewable projects would likely be developed on other sites in the Mojave Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are three large solar projects proposed on BLM land in Nevada within a few miles of the Ivanpah site. In addition, as of August 2009 there were currently 66 applications for solar projects covering 611,692 acres pending with BLM in the California Desert District.

CUMULATIVE IMPACTS AND MITIGATION

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (California Code of Regulations, Title 14, section 15130). NEPA states that "cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR §1508.7).

There is the potential for substantial future development in the Ivanpah Valley area and throughout the southern California desert region. Analysis of cumulative impacts is based on data provided in the following maps and tables (see Cumulative Scenario section):

- Cumulative Impacts Figure 1, Regional Renewable Applications
- Cumulative Impacts Figure 2, Regional Renewable Applications (Detail)
- Cumulative Impacts Figure 3, Ivanpah Valley Existing and Future/Foreseeable Projects
- Cumulative Impacts Table 1, Regional Renewable Energy Projects
- Cumulative Impacts Table 2, Existing Development in the Ivanpah Valley
- Cumulative Impacts Table 3, Future Foreseeable Projects in the Ivanpah Valley Area.

The analysis in this section first defines the geographic area over which cumulative impacts to noise could occur. The cumulative impact analysis itself describes the potential for cumulative impacts to occur as a result of implementation of the ISEGS project along with the listed local and regional projects.

Geographic Extent

Cumulative impacts can occur if implementation of the ISEGS project could combine with those of other local or regional projects. Cumulative noise impacts could occur only locally because the ISEGS project impacts cannot combine with impacts of projects beyond this region. The geographic area impacted by cumulative noise impacts is generally limited to areas within approximately one-quarter mile of the ISEGS project. This area is appropriate because noise impacts would generally be localized, mainly within approximately 500 feet from any noise source; however it is possible that noise from different sources within one-quarter mile of each other could combine to create a significant impact to receptors at any point between the projects. At distances greater than one-quarter mile, steady construction noise from the project would generally dissipate into quiet background noise levels.

Cumulative Impact Analysis

Only one of the reasonably foreseeable projects identified in Table 3 and Figure 3 would be located near enough to the ISEGS project to pose a potential for cumulative noise impacts. The FirstSolar photovoltaic project is proposed to be located directly adjacent to the ISEGS site. The nearest sensitive receptor to the ISEGS project is the Primm Valley Golf Course, located approximately 0.5 mile northeast of the site, and one mile from the FirstSolar photovoltaic project. As discussed above, noise generated during construction of the ISEGS projects could reach levels of 50 to 55 dBA L_{eq} at the Primm Valley Golf Course, but such levels are not likely to be annoying to golfers. Noise from the FirstSolar photovoltaic project could combine with noise generated by the ISEGS project. Because doubling the distance from a noise source reduces the sound pressure level by 6 dB, noise from construction of the FirstSolar project would be expected to be roughly 6 dB quieter at the golf course than noise from ISEGS. Combined construction

noise from the two projects would thus reach levels of 51 to 56 dB at the golf course, an unnoticeable increase over noise from one project alone.
Noise impacts of the ISEGS project would thus not combine with impacts of past, present, and reasonably foreseeable projects to result in a significant contribution to local or regional cumulative impacts related to noise.

AGENCY AND PUBLIC COMMENTS ON THE PSA

No comments were received from agencies or the public on the Preliminary Staff Assessment (PSA).

CONCLUSIONS AND RECOMMENDATIONS

The ISEGS, if built and operated in conformance with the conditions of certification proposed below, would comply with all applicable noise and vibration LORS for both operation and construction and would produce no CEQA or NEPA significant adverse noise impacts on people within the affected area, directly, indirectly, or cumulatively.

MITIGATION MEASURES/PROPOSED CONDITIONS OF CERTIFICATION

NOISE-1 At least 15 days prior to the start of ground disturbance, the project owner shall notify the operator of the Primm Valley Golf Course, by mail or other effective means, of the commencement of project construction. At the same time, the project owner shall establish a telephone number for use by the public to report any undesirable noise conditions associated with the construction and operation of the project and include that telephone number in the above notice. If the telephone is not staffed 24 hours per day, the project owner shall include an automatic answering feature, with date and time stamp recording, to answer calls when the phone is unattended. This telephone number shall be posted at the project site during construction in a manner visible to passersby. This telephone number shall be maintained until the project has been operational for at least one year.

Verification: Prior to ground disturbance, the project owner shall transmit to BLM's Authorized Officer and the Compliance Project Manager (CPM) a statement, signed by the project owner's project manager, stating that the above notification has been performed and describing the method of that notification, verifying that the telephone number has been established and posted at the site, and giving that telephone number.

NOISE COMPLAINT PROCESS

NOISE-2 Throughout the construction and operation of the ISEGS, the project owner shall document, investigate, evaluate, and attempt to resolve all project-related noise complaints. The project owner or authorized agent shall:

- Use the Noise Complaint Resolution Form (below), or a functionally equivalent procedure acceptable to BLM's Authorized Officer and the CPM, to document and respond to each noise complaint;

- Attempt to contact the person(s) making the noise complaint within 24 hours;
- Conduct an investigation to determine the source of noise related to the complaint;
- Take all feasible measures to reduce the noise at its source if the noise is project related; and
- Submit a report documenting the complaint and the actions taken. The report shall include: a complaint summary, including final results of noise reduction efforts, and if obtainable, a signed statement by the complainant stating that the noise problem is resolved to the complainant's satisfaction.

Verification: Within 5 days of receiving a noise complaint, the project owner shall file a copy of the Noise Complaint Resolution Form with BLM's Authorized Officer and the CPM, documenting the resolution of the complaint. If mitigation is required to resolve a complaint, and the complaint is not resolved within a 3-day period, the project owner shall submit an updated Noise Complaint Resolution Form when the mitigation is implemented.

NOISE-3 The project owner shall submit to BLM's Authorized Officer and the CPM for review and approval a noise control program and a statement, signed by the project owner's project manager, verifying that the noise control program will be implemented throughout construction of the project. The noise control program shall be used to reduce employee exposure to high noise levels during construction and also to comply with applicable OSHA and Cal/OSHA standards.

Verification: At least 30 days prior to the start of ground disturbance, the project owner shall submit to BLM's Authorized Officer and the CPM the noise control program and the project owner's project manager's signed statement. The project owner shall make the program available to Cal/OSHA upon request.

NOISE RESTRICTIONS

NOISE-4 The project design and implementation shall include appropriate noise mitigation measures adequate to ensure that operation of the project will not cause noise complaints from residents of Primm, Nevada, or from the operator of the Primm Valley Golf Course. If project-related noise complaints are received from residents of Primm, the project owner shall perform a noise survey to demonstrate that noise levels due to plant operation do not exceed an average of 45 dBA L_{eq} measured at the nearest residence of the community of Primm, Nevada. If project-related noise complaints are received from the operator of the Primm Valley Golf Course, the project owner shall perform a noise survey to demonstrate that noise levels due to plant operation do not exceed an average of 55 dBA L_{eq} measured at the nearest

boundary of the golf course. No new pure-tone components may be caused by the project. No single piece of equipment shall be allowed to stand out as a source of noise that draws legitimate complaints.

A. The measurement of power plant noise for the purposes of demonstrating compliance with this condition of certification may alternatively be made at a location, acceptable to BLM's Authorized Officer and the CPM, closer to the plant (e.g., 400 feet from the plant boundary) and this measured level then mathematically extrapolated to determine the plant noise contribution at the affected location. The character of the plant noise shall be evaluated at the affected residential locations to determine the presence of pure tones or other dominant sources of plant noise.

Verification: The survey shall take place within 30 days of the receipt of the noise complaint. Within 15 days after completing the survey, the project owner shall submit a summary report of the survey to BLM's Authorized Officer and the CPM. Included in the survey report will be a description of any additional mitigation measures necessary to achieve compliance with the above-listed noise limit and a schedule, subject to BLM's Authorized Officer and CPM approval, for implementing these measures. When these measures are in place, the project owner shall repeat the noise survey.

Within 15 days of completion of the new survey, the project owner shall submit to BLM's Authorized Officer and the CPM a summary report of the new noise survey, performed as described above and showing compliance with this condition.

NOISE-5 Following each phase (Ivanpah 1, Ivanpah 2, and Ivanpah 3) of the project's first achieving a sustained output of 80 percent or greater of rated capacity, the project owner shall conduct an occupational noise survey to identify the noise hazardous areas in the facility.

The surveys shall be conducted by a qualified person in accordance with the provisions of Title 8, California Code of Regulations sections 5095–5099 and Title 29, Code of Federal Regulations section 1910.95. The survey results shall be used to determine the magnitude of employee noise exposure.

The project owner shall prepare reports of the survey results and, if necessary, identify proposed mitigation measures that will be employed to comply with the applicable California and federal regulations.

Verification: Within 30 days after completing each survey, the project owner shall submit the noise survey report to BLM's Authorized Officer and the CPM. The project owner shall make the reports available to OSHA and Cal/OSHA upon request.

CONSTRUCTION TIME RESTRICTIONS

NOISE-6 Heavy equipment operation and noisy construction work relating to any project features shall be restricted to the times of day delineated below:

Weekdays and Saturdays	7:00 a.m. to 7:00 p.m.

No noisy construction work shall be performed on Sundays or federal holidays. Haul trucks and other engine-powered equipment shall be equipped with mufflers that meet all applicable regulations. Haul trucks shall be operated in accordance with posted speed limits. Truck engine exhaust brake use shall be limited to emergencies.

Verification: Prior to ground disturbance, the project owner shall transmit to BLM's Authorized Officer and the CPM a statement acknowledging that the above restrictions will be observed throughout the construction of the project.

STEAM BLOW RESTRICTIONS

NOISE-7 If a high-pressure steam blow is employed, the project owner shall equip steam blow piping with a temporary silencer or take other effective measures that quiet the noise of steam blows to no greater than 60 dBA measured at the Primm Valley Golf Club and no greater than 55 dBA measured at any affected residential locations in Primm, NV. The project owner shall conduct high-pressure steam blows only during the hours of 7:00 a.m. to 7:00 p.m.

If a low-pressure continuous steam blow is employed, the project owner shall limit the noise of steam blows to no greater than 45 dBA measured at any affected residential location in Primm, NV.

Verification: At least 15 days prior to the first high pressure steam blow, the project owner shall submit to BLM's Authorized Officer and the CPM drawings or other information describing the temporary steam blow silencer or other noise attenuating measures to be taken, the noise levels expected and a description of the steam blow schedule.

At least 15 days prior to any low-pressure continuous steam blow, the project owner shall submit to BLM's Authorized Officer and the CPM drawings or other information describing the process, including the noise levels expected and the projected time schedule for execution of the process.

EXHIBIT 1 - NOISE COMPLAINT RESOLUTION FORM

Ivanpah Solar Electric Generating System
(07-AFC-5)

NOISE COMPLAINT LOG NUMBER _____

Complainant's name and address:

Phone number: _____

Date complaint received: _____
Time complaint received: _____

Nature of noise complaint:

Definition of problem after investigation by plant personnel:

Date complainant first contacted: _____

Initial noise levels at 3 feet from noise source _____ dBA Date: _____

Initial noise levels at complainant's property: _____ dBA Date: _____

Final noise levels at 3 feet from noise source: _____ dBA Date: _____

Final noise levels at complainant's property: _____ dBA Date: _____

Description of corrective measures taken:

Complainant's signature: _____ Date: _____

Approximate installed cost of corrective measures: $ _____
Date installation completed: _____
Date first letter sent to complainant: _____ (copy attached)
Date final letter sent to complainant: _____ (copy attached)

This information is certified to be correct:

Plant Manager's signature: _____

(Attach additional pages and supporting documentation, as required).

REFERENCES

BSE2007a – Bright Source Energy/ Solar Partners I, LLC/ J. Woolard (tn: 42174). Application for Certification, Volumes I and II, for the Ivanpah Solar Electric Generating System. Dated on 08/28/2007. Submitted to CEC/Docket Unit on 8/31/2007.

CH2M2008g – CH2M HILL/ J. Carrier (tn: 46239). Data Responses Set 1D. Dated on 5/09/2008. Submitted to CEC / Docket Unit on 5/09/2008.

CH2ML2009a – CH2M HILL / J. Carrier (tn 49839). Preliminary Staff Assessment Comments, Set 1. Dated on 01/23/2009. Submitted to CEC / J. Kessler on 01/23/2009.

COSB (County of San Bernardino). 2007a. County of San Bernardino General Plan, 2007.

COSB (County of San Bernardino). 2007b. County of San Bernardino Development Code, April 12, 2007.

NOISE APPENDIX A
FUNDAMENTAL CONCEPTS OF COMMUNITY NOISE

To describe noise environments and to assess impacts on noise-sensitive area, a frequency weighting measure, which simulates human perception, is customarily used. It has been found that "A-weighting" of sound intensities best reflects the human ear's reduced sensitivity to low frequencies and correlates well with human perceptions of the annoying aspects of noise. The A-weighted decibel scale (dBA) is cited in most noise criteria. Decibels are logarithmic units that conveniently compare the wide range of sound intensities to which the human ear is sensitive. **NOISE Table A1** provides a description of technical terms related to noise.

Noise environments and consequences of human activities are usually well represented by an equivalent A-weighted sound level over a given time period (L_{eq}), or by average day and night A-weighted sound levels with a nighttime weighting of 10 dBA (L_{dn}). Noise levels are generally considered low when ambient levels are below 45 dBA, moderate in the 45 to 60 dBA range, and high above 60 dBA. Outdoor day-night sound levels vary over 50 dBA depending on the specific type of land use. Typical L_{dn} values might be 35 dBA for a wilderness area, 50 dBA for a small town or wooded residential area, 65 to 75 dBA for a major metropolis downtown (e.g., San Francisco), and 80 to 85 dBA near a freeway or airport. Although people often accept the higher levels associated with very noisy urban residential and residential-commercial zones, those higher levels nevertheless are considered to be levels of noise adverse to public health.

Various environments can be characterized by noise levels that are generally considered acceptable or unacceptable. Lower levels are expected in rural or suburban areas than would be expected for commercial or industrial zones. Nighttime ambient levels in urban environments are about seven decibels lower than the corresponding average daytime levels. The day-to-night difference in rural areas away from roads and other human activity can be considerably less. Areas with full-time human occupation that are subject to nighttime noise, which does not decrease relative to daytime levels, are often considered objectionable. Noise levels above 45 dBA at night can result in the onset of sleep interference effects. At 70 dBA, sleep interference effects become considerable (U. S. Environmental Protection Agency, Effects of Noise on People, December 31, 1971).

To help the reader understand the concept of noise in decibels (dBA), **NOISE Table A2** illustrates common noises and their associated sound levels, in dBA.

NOISE Table A1 Definition of Some Technical Terms Related to Noise	
Terms	**Definitions**
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this testimony are A-weighted.
L_{10}, L_{50}, & L_{90}	The A-weighted noise levels that are exceeded 10%, 50%, and 90% of the time, respectively, during the measurement period. L_{90} is generally taken as the background noise level.
Equivalent Noise Level, L_{eq}	The energy average A-weighted noise level during the noise level measurement period.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 4.8 decibels to levels in the evening from 7:00 p.m. to 10:00 p.m., and after addition of 10 decibels to sound levels in the night between 10:00 p.m. and 7:00 a.m.
Day-Night Level, L_{dn} or DNL	The Average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 p.m. and 7:00 a.m.
Ambient Noise Level	The composite of noise from all sources, near and far. The normal or existing level of environmental noise at a given location.
Intrusive Noise	That noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.
Pure Tone	A pure tone is defined by the Model Community Noise Control Ordinance as existing if the one-third octave band sound pressure level in the band with the tone exceeds the arithmetic average of the two contiguous bands by 5 decibels (dB) for center frequencies of 500 Hz and above, or by 8 dB for center frequencies between 160 Hz and 400 Hz, or by 15 dB for center frequencies less than or equal to 125 Hz.

Source: Guidelines for the Preparation and Content of Noise Elements of the General Plan, Model Community Noise Control Ordinance, California Department of Health Services 1976, 1977.

NOISE Table A2 Typical Environmental and Industry Sound Levels			
Noise Source (at distance)	A-Weighted Sound Level in Decibels (dBA)	Noise Environment	Subjective Impression
Civil Defense Siren (100')	140-130		Pain Threshold
Jet Takeoff (200')	120		Very Loud
Very Loud Music	110	Rock Music Concert	
Pile Driver (50')	100		
Ambulance Siren (100')	90	Boiler Room	
Freight Cars (50')	85		
Pneumatic Drill (50')	80	Printing Press Kitchen with Garbage Disposal Running	Loud
Freeway (100')	70		Moderately Loud
Vacuum Cleaner (100')	60	Data Processing Center Department Store/Office	
Light Traffic (100')	50	Private Business Office	
Large Transformer (200')	40		Quiet
Soft Whisper (5')	30	Quiet Bedroom	
	20	Recording Studio	
	10		Threshold of Hearing

Source: Handbook of Noise Measurement, Arnold P.G. Peterson, 1980

Subjective Response to Noise

The adverse effects of noise on people can be classified into three general categories:

- Subjective effects of annoyance, nuisance, dissatisfaction.
- Interference with activities such as speech, sleep, and learning.
- Physiological effects such as anxiety or hearing loss.

The sound levels associated with environmental noise, in almost every case, produce effects only in the first two categories. Workers in industrial plants can experience noise effects in the last category. There is no completely satisfactory way to measure the subjective effects of noise or of the corresponding reactions of annoyance and dissatisfaction, primarily because of the wide variation in individual tolerance of noise.

One way to determine a person's subjective reaction to a new noise is to compare the level of the existing (background) noise, to which one has become accustomed, with the level of the new noise. In general, the more the level or the tonal variations of a new noise exceed the previously existing ambient noise level or tonal quality, the less acceptable the new noise will be, as judged by the exposed individual.

With regard to increases in A-weighted noise levels, knowledge of the following relationships can be helpful in understanding the significance of human exposure to noise.

1. Except under special conditions, a change in sound level of 1 dB cannot be perceived.

2. Outside of the laboratory, a 3-dB change is considered a barely noticeable difference.

3. A change in level of at least 5 dB is required before any noticeable change in community response would be expected.

4. A 10-dB change is subjectively heard as an approximate doubling in loudness and almost always causes an adverse community response (Kryter, Karl D., The Effects of Noise on Man, 1970).

Combination of Sound Levels

People perceive both the level and frequency of sound in a non-linear way. A doubling of sound energy (for instance, from two identical automobiles passing simultaneously) creates a 3-dB increase (i.e., the resultant sound level is the sound level from a single passing automobile plus 3 dB). **NOISE Table A3** indicates the rules for decibel addition used in community noise prediction.

NOISE Table A3
Addition of Decibel Values

When two decibel values differ by:	Add the following amount to the larger value
0 to 1 dB	3 dB
2 to 3 dB	2 dB
4 to 9 dB	1 dB
10 dB or more	0
Figures in this table are accurate to ± 1 dB.	

Source: Architectural Acoustics, M. David Egan, 1988.

Sound and Distance

Doubling the distance from a noise source reduces the sound pressure level by 6 dB.

Increasing the distance from a noise source 10 times reduces the sound pressure level by 20 dB.

Worker Protection

OSHA noise regulations are designed to protect workers against the effects of noise exposure and list permissible noise level exposure as a function of the amount of time to which the worker is exposed, as shown in **NOISE Table A4**.

NOISE Table A4
OSHA Worker Noise Exposure Standards

Duration of Noise (Hrs/day)	A-Weighted Noise Level (dBA)
8.0	90
6.0	92
4.0	95
3.0	97
2.0	100
1.5	102
1.0	105
0.5	110
0.25	115

Source: 29 CFR §1910.95.

PUBLIC HEALTH AND SAFETY

Prepared by Alvin J. Greenberg, Ph.D.

SUMMARY OF CONCLUSIONS

U.S. Bureau of Land Management (BLM) and Energy Commission staff (hereafter jointly referred to as staff) have analyzed potential public health and safety risks associated with construction and operation of the Ivanpah Solar Electric Generating System (ISEGS) project and do not expect any adverse cancer or short- or long-term noncancer health effects from project toxic emissions that would be considered to be significant under CEQA or NEPA. Staff's analysis of potential health and safety impacts from the proposed ISEGS uses a highly conservative methodology that accounts for impacts to the most sensitive individuals in a given population, including newborns and infants. According to the results of staff's health risk assessment, emissions from the ISEGS would not contribute significantly to morbidity or mortality in any age or ethnic group residing in the project area. Conditions of Certification referred to herein serve the purpose of both the Energy Commission's Conditions of Certification for purposes of the California Environmental Quality Act (CEQA) and BLM's Mitigation Measures for purposes of the National Environmental Policy Act (NEPA).

INTRODUCTION

The purpose of this Final Staff Assessment/Draft Environmental Impact Statement (FSA/DEIS) is to determine if emissions of toxic air contaminants (TACs) from the proposed ISEGS would have the potential to cause significant adverse public health and safety impacts or to violate standards for public health protection. If potentially significant health and safety impacts are identified, staff will evaluate mitigation measures to reduce such impacts to insignificant levels.

In addition to the analysis contained in this Public Health and Safety Section that focuses on potential effects to the public from emissions of toxic air contaminants, other related aspects to the assessment of ISEGS' potential public health and safety impacts are considered elsewhere in this document as listed and briefly described as follows:

- Air Quality - evaluates the expected air quality impacts from the emissions of criteria air pollutants from both the construction and operation of the ISEGS project; Criteria air pollutants are defined as air contaminants for which the state and/or federal governments have established an ambient air quality standard to protect public health;
- Hazardous Materials Management - evaluates the potential impacts on public and worker health from accidental releases of hazardous materials;
- Socioeconomics and Environmental Justice - evaluates project-induced changes on community services including law enforcement and hospitals;
- Soil and Water Resources – evaluates the potential for ISEGS to cause contamination of soil and water resources, to exacerbate flooding, and to cause adverse effects to water supply in consideration of other existing users and projected needs;

- Traffic and Transportation – evaluates potential effects on roads used during project construction and operation, effects on traffic, and the potential for project-related glare to cause a health or safety hazard;
- Transmission Line Safety and Nuisance – evaluates potential effects associated with proposed transmission lines accounting for both the physical presence of the lines and the physical interactions of their electric and magnetic fields; The potential effects include aviation safety, interference with radio-frequency communication, audible noise, fire hazards, hazardous shocks, nuisance shocks, and electric and magnetic field (EMF) exposure.
- Worker Safety and Fire Protection - assess the worker safety and fire protection measures proposed by the applicant including determining whether the project would have any adverse impacts on fire protection and emergency medical services that are also relied upon by the public;
- Waste Management - evaluates issues associated with wastes generated from the proposed project construction and operation including ensuring that wastes would be managed in an environmentally safe manner;

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

PUBLIC HEALTH AND SAFETY Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
Clean Air Act section 112 (Title 42, U.S. Code section 7412)	This act requires new sources that emit more than 10 tons per year of any specified Hazardous Air Pollutant (HAP) or more than 25 tons per year of any combination of HAPs to apply Maximum Achievable Control Technology.
State	
California Health and Safety Code section 25249.5 et seq. (Proposition 65)	These sections establish thresholds of exposure to carcinogenic substances above which Prop 65 exposure warnings are required.
California Health and Safety Code section 41700	This section states that "no person shall discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause injury or damage to business or property."
California Public Resource Code section 25523(a); Title 20 California Code of Regulations (CCR) section 1752.5, 2300–2309 and Division 2 Chapter 5, Article 1, Appendix B, Part (1); California Clean Air Act, Health and Safety Code section 39650, et seq.	These regulations require a quantitative health risk assessment for new or modified sources, including power plants that emit one or more toxic air contaminants (TACs).
Local	
Mojave Desert Air Quality Management District Regulation XIII Rule 1320	This rule requires a review of new or modified projects that emit toxic air contaminants and the preparation of a health risk assessment. A permit would not be issued if the risk were greater than 10 in 1 million or if the hazard index were greater than 1.0. It also requires the use of best available control of toxics.

SETTING

This section describes the environment in the vicinity of the proposed project site from the public health perspective. Characteristics of the natural environment, such as

meteorology and terrain, affect the project's potential for causing impacts on public health. An emissions plume from a facility may affect elevated areas before lower terrain areas due to a reduced opportunity for atmospheric mixing. Consequently, areas of elevated terrain can often be subjected to increased pollutant impacts. Also, the types of land use near a site influence the surrounding population distribution and density, which, in turn, affect public exposure to project emissions. Additional factors affecting potential public health impacts include existing air quality and environmental site contamination. The area surrounding the project is rural and sparsely populated, primarily dedicated to agricultural uses.

SITE AND VICINITY DESCRIPTION

Land in the vicinity of the proposed project is designated for Class L Limited Use and Class M Moderate Use, which include a variety of industrial uses as well as agricultural and recreational uses (BSE 2007a section 5.6.3.2 and Table 5.6-4). The natural gas pipeline proposed for construction for this project would be approximately 5.3 miles long, running from the Kern River Gas Transmission Company (KRGT) pipeline through Ivanpah 3 and 2 and ending at Ivanpah 1 (BSE 2007a section 2.2.6). The nearest residence is located approximately 5 miles from the site in the community of Primm, Nevada. According to the Application for Certification (AFC), there are no sensitive receptors within 6 miles of the project site (BSE 2007 section 5.9.3). However, staff learned of a house trailer used as a residence that is located near the southeast quadrant of the Interstate 15/Yates Well Road interchange.

The ISEGS would have three exhaust stacks associated with the start-up boilers, one for each plant (Ivanpah 1, 2, and 3). The stack heights would be 39.62 meters (130 feet) (BSE 2007a Table 5.1D-2). The location of elevated terrain (above the stack height) is important in assessing potential exposure, as an emission plume may impact high elevations before impacting lower elevations. The site elevation ranges from 2,880 to 3,030 feet above sea level, and the topography in the immediate vicinity is generally flat. Terrain above stack height includes a volcanic rock structure rising to 3,160 feet above sea level approximately 0.8 miles east of the project site, and at 4 miles from the project site terrain in all directions (except southeast) rises to about 6,000 feet (BSE 2007a section 5.1.3.1).

METEOROLOGY

Meteorological conditions, including wind speed, wind direction, and atmospheric stability, affect the extent to which pollutants are dispersed into ambient air as well as the direction of pollutant transport. This, in turn, affects the level of public exposure to emitted pollutants and associated health risks. When wind speeds are low and the atmosphere is stable, for example, dispersion is reduced, and localized exposure may be increased.

The Ivanpah Basin of the Mojave Desert is characterized by a desert climate. Summers are hot and dry and winters are moderate with an average annual rainfall of 2–5 inches. Winds generally flow west to east across the region (BSE 2007a section 5.1.3.2)

Atmospheric stability is a measure related to turbulence, or the ability of the atmosphere to disperse pollutants due to convective air movement. Mixing heights (the height above

ground level through which the air is well mixed and in which pollutants can be dispersed) are lower during mornings due to temperature inversions and increase during the warmer afternoons. Staff's **Air Quality** section presents more detailed meteorological data.

EXISTING AIR QUALITY

The proposed site is within the jurisdiction of the Mojave Desert Air Quality Management District. By examining average toxic concentration levels from representative air monitoring sites with cancer risk factors specific to each contaminant, lifetime cancer risk can be calculated to provide a background risk level for inhalation of ambient air. For comparison purposes, it should be noted that the overall lifetime cancer risk for the average individual in the United States is about 1 in 3, or 333,000 in 1 million.

There are no monitoring stations in the San Bernardino County; therefore staff was unable to determine background concentrations for the ISEGS site. The applicant noted that air quality data from the South Coast Air Basin (upwind from the project area) between the years 1990 and 2005 show a steady reduction in Toxic Air Contaminant (TAC) emissions (BSE 2007a section 5.9.3).

The use of reformulated gasoline, beginning in the second quarter of 1996, as well as other toxics reduction measures, have led to a decrease of ambient levels of toxics and associated cancer risk during the past few years in all areas of the state and the nation. For example, in the San Francisco Bay Area, cancer risk was 342 in 1 million based on 1992 data, 315 in 1 million based on 1994 data, and 303 in 1 million based on 1995 data. In 2002, the most recent year for which data is available, the average inhalation cancer risk decreased to 162 in 1 million (BAAQMD 2004b, p. 12).

EXISTING PUBLIC HEALTH CONCERNS

When evaluating a new project, staff conducts a detailed study and analysis of existing public health issues in the project vicinity. This analysis is prepared in order to identify the current status of respiratory diseases (including asthma), cancer, and childhood mortality rates in the population located near the proposed project. Assessing existing health concerns in the project area will provide staff with a basis on which to evaluate the significance of any additional health impacts from the proposed ISEGS project and evaluate any proposed mitigation. No existing health issues have been reported within a 6-mile radius of the project.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

The **PUBLIC HEALTH AND SAFETY** section of this FSA/DEIS discusses toxic emissions to which the public could be exposed during project construction, routine operation, and closure/decommissioning. Following the release of toxic contaminants into the air or water, people may come into contact with them through inhalation, dermal contact, or ingestion via contaminated food or water.

Air pollutants for which no ambient air quality standards have been established are called noncriteria pollutants. Unlike criteria pollutants such as ozone, carbon monoxide, sulfur dioxide, or nitrogen dioxide, noncriteria pollutants have no ambient (outdoor) air quality standards that specify levels considered safe for everyone.

Since noncriteria pollutants do not have such standards, a health risk assessment is used to determine if people might be exposed to those types of pollutants at unhealthy levels. The risk assessment consists of the following steps:

- identify the types and amounts of hazardous substances that ISEGS could emit to the environment;
- estimate worst-case concentrations of project emissions in the environment using dispersion modeling;
- estimate amounts of pollutants that people could be exposed to through inhalation, ingestion, and dermal contact; and
- characterize potential health risks by comparing worst-case exposure to safe standards based on known health effects.

Staff relies upon the expertise of the California Environmental Protection Agency (Cal/EPA) Office of Environmental Health Hazard Assessment (OEHHA) to identify contaminants that are known to the state to cause cancer or other noncancer toxicological endpoints and to calculate the toxicity and cancer potency factors of these contaminants. Staff also relies upon the expertise of the California Air Resources Board and the local air districts to conduct ambient air monitoring of toxic air contaminants and the state Department of Public Health to conduct epidemiological investigations into the impacts of pollutants on communities. It is not within the purview or the expertise of the Energy Commission staff to duplicate the expertise and statutory responsibility of these agencies.

Initially, a screening level risk assessment is performed using simplified assumptions that are intentionally biased toward protection of public health. That is, an analysis is designed that overestimates public health impacts from exposure to project emissions. In reality, it is likely that the actual risks from the power plant will be much lower than the risks as estimated by the screening level assessment. The risks for screening purposes are based on examining conditions that would lead to the highest, or worst-case, risks and then using those conditions in the study. Such conditions include:

- using the highest levels of pollutants that could be emitted from the plant;
- assuming weather conditions that would lead to the maximum ambient concentration of pollutants;
- using the type of air quality computer model which predicts the greatest plausible impacts;
- calculating health risks at the location where the pollutant concentrations are estimated to be the highest;
- assuming that an individual’s exposure to cancer-causing agents occurs continuously for 70 years; and

- using health-based standards designed to protect the most sensitive members of the population (i.e., the young, elderly, and those with respiratory illnesses).

A screening level risk assessment will, at a minimum, include the potential health effects from inhaling hazardous substances. Some facilities may also emit certain substances that could present a health hazard from noninhalation pathways of exposure (OEHHA 2003, Tables 5.1, 6.3, 7.1). When these substances are present in facility emissions, the screening level analysis includes the following additional exposure pathways: soil ingestion, dermal exposure, and mother's milk (OEHHA 2003, p. 5-3).

The risk assessment process addresses three categories of health impacts: acute (short-term) health effects, chronic (long-term) noncancer effects, and cancer risk (also long-term). Acute health effects result from short-term (one-hour) exposure to relatively high concentrations of pollutants. Acute effects are temporary in nature and include symptoms such as irritation of the eyes, skin, and respiratory tract.

Chronic health effects are those that arise as a result of long-term exposure to lower concentrations of pollutants. The exposure period is considered to be approximately from 12 percent to 100 percent of a lifetime, or from 8 to 70 years (OEHHA 2003, p. 6-5). Chronic health effects include diseases such as reduced lung function and heart disease.

The analysis for noncancer health effects compares the maximum project contaminant levels to safe levels called *Reference Exposure Levels*, or RELs. These are amounts of toxic substances to which even sensitive people can be exposed and suffer no adverse health effects (OEHHA 2003, p. 6-2). These exposure levels are designed to protect the most sensitive individuals in the population, such as infants, the aged, and people suffering from illness or disease which makes them more sensitive to the effects of toxic substance exposure. The Reference Exposure Levels are based on the most sensitive adverse health effect reported in the medical and toxicological literature and include margins of safety. The margin of safety addresses uncertainties associated with inconclusive scientific and technical information available at the time of standard setting and is meant to provide a reasonable degree of protection against hazards that research has not yet identified. The margin of safety is designed to prevent pollution levels that have been demonstrated to be harmful, as well as to prevent lower pollutant levels that may pose an unacceptable risk of harm, even if the risk is not precisely identified as to nature or degree. Health protection is achieved if the estimated worst-case exposure is below the relevant reference exposure level. In such a case, an adequate margin of safety exists between the predicted exposure and the estimated threshold dose for toxicity.

Exposure to multiple toxic substances may result in health effects that are equal to, less than, or greater than effects resulting from exposure to the individual chemicals. Only a small fraction of the thousands of potential combinations of chemicals have been tested for the health effects of combined exposures. In conformity with the California Air Pollution Control Officers Association (CAPCOA) guidelines, the health risk assessment assumes that the effects of each substance are additive for a given organ system (OEHHA 2003, pp. 1-5, 8-12). Other possible mechanisms due to multiple exposures

include those cases where the actions may be synergistic or antagonistic (where the effects are greater or less than the sum, respectively). For these types of substances, the health risk assessment could underestimate or overestimate the risks.

For carcinogenic substances, the health assessment considers the risk of developing cancer and assumes that continuous exposure to the cancer-causing substance occurs over a 70-year lifetime. The risk that is calculated is not meant to project the actual expected incidence of cancer, but rather a theoretical upper-bound number based on worst-case assumptions.

Cancer risk is expressed in chances per million and is a function of the maximum expected pollutant concentration, the probability that a particular pollutant will cause cancer (called *potency factors* and established by OEHHA), and the length of the exposure period. Cancer risks for each carcinogen are added to yield total cancer risk. The conservative nature of the screening assumptions used means that actual cancer risks due to project emissions are likely to be considerably lower than those estimated.

The screening analysis is performed to assess worst-case risks to public health associated with the proposed project. If the screening analysis predicts no significant risks, then no further analysis is required. However, if risks are above the significance level, then further analysis, using more realistic site-specific assumptions, would be performed to obtain a more accurate assessment of potential public health risks.

Significance Criteria

Energy Commission staff determines the health effects of exposure to toxic emissions based on impacts to the maximum exposed individual. This is a person hypothetically exposed to project emissions at a location where the highest ambient impacts were calculated using worst-case assumptions, as described above.

As described earlier, noncriteria pollutants are evaluated for short-term (acute) and long-term (chronic) noncancer health effects, as well as cancer (long-term) health effects. The significance of project health impacts is determined separately for each of the three categories.

Acute and Chronic Noncancer Health Effects

Staff assesses the significance of noncancer health effects by calculating a *hazard index*. A hazard index is a ratio comparing exposure from facility emissions to the reference (safe) exposure level. A ratio of less than 1.0 signifies that the worst-case exposure is below the safe level. The hazard index for every toxic substance that has the same type of health effect is added to yield a Total Hazard Index. The Total Hazard Index is calculated separately for acute and chronic effects. A Total Hazard Index of less than 1.0 indicates that cumulative worst-case exposures are less than the reference exposure levels. Under these conditions, health protection from the project is likely to be achieved, even for sensitive members of the population. In such a case, staff presumes that there would be no significant noncancer project-related public health impacts. This assumption is consistent with both California and U.S. EPA risk management guidelines.

Cancer Risk

Staff relied upon regulations implementing the provisions of Proposition 65, the Safe Drinking Water and Toxic Enforcement Act of 1986, (Health & Safety Code, §§25249.5 et seq.) for guidance to determine a cancer risk significance level. Title 22, California Code of Regulations section 12703(b) states that "the risk level which represents no significant risk shall be one which is calculated to result in one excess case of cancer in an exposed population of 100,000, assuming lifetime exposure." This level of risk is equivalent to a cancer risk of 10 in 1 million, which is also written as 10×10^{-6}. An important distinction is that the Proposition 65 significance level applies separately to each cancer-causing substance, whereas staff determines significance based on the total risk from all cancer-causing chemicals. Thus, the manner in which the significance level is applied by staff is more conservative (health-protective) than that applied by Proposition 65. The significant risk level of 10 in 1 million is consistent with the level of significance adopted by many air districts. In general, these air districts would not approve a project with a cancer risk exceeding 10 in 1 million. The Mojave Desert Air Quality Management District (MDAQMD) also uses 10 in 1 million as the level of "Significant Health Risk" (MDAQMD 2006). The U.S. EPA has a similar level for acceptable risk.

As noted earlier, the initial risk analysis for a project is typically performed at a screening level, which is designed to overstate actual risks, so that health protection can be ensured. Staff's analysis also addresses potential impacts on all members of the population including the young, the elderly, people with existing medical conditions that may make them more sensitive to the adverse effects of toxic air contaminants, and any minority or low-income populations that are likely to be disproportionately affected by impacts. To accomplish this goal, staff uses the most current acceptable public health exposure levels (both acute and chronic) set to protect the public from the effects of airborne toxics. When a screening analysis shows cancer risks to be above the significance level, refined assumptions would likely result in a lower, more realistic risk estimate. Based on refined assumptions, if risk posed by the facility exceeds the significance level of 10 in 1 million, staff would require appropriate measures to reduce the risk to less than significant. If, after all risk reduction measures had been considered, a refined analysis identifies a cancer risk greater than 10 in 1 million, staff would deem such risk to be significant and would not recommend project approval.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Proposed Project - Construction Impacts and Mitigation

Potential risks to public health during construction may be associated with exposure to toxic substances in contaminated soil disturbed during site preparation, as well as diesel exhaust from heavy equipment operation. Criteria pollutant impacts from the operation of heavy equipment and particulate matter from earth moving are examined in staff's **Air Quality** analysis.

Site disturbances occur during facility construction from excavation, grading, and earth moving. Such activities have the potential to adversely affect public health through various mechanisms, such as the creation of airborne dust, material being carried off site through soil erosion, and uncovering buried hazardous substances. A Phase I

Environmental Site Assessment conducted for this site in 2007 identified no "Recognized Environmental Conditions" per the American Society for Testing and Materials Standards (ASTM) definition. That is, there was no evidence or record of any use, spillage, or disposal of hazardous substances on the site, nor was there any other environmental concern that would require remedial action. In fact, the report concluded that the project site has never been used for commercial or industrial activities (BSE 2007a, Appendix 5.14A). In the event that any unexpected contamination is encountered during construction, proposed **Waste Management** Conditions of Certification **Waste-1** and **Waste-2** (which require a registered professional engineer or geologist to be available during soil excavation and grading to ensure proper handling and disposal of contaminated soil) would ensure that contaminated soil does not affect the public. See the staff assessment section on **Waste Management** for a more detailed analysis of this topic.

The operation of construction equipment will result in air emissions from diesel-fueled engines. Diesel emissions are generated from sources such as trucks, graders, cranes, welding machines, electric generators, air compressors, and water pumps. Although diesel exhaust contains criteria pollutants such as nitrogen oxides, carbon monoxide, and sulfur oxides, it also includes a complex mixture of thousands of gases and fine particles. These particles are primarily composed of aggregates of spherical carbon particles coated with organic and inorganic substances. Diesel exhaust contains over 40 substances that are listed by the U.S. Environmental Protection Agency (U.S. EPA) as hazardous air pollutants and by the California Air Resources Board (ARB) as toxic air contaminants.

Exposure to diesel exhaust may cause both short- and long-term adverse health effects. Short-term effects can include increased coughing, labored breathing, chest tightness, wheezing, and eye and nasal irritation. Long-term effects can include increased coughing, chronic bronchitis, reductions in lung function, and inflammation of the lung. Epidemiological studies also strongly suggest a causal relationship between occupational diesel exhaust exposure and lung cancer.

Based on a number of health effects studies, the Scientific Review Panel on Toxic Air Contaminants recommended a chronic reference exposure level (see discussion of reference exposure levels in Method of Analysis section above) for diesel exhaust particulate matter of 5 micrograms of diesel particulate matter per cubic meter of air ($\mu g/m^3$) and a cancer unit risk factor of $3x10^{-4}$ $(\mu g/m^3)^{-1}$ (SRP 1998, p. 6).[1] The Scientific Review Panel did not recommend a value for an acute Reference Exposure Level since available data in support of a value was deemed insufficient. On August 27, 1998, ARB listed particulate emissions from diesel-fueled engines as a toxic air contaminant and approved the panel's recommendations regarding health effect levels.

Construction of the three power plants of ISEGS is anticipated to take place over a period of 48 months, with each phase taking about 24 months to complete and with 12 months of overlap between the construction of any of the two power plants at one time

(BSE 2007a section 2.2.15). As noted earlier, assessment of chronic (long-term) health effects assumes continuous exposure to toxic substances over a significantly longer time period, typically from 8 to 70 years.

Appendix 5.1F of the AFC (BSE 2007a) presents diesel exhaust emission factors and daily emissions from construction equipment. The applicant estimated worst-case emissions of 267.38 pounds per day of particulate matter 10 (PM10) and 57.56 pounds per day of PM2.5 during construction. Modeling of construction activities including impacts of fugitive dust over a 12-month period (using ISCST3; Industrial Source Complex Short-term, version 3) resulted in a predicted annual average concentration of 0.7 $\mu g/m^3$ of PM10 and 0.2 $\mu g/m^3$ of PM2.5 at any location. Annual background concentrations of PM10 and PM2.5 measured in the vicinity of the ISEGS site are 25.4 $\mu g/m^3$ and 10.6 $\mu g/m^3$ respectively (BSE 2007a Table 5.1F-4). The maximum carcinogenic risk from exposure to diesel emissions during 32 months of construction (not including 15 months of vegetation removal and using average annual emissions estimated for the peak period of construction) was modeled using the ARB/OEHHA Hotspots Analysis and Reporting Program (HARP). The expected cancer risk calculated with the assumptions detailed in section F-5.4 of the AFC would be between 0.3 and 0.5 in 1 million in the immediate vicinity of the project site (BSE 2007a Appendix 5.1F). The applicant has stated that the estimated cancer risk is over-predicted due to the conservative nature of the model used.

The estimated maximum 24-hour emissions of PM10 exceed the federal Prevention of Significant Deterioration (PSD) level of significance. However, the applicant stated that background concentrations already exceed the PSD significance level and that these levels were established for emissions associated with a facility's routine operations and therefore are not appropriate for determining the significance of emissions over a short period of construction.

Mitigation measures are proposed by both the applicant and Energy Commission staff to reduce the maximum calculated PM10 emissions. These include the use of extensive fugitive dust control measures in accordance with **Air Quality** Conditions of Certification **AQ-SC3 and AQ-SC-7**. The fugitive dust control measures are assumed to result in 90 percent reductions of emissions. The applicant has stated that the ISEGS project will incorporate all feasible mitigation measures to reduce PM10 (BSE 2007a section F-4.5.3 of Appendix 5.1F).

In accordance with **Air Quality** Condition of Certification **AQ-SC5** and in order to further mitigate potential impacts from particulate emissions during the operation of diesel-powered construction equipment, Energy Commission staff recommends the use of ultra-low sulfur diesel fuel and Tier 3 California Emission Standards for Off-Road Compression-Ignition Engines. In the event that a Tier 3 engine is not available for any off-road equipment larger than 100 hp, that equipment is to be equipped with a Tier 2 engine, or an engine that is equipped with retrofit controls to reduce exhaust emissions of nitrogen oxides (NOx) and diesel particulate matter (DPM) to no more than Tier 2 emission standard levels. The retrofit controls include installation of an oxidation catalyst and soot filters on diesel equipment. The catalyzed diesel particulate filters are passive, self-regenerating filters that reduce particulate matter, carbon monoxide, and hydrocarbon emissions through catalytic oxidation and filtration. The degree of

particulate matter reduction is comparable for both mitigation measures in the range of approximately 85–92 percent. Such Tier 3 or 2 engines or use of diesel particulate filters on engines that do not meet Tier 3 or 2 emission standards, will reduce diesel emissions during construction and reduce any potential for significant health impacts.

Proposed Project - Operation Impacts and Mitigation

Emissions Sources

The emissions sources at the proposed ISEGS include three partial-load natural gas-fired steam boilers, three emergency diesel fire pumps, and three emergency diesel generators (one per plant). The partial-load steam boilers would be used during startup and periods of cloud cover, would be expected to average about 1 hour per day and not exceed 4 hours per day. On an annual basis, the partial-load steam boilers for each power plant would not exceed a total annual natural gas fuel heat input that is more than 5 percent of the total annual heat input from the sun in accordance with **Air Quality** Condition of Certification **AQ-SC10.** As noted earlier, the first step in a health risk assessment is to identify potentially toxic compounds that may be emitted from the facility. Since the facility uses dry cooling, there are no emissions of metals or volatile organic compounds from cooling tower mist or drift. Also, there is no hazard posed by the potential presence of Legionella bacteria.

Tables 5.9-2, 5.1-B6, and 5.1-B7 of the AFC list noncriteria pollutants that may be emitted from ISEGS boilers as combustion byproducts, along with their anticipated amounts (emission factors). Toxic Air Contaminant emission factors were obtained from the Environmental Protection Agency (EPA) AP-42 database of emission factors. Table 5.9-3 of the AFC lists toxicity values used to characterize cancer and noncancer health impacts from project pollutants. The toxicity values include Reference Exposure Levels, which are used to calculate short-term and long-term noncancer health effects, and cancer unit risks, which are used to calculate the lifetime risk of developing cancer, as published in the OEHHA Guidelines (OEHHA 2003). **PUBLIC HEALTH AND SAFETY Table 2** lists the toxic emissions potentially emitted by the ISEGS and shows how each contributes to the health risk analysis.

PUBLIC HEALTH AND SAFETY Table 2
Types of Health Impacts and Exposure Routes Attributed to Toxic Emissions

Substance	Oral Cancer	Oral Noncancer	Inhalation Cancer	Noncancer (Chronic)	Noncancer (Acute)
Benzene			✔	✔	✔
Diesel Exhaust			✔	✔	
Ethylbenzene				✔	
Formaldehyde			✔	✔	✔
Hexane				✔	
Napthalene		✔	✔	✔	
Polynuclear Aromatic Hydrocarbons (PAHs)	✔	✔	✔	✔	
Toluene				✔	✔

Source: OEHHA 2003, Appendix L and BSE 2007a, Table 5.9-3

Emissions Levels

Once potential emissions are identified, the next step is to quantify them by conducting a “worst case” analysis. Maximum hourly emissions are required to calculate acute (one-hour) noncancer health effects, while estimates of maximum emissions on an annual basis are required to calculate cancer and chronic (long-term) noncancer health effects.

The next step in the health risk assessment process is to estimate the ambient concentrations of toxic substances. This is accomplished by using a screening air dispersion model and assuming conditions that result in maximum impacts. The applicant’s screening analysis was performed using the ARB/OEHHA Hotspots Analysis and Reporting Program (HARP). Ambient concentrations were used in conjunction with Reference Exposure Levels and cancer unit risk factors to estimate health effects that might occur from exposure to facility emissions. Exposure pathways, or ways in which people might come into contact with toxic substances, include inhalation, dermal (through the skin) absorption, soil ingestion, consumption of locally grown plant foods, and mother’s milk.

The above method of assessing health effects is consistent with OEHHA’s Air Toxics Hot Spots Program Risk Assessment Guidelines (OEHHA, 2003) referred to earlier and results in the following health risk estimates.

Impacts

The applicant’s screening health risk assessment for the project including emissions from all sources resulted in a maximum acute Hazard Index (HI) of 0.013 and a maximum chronic HI of 0.00001 (BSE 2007a Table 5.9-4). As **PUBLIC HEALTH AND SAFETY Table 3** shows, both acute and chronic hazard indices are less than 1.0, indicating that no short- or long-term adverse health effects are expected.

PUBLIC HEALTH AND SAFETY Table 3
Operation Hazard/Risk at Point of Maximum Impact: Applicant Assessment

Type of Hazard/Risk	Hazard Index/Risk	Significance Level	Significant?
Acute Noncancer	0.013	1.0	No
Chronic Noncancer	0.00001	1.0	No
Individual Cancer	0.065 in a million	10.0 in a million	No

Source: BSE 2007a Table 5.1E-1
0.065×10^{-6} = 0.065 in 1 million

As shown in **PUBLIC HEALTH AND SAFETY Table 3**, total worst-case individual cancer risk was calculated by the applicant to be 0.065 in 1 million at the location of maximum impact.

Staff conducted an independent analysis of cancer risks and acute and chronic hazards due to emissions from the three solar concentrating thermal power plants which make up the Ivanpah solar project (Ivanpah 1, 2, and 3). Each of the three thermal power plants includes three emitting units: a natural gas-fired boiler, a diesel fuel-fired emergency engine, and a diesel fuel-fired emergency firewater pump engine, for a total of nine emitting sources at the proposed facility.

Staff's quantitative analysis of facility operations included the following:

- emissions from the concurrent operation of all three natural gas boilers, the three emergency diesel generators, and from the three diesel fire pump engines.
- use of a coarse receptor grid of -6000 to 6000 meters east and -6000 to 6000 m north, at 500 meter increments.
- exposure pathways including inhalation, dermal absorption, soil ingestion, and mother's milk.

Atmospheric dispersion modeling was conducted using the ARB/OEHHA Hotspots Analysis and Reporting Program (HARP), Version 1.3. Staff was unable to incorporate the local meteorological data provided by the applicant and used the ARB-approved screening meteorology file that is included with the HARP model. This file includes a full range of meteorological conditions, including all stability classes and wind speeds, and provides a conservative analysis of potential impacts. Local topography and receptor and source elevations were included in this analysis by incorporating demographic files of the local area in the modeling. Site-specific and building-specific input parameters used in the HARP model were obtained from the AFC and modeling files provided by the applicant.

The emission factors used in staff's analysis of cancer risk and hazard were obtained from the AFC and are listed in **PUBLIC HEALTH AND SAFETY Table 4**. Cancer risk

was determined under the Derived(OEHHA) and Derived(Adjusted) risk assessment methods. The following receptor locations were quantitatively evaluated in staff's analysis:

- point of maximum impact (PMI), approximately 500 meters (1,640 feet) south of the southern boundary of Ivanpah 1 (70-year residential scenario)
- location of the nearest residence specified in the AFC, approximately 5.6 miles (9.1 km) northeast of the center of the project (70-year residential scenario)
- location of the nearest residence identified during a site visit by staff (at a mobile home located to the southeast of the intersection of Interstate 15 and Yates Well Road), approximately 3.1 miles (5.0 km) southeast of the center of the project (70-year residential scenario)
- clubhouse at Primm Valley Golf Club, approximately 2.5 miles (4.0 km) east of the center of the project (recreational scenario assuming exposure of 5 hours/day, 2 days/week, 52 weeks/year for 70 years)
- clubhouse at Primm Valley Golf Club (occupational scenario assuming exposure of 8 hours/day, 50 weeks/year for 35 years)

Results of staff's analysis are summarized in **PUBLIC HEALTH AND SAFETY Table 5** and are compared to the results presented in the AFC. Substance-specific risks are presented in **PUBLIC HEALTH AND SAFETY Table 6** for the point of maximum impact and in **PUBLIC HEALTH AND SAFETY Table** 7 for the nearest residence.

PUBLIC HEALTH AND SAFETY Table 4
Emission Factors Used in the Cancer Risk and Hazard Analyses

	Annual Average Emissions lbs/year			Maximum 1-Hour Emissions lbs/hour		
Substance	Boiler	Emergency Generator	Emergency Fire Pump	Boiler	Emergency Generator	Emergency Fire Pump
IVANPAH 1 & 2						
Hexane	4.73E+01			4.05E-01		
PAHs	2.63E-03			2.25E-05		
Toluene	8.96E-02			7.64E-04	9.67E-04	6.17E-05
Naphthalene	1.60E-02			1.37E-04		
Benzene	5.52E-02			4.72E-04	2.20E-03	1.40E-04
Formaldehyde	1.97E+00			1.69E-02	2.78E-03	1.78E-04
Xylene					6.72E-04	4.30E-05
Diesel PM		1.49E+01	2.38E+00			
Acrolein					2.18E-04	1.40E-05
1,3-Butadiene					9.20E-05	5.90E-06
IVANPAH 3						
Hexane	1.89E+02			8.10E-01		
PAHs	1.05E-02			4.50E-05		
Toluene	3.57E-01			1.53E-03	9.67E-04	6.17E-05
Naphthalene	6.41E-02			2.74E-04		
Benzene	2.21E-01			9.44E-04	2.20E-03	1.40E-04
Formaldehyde	7.85E+00			3.37E-02	2.78E-03	1.78E-04
Xylene					6.72E-04	4.30E-05
Diesel PM		1.49E+01	2.38E+00			
Acrolein					2.18E-04	1.40E-05
1,3-Butadiene					9.20E-05	5.90E-06

Source: BSE 2007a, Table 5.1-B6

PUBLIC HEALTH AND SAFETY Table 5
Results of Staff's Analysis and the Applicant's Analysis for Cancer Risk and Chronic Hazard

	Staff's Analysis			Applicant's Analysis		
Risk Methodology	Cancer Risk (per million)	Chronic HI	Acute HI	Cancer Risk (per million)	Chronic HI	Acute HI
PMI Derived(OEHHA)	2.9	0.0014	0.057	0.084	0.00001	0.013
Nearest residence[2] Derived(OEHHA)	0.16	0.000084	0.0025	-	-	-
Second nearest residence[3] Derived(OEHHA)	0.12	0.000066	0.0032	-	-	-
Clubhouse, recreational, Derived(OEHHA)	0.0089	-	-	-	-	-
Clubhouse, occupational	0.017	-	-	-	-	-

HI = Hazard Index
[2] Location of the nearest residence identified during a site visit by staff (at a trailer located to the southeast of the intersection of Interstate 15 and Yates Well Road), 70-year residential scenario.
[3] Location of the nearest residence specified in the AFC, 70-year residential scenario.

Public Health AND SAFETY Table 6
Results of Staff's Analysis: Contribution to Total Cancer Risk by Individual Substances at the Point of Maximum Impact (PMI)

IVANPAH 1

Substance	Boiler	Emerg. Gen.	Fire Pump
PAHs-w/o	5.2E-09		
Naphthalene	3.6E-11		
Benzene	1.0E-10		
Formaldehyde	7.8E-10		
DieselExhPM		2.4E-06	3.1E-07
TOTAL	6.1E-09	2.4E-06	3.1E-07

IVANPAH 2

Substance	Boiler	Emerg. Gen.	Fire Pump
PAHs-w/o	7.7E-10		
Naphthalene	5.3E-12		
Benzene	1.5E-11		
Formaldehyde	1.1E-10		
DieselExhPM		1.1E-07	1.7E-08
TOTAL	9.0E-10	1.1E-07	1.7E-08

IVANPAH 3

Substance	Boiler	Emerg. Gen.	Fire Pump
PAHs-w/o	1.4E-09		
Naphthalene	9.6E-12		
Benzene	2.7E-11		
Formaldehyde	2.1E-10		
DieselExhPM		3.4E-08	5.4E-09
TOTAL	1.6E-09	3.4E-08	5.4E-09

IVANPAH 1, 2 & 3

Substance	TOTAL DUE TO 3 SOURCES AT 3 UNITS
PAHs-w/o	7.3E-09
Naphthalene	5.1E-11
Benzene	1.5E-10
Formaldehyde	1.1E-09
DieselExhPM	2.9E-06
TOTAL	2.9E-06

PUBLIC HEALTH AND SAFETY Table 7
Results of Staff's Analysis: Contribution to Total Cancer Risk by Individual Substances at Nearest Residence

IVANPAH 1

Substance	Boiler	Emerg. Gen.	Fire Pump
PAHs-w/o	6.1E-10		
Naphthalene	4.2E-12		
Benzene	1.2E-11		
Formaldehyde	9.1E-11		
DieselExhPM		9.0E-08	1.4E-08
TOTAL	7.2E-10	9.0E-08	1.4E-08

IVANPAH 2

Substance	Boiler	Emerg. Gen.	Fire Pump
PAHs-w/o	2.7E-10		
Naphthalene	1.8E-12		
Benzene	5.3E-12		
Formaldehyde	4.0E-11		
DieselExhPM		2.9E-08	4.3E-09
TOTAL	3.1E-10	2.9E-08	4.3E-09

IVANPAH 3

Substance	Boiler	Emerg. Gen.	Fire Pump
PAHs-w/o	7.7E-10		
Naphthalene	5.4E-12		
Benzene	1.5E-11		
Formaldehyde	1.2E-10		
DieselExhPM		1.4E-08	2.1E-09
TOTAL	9.1E-10	1.4E-08	2.1E-09

IVANPAH 1, 2 & 3

Substance	TOTAL DUE TO 3 SOURCES AT 3 UNITS
PAHs-w/o	1.7E-09
Naphthalene	1.1E-11
Benzene	3.3E-11
Formaldehyde	2.5E-10
DieselExhPM	1.5E-07
TOTAL	1.6E-07

Proposed Project - Closure and Decommissioning Impacts and Mitigation

Closure of the proposed ISEGS would presumably begin 50 years from the start of commercial operation and would follow a Closure, Revegetation, and Rehabilitation Plan prepared by the applicant and designed to minimize public health and environmental impacts (CH2ML 2009f, Section 3.6 of Attachment DR130-2B). The preparation and implementation of the Closure, Revegetation, and Rehabilitation Plan would be in accordance with **Biological Resources** Condition of Certification **BIO-14**. Staff expects that impacts to public health from the closure and decommissioning process would represent a fraction of the impacts associated with the construction or operation of the proposed ISEGS. Therefore based on staff's analysis for the construction and operation phases of this project, staff concludes that public health-related impacts from closure and decommissioning of the ISEGS would be insignificant.

No Project / No Action Alternative

In the No Project / No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan.

The results of the No Project / No Action Alternative would be the following:

- The public health impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project.
- The benefits of the proposed project in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

If this project is not approved, renewable projects would likely be developed on other sites in the Mojave Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are three large solar projects proposed on BLM land in Nevada within a few miles of the Ivanpah site. In addition, as of August 2009 there were 66 applications for solar projects covering 611,692 acres pending with BLM in the California Desert District.

CUMULATIVE IMPACTS AND MITIGATION

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (California Code Regulation, Title 14, section 15130). NEPA states that cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR §1508.7).

There is the potential for substantial future development in the Ivanpah Valley area and throughout the southern California desert region. Analysis of cumulative impacts is based on data provided in the following maps and tables (see Section 4.0, Cumulative Scenario):

- Cumulative Impacts Figure 1, Regional Renewable Applications
- Cumulative Impacts Figure 2, Regional Renewable Applications (Detail)
- Cumulative Impacts Figure 3, Ivanpah Valley Existing and Future/Foreseeable Projects
- Cumulative Impacts Table 1, Regional Renewable Energy Projects
- Cumulative Impacts Table 2, Existing Development in the Ivanpah Valley
- Cumulative Impacts Table 3, Future Foreseeable Projects in the Ivanpah Valley Area.

The analysis in this section first defines the geographic area over which cumulative impacts related to public health could occur. The cumulative impact analysis itself describes the potential for cumulative impacts to occur as a result of implementation of the ISEGS project along with the listed local and regional projects.

Geographic Extent

Cumulative impacts can occur if implementation of the ISEGS project could combine with those of other local or regional projects. Cumulative impacts would occur locally if ISEGS project impacts combined with impacts of projects located within the Ivanpah Valley. Cumulative impacts could also occur as a result of development of some of the many proposed solar and wind development projects that have been or are expected to be under consideration by the BLM and the Energy Commission in the near future. Many of these projects are located within the California Desert Conservation Area, as well as on BLM land in Nevada and Arizona.

For purposes of the cumulative analysis, the emissions from construction or operation of the ISEGS project could potentially combine with emissions from past, present and reasonably foreseeable projects to result in adverse health effects to the public. Cumulative impacts to public health could occur as a result of implementation of the ISEGS project on both a local and regional level. The geographic extent for the analysis of local cumulative impacts associated with the ISEGS project includes the Mojave Desert Air Basin (MDAB) and the Ivanpah Valley Air Basin (IVAB). The shared nature of air resources warrants consideration of emissions occurring outside of the local air basin (MDAB).

Cumulative Impact Analysis

Cumulative impacts of the proposed project and other projects within a 6-mile radius were not evaluated by the applicant. The applicant has requested from the MDAQMD a list of all existing or planned emission sources (with construction permits or in the permitting process) within a 6-mile radius. The information received in response from the MDAQMD indicates that the only existing or planned emission source within six miles of the proposed project is a small existing gasoline dispensing system at the

Primm Valley Gold Club. The permit for this source limits ROG/VOC emissions to 0.45 tons per year. Another emission source (the Union Oil Molycorp facility) is approximately 6 miles from the proposed ISEGS, but the MDAQMD indicated that almost all equipment is located beyond the 6-mile radius (CH2ML 2008a, Attachment DR11-1). The applicant stated that due to the lack of existing or planned projects within a 6-mile radius for which emission data is available, no cumulative impact analysis would be prepared (CH2ML 2008a, Response to Data Requests 11 and 12). Staff has analyzed the public health and safety effects of existing and foreseeable projects listed in the Cumulative Scenario section as follows.

Local Projects

The maximum cancer risk for emissions from ISEGS (calculated by staff) is 2.9 in one million located at an isolated area in the adjacent desert with no buildings or residences nearby. The maximum impact location occurs where pollutant concentrations from ISEGS with all combustion sources operating at the same time would theoretically be the highest. Even at the maximum impact location, and in consideration of the existing natural gas-fired Bighorn Electric Generating Station, a proposed natural gas-fired Ivanpah Energy Center, both near Primm, and the proposed FirstSolar photovoltaic electric generation facility east of ISEGS, staff does not expect any significant change in lifetime risk to any person. The increase does not represent any real contribution to the average lifetime cancer incidence rate due to all causes (environmental as well as life-style and genetic). Modeled facility-related residential risks are lower at more distant locations, and actual risks are expected to be much lower since worst-case estimates are based on conservative assumptions and thus overstate the true magnitude of the risk expected. Therefore, staff does not consider the incremental impact of the additional risk posed by the ISEGS to be either individually or cumulatively significant.

Regional Projects

The nature of public health impacts—acute or long term exposure of people to materials that could result in negative health effects—combined with the vast area over which the future solar and wind development projects would be built in southeastern California, southern Nevada, and western Arizona, as well as the relative isolation of these projects from sensitive receptors, precludes the potential for impacts of these projects to combine with each other to result in significant impacts. Any emission from construction of these projects would be dispersed over these areas and would not be expected to result in acute or chronic health problems to sensitive receptors. Operation of the future solar and wind energy projects would result in negligible emissions, mostly related to worker vehicles and maintenance trucks, therefore, operation of these future projects would not result in negative regional health effects.

Cumulative Impact Conclusion

Public health impacts of the ISEGS project would not combine with impacts of any past, present, or reasonably foreseeable projects to result in cumulatively considerable local or regional impacts. Therefore, no mitigation is recommended to address potential cumulative project impacts.

COMPLIANCE WITH LORS

Staff has considered the minority population as identified in **Socioeconomics Figure 1** in its impact analysis and has found no potential significant adverse impacts for any receptors, including environmental justice populations. In arriving at this conclusion, staff notes that its analysis complies with all directives and guidelines from the Cal/EPA Office of Environmental Health Hazard Assessment and the California Air Resources Board. Staff's assessment is biased toward the protection of public health and takes into account the most sensitive individuals in the population. Using extremely conservative (health-protective) exposure and toxicity assumptions, staff's analysis demonstrates that members of the public potentially exposed to toxic air contaminant emissions of this project—including sensitive receptors such as the elderly, infants, and people with pre-existing medical conditions—will not experience any acute or chronic significant health risk or any significant cancer risk as a result of that exposure. Staff believes that it incorporated every conservative assumption called for by state and federal agencies responsible for establishing methods for analyzing public health impacts. The results of that analysis indicate that there would be no direct or cumulative significant public health and safety impact to any population in the area. Therefore, given the absence of any significant health impacts, there are no disparate health impacts and there are no environmental justice issues associated with **PUBLIC HEALTH AND SAFETY**.

Staff concludes that construction and operation of the ISEGS will be in compliance with all applicable LORS regarding long-term and short-term project impacts in the area of **PUBLIC HEALTH AND SAFETY**.

NOTEWORTHY PUBLIC BENEFITS

It is noteworthy that a solar electric generating facility such as the proposed ISEGS project would emit significantly less TACs to the environment than other energy sources available in California such as natural gas or biomass, thereby reducing the health risks that would otherwise occur with these non-renewable energy sources. At the same time, the proposed ISEGS would provide much needed electrical power to California residences and businesses, and will contribute to electric reliability. Electrical power is not only necessary to maintain a functioning society, but it also benefits many individuals who rely on powered equipment for their health (such as dialysis equipment and temperature control equipment). For example, it is documented that during heat waves in which elevated air-conditioning use causes an electrical blackout, hospitalizations and deaths due to heat stroke are increased.

PUBLIC AND AGENCY COMMENTS ON THE PSA

No comments have been received from the public or from agencies regarding public health.

CONCLUSIONS

Staff has analyzed potential public health risks associated with construction and operation of the ISEGS and does not expect any significant adverse cancer, short-term, or long-term health effects that would be considered to be significant under CEQA or NEPA to any members of the public, including low income and minority populations, from project toxic emissions. Staff also concludes that its analysis of potential health impacts from the proposed ISEGS uses a highly conservative methodology that accounts for impacts to the most sensitive individuals in a given population, including newborns and infants. According to the results of staff's health risk assessment, emissions from the ISEGS would not contribute significantly or cumulatively to morbidity or mortality in any age or ethnic group residing in the project area.

MITIGATION MEASURES/PROPOSED CONDITIONS OF CERTIFICATION

No conditions are proposed.

REFERENCES

BAAQMD (Bay Area Air Quality Management District). 2004b. Toxic Air Contaminant Control Program Annual Report 2002. Volume I. June.

BSE2007a – Bright Source Energy/ Solar Partners I, LLC/ J. Woolard (tn: 42174). Application for Certification, Volumes I and II, for the Ivanpah Solar Electric Generating System. Dated on 8/28/2007. Submitted to CEC/Docket Unit on 8/31/2007.

CH2ML2008a – CH2M HILL/ J. Carrier (tn: 44310). Data Response Set 1A. Dated on 1/14/2008. Submitted to CEC / Docket Unit on 1/14/2008.

CH2ML2009f – CH2M HILL / J. Carrier (tn 51597). Data Response Set 2L (Response to Data Requests 130, 131, and 139). Submitted to CEC / J. Kessler on 05/18/2009.
May 18, 2009.

California Air Resources Board. 2002. California Air Quality Data, <http://www.arb.ca.gov/aqd/aqd.htm>.

CAPCOA (California Air Pollution Control Officers Association).1993. CAPCOA Air Toxics "Hot Spots" Program Revised 1992 Risk Assessment Guidelines. Prepared by the Toxics Committee. October.

MDAQMD (Mojave Desert Air Quality Management District). 2006. Rule 1320, New Source Review for Toxic Air Contaminants <http://www.mdaqmd.ca.gov/rules_plans/documents/1320_000.pdf>.

OEHHA (Office of Environmental Health Hazard Assessment). 2003. *Air Toxics Hot Spots Program Risk Assessment Guidelines*. The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments. August.

SRP (Scientific Review Panel on Toxic Air Contaminants). 1998. Findings of the Scientific Review Panel on The Report on Diesel Exhaust as adopted at the Panel's April 22, 1998, meeting.

SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

Prepared by Negar Vahidi and Scott Debauche

SUMMARY OF CONCLUSIONS

U.S. Bureau of Land Management (BLM) and Energy Commission staff (hereafter referred to as staff) conclude that the two 100-megawatt (MW) (nominal) solar electric generating plants, known as Ivanpah 1 and 2, and the one 200-MW (nominal) plant, known as Ivanpah 3, referred to collectively as the Ivanpah Solar Electric Generating System (ISEGS), would not result in significant adverse direct or indirect socioeconomics impacts with respect to either CEQA or NEPA. In addition, the ISEGS would not contribute to a cumulative socioeconomic impact on the area's population, employment, housing, police, schools, or hospitals because the proposed project's construction and operation workforce currently resides in the regional or local labor market area and construction would be short term. Gross public benefits from the proposed project include capital costs, construction and operation payroll, and property and sales taxes. Furthermore, the construction and operation of the proposed ISEGS would not result in any disproportionate impacts to low-income or minority populations. Conditions of Certification referred to herein serve the purpose of both the Energy Commission's Conditions of Certification for purposes of CEQA and BLM's Mitigation Measures for purposes of NEPA.

INTRODUCTION

Staff's socioeconomics impact analysis evaluates project-induced changes on existing population and employment patterns, community services, and related community issues such as environmental justice. A discussion of the estimated beneficial economic impacts of the construction and operation of the proposed ISEGS and other related economic impacts are provided. For purposes of analyzing the complete ISEGS project, this **Socioeconomics and Environmental Justice** section analyzes the proposed ISEGS (Phases 1, 2, and 3) as a whole. Therefore, **Socioeconomics and Environmental Justice** setting data and analysis are presented for the entire ISEGS project.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

SOCIOECONOMICS and ENVIRONMENTAL JUSTICE Table 1 contains all applicable socioeconomics laws, ordinances, regulations, and standards (LORS) applicable to the proposed ISEGS. The proposed project is subject to federal socioeconomics LORS (including the National Environmental Policy Act) because it would be located on federal lands administered by the United States Bureau of Land Management (BLM).

SOCIOECONOMICS and ENVIRONMENTAL JUSTICE Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable LORS	Description
Federal	
Executive Order 12898 (*Federal Register*, Vol. 59, No. 32, February 11, 1994)	Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," focuses federal attention on the environment and human health conditions of minority communities and calls on agencies to achieve environmental justice as part of this mission. The order requires the U.S. Environmental Protection Agency (EPA) and all other federal agencies (as well as state agencies receiving federal funds) to develop strategies to address this issue. The agencies are required to identify and address any disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and/or low-income populations.
National Environmental Policy Act (NEPA) 42 United States Code (USC) 4321 et seq.	Under NEPA, an environmental impact statement must discuss social and economic effects if they are related to the natural or physical effects and the definition of "effects" includes economic and social factors. Consequently, a federal environmental document must include an analysis of the proposed project's economic, social, and demographic effects related to effects on the natural or physical environment in the affected area, but does not allow for economic, social, and demographic effects to be analyzed in isolation from the physical environment.
State	
California Environmental Quality Act (CEQA) Title 14 of the California Code of Regulations, Chapter 3, Guidelines for Implementation of the California Environmental Quality Act, Article 9(a), section 15131	Socioeconomic impacts are limited to those that could be considered direct effects on the environment, such as changes to population and housing, and that are separate from strictly economic impacts, such as a loss of revenue.
California Education Code, section 17620	The governing board of any school district is authorized to levy a fee, charge, dedication, or other requirement for the purpose of funding the construction or reconstruction of school facilities.
California Government Code, sections 65996–65997	These sections include provisions for school district levies against development projects. As amended by Senate Bill 50 (Greene, Chapter 407, section 23, Statutes of 1998), these sections state that, except for fees established under Education Code 17620, state and local public agencies may not impose fees, charges, or other financial requirements to offset the cost of school facilities.

Applicable LORS	Description
California Revenue and Taxation Code, sections 721–725: California Board of Equalization (BOE) – Property Tax Rule 905 (BOE authority to assess electrical generating facilities is found in Article XIII, section 19, of California's Constitution)	Property Tax Rule 905 states "the Board shall annually assess every electric generation facility with generating capacity of 50 MW or more..." It also states that for purposes of this rule, "electric generation facility" does not include a qualifying small power production facility or qualifying cogeneration facility within the meaning of section 201 and section 210 of Title II of the Public Utility Regulatory Policies Act of 1978. According to this act, (16 USC, section 796 [17] [A]), a "small power production facility is defined as 'A facility which is eligible solar, wind, waste, or geothermal facility...[that] has a power production capacity, which together with any other facilities located at the same site, is not greater than 80 MW.'"
Local	
San Bernardino County General Plan	San Bernardino County General Plan's (2007) Economic Development Element calls for a vibrant and thriving local economy that spans a variety of industries, services, and other sectors while recognizing the distinctions between the growth stages of the Valley, Mountain, and Desert Planning Regions in encouraging industrial, office, and professional development and local-serving employment. The Economic Development Background report (2005) states that the Desert Planning Region (which includes the proposed ISEGS site) is just entering Stage 2 of the three-stage pattern of development. Stage 2 is where an area is capable of attracting blue collar and entry-level white collar workers and companies that take advantage of undeveloped industrial space.

SETTING

PROJECT LOCATION

The applicant is developing three solar energy plants to be located in the Ivanpah Basin of San Bernardino County, California, 4.5 miles southwest of Primm, Nevada just west of the Ivanpah Dry Lake and 0.5 miles west of the Primm Valley Golf Club. The ISEGS project includes Ivanpah 1, 2, and 3, which are designed to generate a total of 400 megawatts (MW) of electricity. Ivanpah 1 and 2 are designed to provide 100 MW each of electricity and Ivanpah 3 is designed to provide 200 MW of electricity. The 100 MW Ivanpah 1 and 2 would each occupy approximately 914 acres and 921 acres respectively; the 200 MW Ivanpah 3 would occupy approximately 1,837 acres. All three phases would be developed on contiguous property, sharing an administration building, an operation and maintenance building and a substation within a common logistics area between Ivanpah 1 and 2 that would also be used for construction laydown and staging activities. The proposed project would cause permanent disturbance of about 3,713 acres, temporary disturbance of 321 acres, and including the existing transmission line corridor of about 39 acres within the Construction Logistics area, ISEGS would utilize about 4,073 acres (6.4 square miles) of federal land managed by BLM (CH2ML 2009f).

For purposes of analyzing the complete ISEGS project, this **Socioeconomics and Environmental Justice** section analyzes the proposed ISEGS (Ivanpah 1, 2, and 3 and associated facilities) as a whole. Therefore, **Socioeconomics and Environmental Justice** setting data and analysis are presented for the entire ISEGS project.

Research shows that workers may commute as much as two hours each direction from their communities rather than relocate (EPRI 1982). Therefore, for purposes of this analysis, the socioeconomics study area is San Bernardino County in California and Clark County in Nevada. San Bernardino County is bordered on the north by Inyo County, on the south by Riverside County, on the west by Los Angeles, Kern, and Orange Counties; on the east by Clark County, Nevada, and also by portions of Mojave and La Paz Counties in Arizona. There are 24 incorporated cities in San Bernardino County, including Fontana, Ontario, Rancho Cucamonga, and San Bernardino. There are five incorporated cities in Clark County, Nevada, including Las Vegas.

DEMOGRAPHIC CHARACTERISTICS

Within the study area, San Bernardino County, California, and Clark County, Nevada, are considered areas that may be affected by potential population in-migration resulting from the proposed ISEGS. In order to characterize the population profile of the study area, current and forecasted population trends for the study area are summarized in **SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE Table 2**. Between the period of 2000 and 2010, the total population increase in San Bernardino County, California, is expected to be approximately 25 percent, while the population increase in Clark County, Nevada, within the same time period is expected to be approximately 64 percent.

SOCIOECONOMICSAND ENVIRONMENTAL JUSTICE Table 2
Population Profile of the Study Area, Year 2000–2030

	Year			
Area	**2000 Population**	**2010 Projected Population**	**2020 Projected Population**	**2030 Projected Population**
San Bernardino County, CA	1,709,434	2,133,377	2,456,089	2,762,307
Clark County, NV	1,375,765	2,258,748	2,946,350	3,358,456

Source: US Census 2008; CDOF 2008a; Clark County 2008a.

DEMOGRAPHIC SCREENING

Staff's demographic screening is designed to determine the existence of a minority or below-poverty-level population or both within a six-mile area of the proposed project site.

The demographic screening process is conducted based on information contained in two documents: *Environmental Justice: Guidance Under the National Environmental Policy Act* (Council on Environmental Quality, 1997) and *Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses* (Council on Environmental Quality, 1998). Based on the demographic screening analysis, the potential affected area is a six-mile radius of the proposed ISEGS site. The six-mile radius is consistent with the radius used in the Air Quality section of the

FSADEIS to determine potential air quality impacts. The screening process relies on Year 2000 U.S. Census data to determine levels of minority and below-poverty-level populations.

Minority Population

According to *Environmental Justice: Guidance Under the National Environmental Policy Act*, minority individuals are defined as members of the following groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic.

A minority population, for the purposes of environmental justice, is identified when the minority population of the potentially affected area is (1) greater than 50 percent; (2) meaningfully greater than the percentage of the minority population in the general population or other appropriate unit of geographical analysis; or (3) when one or more U.S. Census blocks in the potentially affected area have a minority population of greater than 50 percent.

For the proposed ISEGS Project, the total population within the six-mile radius of the proposed site is 36 persons, and the total minority population is 10 persons or 27.8 percent of the total population (see **SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE FIGURE 1**).[3] Primm, Nevada is entirely contained within the six-mile radius of the proposed ISEGS site but is not included in **SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE FIGURE 1** as Primm was not considered a Census Designated Place at the time of the Year 2000 Census (US Census, 2008). Therefore, no Year 2000 Census Data is available for the City of Primm. In 2008, the community of Primm had a population of 1,060 persons (Clark County 2008c). As shown in **SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE FIGURE 1**, no census blocks within a six-mile radius of the proposed ISEGS site contain minority populations greater than 50 percent.

Below-Poverty-Level Population

Staff has also identified the below-poverty-level population based on Year 2000 U.S. Census block data within a six-mile radius of the project site. The below-poverty-level population within a six-mile radius of the proposed ISEGS Project consists of no people or 0.0 percent of the total population in that area.

ENVIRONMENTAL JUSTICE

Executive Order 12898, “Federal Actions to address Environmental Justice in Minority Populations and Low-Income Populations,” focuses federal attention on the

[3] To more accurately map the affected population, **SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE FIGURE 1** typically includes only US census blocks that contain over 50 percent of the blocks’ geographic area within a six-mile radius of a proposed site. In the ISEGS case, the census blocks were extremely large and captured population that extended 60 miles to the southwest and 50 miles to the northwest of the ISEGS site to include population in Boulder City and south Las Vegas, NV. Primm, NV is in the census block that extends 50 miles to the northwest of the project site and data was not used because it would grossly miscount the population in that area. Therefore, the census data, including the population and race for the town of Primm was not represented on the map.

environment and human health conditions of minority communities and calls on federal agencies to achieve environmental justice as part of this mission. The order requires the USEPA and all other federal agencies (as well as state agencies receiving federal funds) to develop strategies to address this issue. The agencies are required to identify and address any disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and/or low-income populations.

The purpose of the screening analysis is to determine whether a minority or low-income population exists within the potentially affected area of the proposed site. For all siting cases, Energy Commission staff conducts an environmental justice screening analysis in accordance with the "Final Guidance for Incorporating Environmental Justice Concerns in USEPA's National Environmental Policy Act (NEPA) Compliance Analysis" dated April 1998, which defined minority populations as either:

- the minority population of the affected area is greater than 50% of the affected area's general population; or
- the minority population percentage of the area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis.

California Statute, Section 65040.12 (c) of the Government Code, defines "environmental justice" to mean "fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies." In light of the progress made by federal environmental agencies on environmental justice, the Energy Commission has examined federal guidelines pursuant to its desire to follow environmental justice principles for the environmental review of this project.

The steps recommended by these guidance documents to assure compliance with the Executive Order are: (1) outreach and involvement; (2) a screening-level analysis to determine the existence of a minority or low-income population; and (3) if warranted, a detailed examination of the distribution of impacts on segments of the population. Though the Federal Executive Order and guidance are not binding on the Energy Commission, staff finds these recommendations helpful for implementing this environmental justice analysis. Staff has followed each of the above steps for the following 11 sections in the FSA/DEIS: Air Quality, Hazardous Materials, Land Use, Noise, Public Health and Safety, Socioeconomics and Environmental Justice, Soils and Water, Traffic and Transportation, Transmission Line Safety/Nuisance, Visual Resources, and Waste Management.

According to the Census 2000 data there were 36 people within six miles of the proposed project site which resided within California. With 10 or 27.8 percent of the total California residents classified as minority. (see **SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE FIGURE 1**), no census blocks within a six-mile radius of the proposed ISEGS site contain minority populations greater than 50 percent. The 2000 Census block data did not identify any California residents living below the designated poverty level within a six-mile radius of the project site.

No minority communities or low income communities are located within or adjacent to the proposed project areas. The proposed action would not impact distinct Native American cultural practices or result in disproportionately high or adverse human health or environmental effects on minority communities.

EMPLOYMENT CHARACTERISTICS

Labor force characteristics for the study area, which includes San Bernardino County, California (Year 2006 data), and Clark County, Nevada (Year 2005 data), are described in **SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE Table 3**. San Bernardino County is part of the Riverside-San Bernardino-Ontario Metropolitan Statistical Area (MSA) as defined by the U.S. Census Bureau. In 2006, total employment in the Riverside-San Bernardino-Ontario MSA was 1,084,800. As shown in **SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE Table 3**, construction, manufacturing, retail trade, and services were the largest employment sectors. Clark County is part of the Las Vegas-Paradise MSA. In 2005, total employment in the Las Vegas-Paradise MSA was 871,600, with the largest employment sectors being construction and services.

SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE Table 3
Labor Force Characteristics, San Bernardino County, California (Year 2006) and Clark County, Nevada (Year 2005)

Industry	Riverside-San Bernardino-Ontario MSA 2006 Labor Force Characteristics	Las Vegas-Paradise MSA 2005 Labor Force Characteristics
Agriculture	17,200	N/A
Natural Resources, Mining	1,400	400
Construction	129,500	101,500
Manufacturing	124,000	25,000
Wholesale Trade	53,800	22,200
Retail Trade	171,500	94,000
Transportation, Warehousing, and Utilities	63,800	32,400
Information	15,200	10,400
Financial Activities	51,800	48,800
Services	436,200	449,400
Government	18,800	87,500
Total Employed	1,084,800	871,600
Unemployment	41,800 (4.7%)	33,000 (3.7%)

Source: CEDD 2008a; CEDD 2008b; NDETR 2008a.

HOUSING

Current housing conditions within the study area are shown in **SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE Table 4.** There were 1,402,485 total housing units in the study area in 2006, with 110,011 of these units vacant, creating a study area vacancy rate of 7.8 percent.

SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE Table 4
Housing Units in the Study Area, Year 2006

	Total Units	Single-Family	Multi-Family	Mobile Homes	Percent Vacant
Clark County, NV	740,817	433,317	227,040	30,460	32,596 (4.4%)
San Bernardino County, CA	661,668	492,519	125,594	43,555	77,415 (11.7%)
Total	1,402,485	925,836	352,634	74,015	110,011 (7.8%)

Source: CDOF 2008b; Clark County 2008a.

FISCAL REVENUE

The two key taxing agencies in the study area are San Bernardino County, California, and Clark County, Nevada. As comparable fiscal data for Clark County, Nevada, is unavailable, fiscal data for the City of Las Vegas (the primary Metropolitan Service Area within Clark County, Nevada) is presented. **SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE Table 5** shows the revenues and expenditures for both San Bernardino County and the City of Las Vegas for fiscal year 2006. As shown, both San Bernardino County and the City of Las Vegas generated more revenue than expenditures in fiscal year 2006.

SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE Table 5
Fiscal Revenue and Expenditures for San Bernardino County, California, and the City of Las Vegas, Nevada, Year 2006

	San Bernardino County*	City of Las Vegas*
Expenditures For Countywide Operations		
Admin/Exec	$462,158	$164,150
Contingencies	$59,124	N/A
Financial Administration	$6,916	$1,019
Debt Service	$21,137	$38,461
Economical Development Agency	$3,845	$22,205
Fiscal Group	$55,580	N/A
Human Services	$837,760	N/A
Law & Justice	$65,595	$26,169
Public and Support Services	$99,187	514,121
Total Expenses	$2,157,013	$917,834
Revenues		
Property Taxes	$415,936	$108,092
Sales and Other Taxes	$207,443	$7,954
Intergovernmental Revenue	$1,622,031	$442,187
Charges for Current Services	$568,348	$181,211
Other Revenue	$130,465	N/A
Operating Transfers In	$275,104	N/A
Fund Balance/Net Assets	$329,871	N/A
General Fund Unreserved Fund Balance	$100,699	N/A
Use of Reserves	$6,064	N/A
Contribution to Reserves	($35,453)	N/A
Total Other Financing	$676,285	N/A
Total Revenues and Financing Sources	$3,620,501	$1,442,055

Source: San Bernardino County 2008; City of Las Vegas 2008.
* $ Thousands
N/A – Data Not Available

PUBLIC SERVICES

Physical impacts to public services and facilities are usually associated with population in-migration and growth in an area, which increase the demand for a particular service, leading to the need for expanded or new facilities. Therefore, public services data is provided below for both San Bernardino County and Clark County.

Police Protection

The proposed ISEGS site is located within the jurisdiction of the San Bernardino County Sheriff's Department, which is headquartered at 655 East 3rd Street in San Bernardino. The nearest sheriff's office to the proposed ISEGS site is the Barstow Station in the city of Barstow located at 225 East Mountain View Road (SBCo Sheriff 2008). The California Highway Patrol (CHP) is the primary law enforcement agency for California highways and roads (CHP 2008). CHP services include law enforcement, traffic control, accident investigation, and the management of hazardous materials incidents.

Within Clark County, the Las Vegas Metropolitan Police Department (LVMPD) provides police protection services. The LVMPD is a joint city/county police force providing law enforcement services for all of Clark County, including the City of Las Vegas, with over 2,600 sworn officers (LVMPD 2008)

Schools

The proposed ISEGS site is located within the Baker Valley Unified School District (BVUSD). Clark County School District (CCSD) provides school services to the Nevada portion of the study area. Current school enrollment figures within the study area for the 2006–2007 school year are shown in **SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE Table 6.** As shown, the BVUSD has a small student enrollment, while the CCSD serves a large number of students.

SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE Table 6
Enrollment Figures for the BVUSD and the CCSD, Year 2006–2007

Student Level	Baker Valley Unified School District	Clark County School District
Kindergarten	21	23,391
Elementary School (1st through 5th Grade)	82	121,816
Middle School (6th through 8th Grade)	42	73,862
High School (9th through 12th Grade)	56	84,681
Total	*201*	*303,750*

Source: ED-Data 2008; NDE 2008.

Hospitals

The closest hospital with an emergency room to the proposed ISEGS site is the Saint Rose Hospital - Siena Campus in Henderson, Nevada (within Clark County) located at 3001 St. Rose Parkway, approximately 40 miles east of the proposed ISEGS site. This facility is a 214-bed hospital and has over 2,600 employees with approximately 1,142 physicians in the area with staffing privileges at Saint Rose (SRDH 2008). The emergency room at Saint Rose Hospital is designated as a Level II trauma center that

provides immediate, specialized care to accident victims and victims of sudden illness. Specialty services at the hospital include intensive care unit, emergency/trauma, labor and delivery, cardiac care, orthopedics, surgery, and transplant.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Staff reviewed the socioeconomics section of the applicant's Ivanpah Solar Electric Generating System Application for Certification (AFC) and the socioeconomic data provided and referenced from various governmental agencies and trade associations and conducted its own independent analysis to form the following socioeconomics analysis and conclusions.

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

NEPA provides no specific thresholds of significance for socioeconomics impact assessment. Significance varies, depending on the setting of the proposed action (40 CFR 1508.27[a]), but 40 CFR 1508.8 states that indirect effects may include those that are growth inducing and others related to induced changes in the pattern of land use, population density, or growth rate. With respect to the California Environmental Quality Act (CEQA), socioeconomic impacts are limited to those that could be considered direct effects on the environment, such as changes to population and housing, and that are separate from strictly economic impacts, such as a loss of revenue.
Based on a review of recent environmental assessment documents prepared for the BLM and the CEQA Guidelines, Appendix G, staff has determined the list of thresholds below to be appropriate for analysis of socioeconomics impacts under both NEPA and CEQA. A project may have a significant effect on socioeconomics if the project would:

- Induce substantial population growth in an area, either directly or indirectly;
- Displace substantial numbers of people and/or existing housing, necessitating the construction of replacement housing elsewhere;
- Cause a substantial change in revenue for local businesses or government agencies; or
- Adversely impact acceptable levels of service for law enforcement, schools, and hospitals.

Typically, substantial long-term employment of people from regions outside the study area would have the potential to result in significant adverse socioeconomic impacts due to a change in the local housing demand and supply and an increase in population resulting in increased demands to public services. In addition to direct population, employment, and housing impacts based on the above criteria, the following socioeconomic analysis looks at beneficial impacts on local finances from property and sales taxes as well as potential adverse impacts on public services. In order to determine if a project would have any significant impacts, staff analyzes whether the current status of these community services and capacities can absorb the project-related impacts in each of these areas. A project's property taxes, sales tax, local school impact fees, or development fees can help local governments augment public services required to meet project needs. If the project's impacts could appreciably strain or degrade these services, staff considers this to be a significant adverse impact.

The analysis of subject areas such as capacities of fire service providers, utilities, water use, and wastewater disposal are identified in the **Worker Safety and Fire Protection**, **Soil and Water Resources**, and **Waste Management** sections of the Staff Assessment.

Socioeconomic impacts resulting from ISEGS closure/decommissioning activities are included below, based on the **Project Description** section of the FSA/DEIS.

DIRECT/INDIRECT/INDUCED IMPACTS

Proposed Project

Proposed Project - Population and Employment

Construction

It is anticipated that the construction period for the proposed ISEGS would occur from first quarter 2009 through fourth quarter 2012. There will be an average of approximately 474 daily construction workers, with a peak daily workforce of 959, depending on the month and the work required. Laborers would consist of craftspeople and supervisory, support, and construction management personnel on site during construction. According to AFC section 2.0 (Project Description), the peak construction labor force of 959 total daily construction workers would occur during the 32nd month of construction. This maximum employment number is used to analyze worst-case construction population and employment impacts.

Research shows that construction workers would commute as much as two hours each direction from their communities rather than relocate (EPRI 1982). Staff reviewed the socioeconomics data for counties within the two-hour commute range, which is within the study area and includes San Bernardino County and Clark County. **SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE Table 3** indicates that a total of 231,000 construction workers are available within the study area. An assumed maximum need of 959 construction workers represents 0.4 percent of the total construction workforce within the study area. Because the number of construction workers required represents such a small portion of the local available labor force, it is assumed that no population in-migration would occur as a result of project-related construction activities. Therefore, no significant impacts would occur to existing population levels or employment distribution within the study area from the proposed ISEGS construction.

Operation

Research shows that operational workers would commute as much as one hour to a power plant site from their homes rather than relocate (EPRI 1982). This one-hour commute range is within the study area and includes San Bernardino County and Clark County. According to AFC section 2.0, the proposed ISEGS is expected to employ a total of 90 permanent full-time employees (management, engineering, and administrative staff; skilled workers; and operators). According to AFC section 5.10

(Socioeconomics), it is anticipated that most of the operational workforce will be drawn from the City of Las Vegas within Clark County, Nevada, as well as parts of surrounding rural areas in San Bernardino County, California.

As stated in **SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE Table 3**, a total of 90 workers would account for a negligible amount of the total San Bernardino County and Clark County total labor force. As all workers would reside within the study area, no impacts to existing population levels would occur. Because the number of operational workers required represents such a small portion of the local available labor force, no significant impacts to the study area population or employment base would result from proposed project operation.

Closure and Decomissioning

As described in the **Project Description** section of the FSA/DEIS, it is assumed decommissioning of the facility would occur in a phased sequential manner; work would start at Ivanpah 1, followed by similar work at Ivanpah 2 and then Ivanpah 3, while the later phases of demolition / restoration work are finished at Ivanpah 1 and Ivanpah 2. Therefore, work would pass sequentially across all three units, with phases of work occurring at the same time at different locations and would be temporary in duration. It is assumed that the number and type of workers required for closure and decommissioning activities would be similar to that described above for construction of the ISEGS. Also, the the closure and decommissioning workforce would be drawn from the City of Las Vegas within Clark County, Nevada, as well as parts of surrounding rural areas in San Bernardino County, California. As all workers are expected to reside within the ISEGS area, no impacts to existing population levels are expected to occur. As closure and decommissioning activities would be temporary and the number workers anticipated would represent a small portion of the local available labor force, no significant impacts to the study area population or employment base would result from proposed project closure and decommissioning activities.

Staff cannot speculate as to the long-term economic and fiscal effects that closure and decommissioning activities would have on the study area because future conditions are unknown. Upon permanent closure of the ISEGS, the beneficial socioeconomic operational impacts such as worker payroll, project expenditures, and local economic stimulus would no longer occur. It should be noted that closure and decommissioning of the ISEGS would likely require further environmental impact evaluation, and most likely would have some beneficial fiscal and non-fiscal impacts to the area..

Proposed Project - Housing

The proposed ISEGS site would be located within vacant BLM land and contains no housing. As such, no housing would be displaced. As presented in **SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE Table 4,** there were 1,402,485 total housing units within the study area, with 110,011 vacant units, resulting in a 7.8 percent vacancy rate. As discussed above, during project construction and operation, all workers would reside within commuting distance of the proposed ISEGS site, and therefore would not need to move into the area. Therefore, no construction or operation-related impacts are expected on the local housing supply availability or demand. As no housing units would be located within the ISEGS site, closure and

decommissioning activities would not result in the removal of any housing units. As discussed above, all closure and decommissioning workers are expected to reside within the ISEGS area, and therefore would not need to move into the area requiring permanent housing.

Proposed Project - Fiscal and Economic Effects

Property Taxes

The proposed ISEGS would generate property tax revenue to San Bernardino County, California. The California State Board of Equalization (BOE) has jurisdiction over the valuation of a power-generating facility of 50 MW or more for property tax purposes except for a qualifying small power production facility or qualifying cogeneration facility such as a solar, wind, waste, or geothermal facility that together with any other facilities located at the same site, is not greater than 80 MW. For power-generating facilities determined to be under the jurisdiction of the state of California for property tax assessment purposes, the BOE determines the assessed value of the property, which is then used by the relevant county to assess and collect the appropriate amount of property taxes. In this case, the San Bernardino County assessor would assess and collect the appropriate amount of taxes. According to AFC section 5.10, under current law with exemptions for portions of the proposed ISEGS, property taxes are estimated at approximately $2.2 million per year. According to AFC section 5.10, once property taxes are assessed, tax monies would be allocated as follows:

- 39.66 percent to local schools;
- 31.74 percent to the local Educational Revenue Augmentation Fund;
- 20.96 percent to the San Bernardino County General Fund;
- 3.80 percent to Special Districts;
- 2.02 percent to the County Library; and
- the remaining 1.78 percent to flood control.

The additional property tax revenues generated by the proposed ISEGS would have a beneficial impact to San Bernardino County by increasing the amount of public funds available for community projects and spending by the county.

Sales Tax

The proposed ISEGS's annual operations and maintenance (O&M) budget is expected to be approximately $340,500 (in 2007 dollars), of which it is assumed that $27,000 would be spent locally within San Bernardino County, California, and the remaining $313,500 within Clark County Nevada. The additional sales tax revenues generated by the proposed ISEGS would have a beneficial impact to both the San Bernardino and Clark Counties' local economies.

Employment

Operation of the proposed ISEGS would generate a beneficial impact by creating employment opportunities for local workers through local expenditures for materials, such as office supplies and services. According to AFC section 5.10, the proposed

ISEGS would provide a total of approximately $5.4 million (in 2007 dollars) in operational payroll, at an average salary of $60,000 per year (including benefits) for the estimated 90 full-time employees. The additional revenues generated by employment and spending of the ISEGS would have a beneficial impact to both the San Bernardino and Clark County areas. However, the addition of 90 full-time jobs would not significantly reduce unemployment rates within the study area as presented in **SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE Table 3**, as the contribution of 90 full-time jobs would account for only 0.1 percent of the total unemployed workers (74,800) within the study area.

Proposed Project - Public Services

Physical impacts to public services and facilities are usually associated with population in-migration and growth in an area, which increase the demand for a particular service and lead to the need for expanded or new facilities. An increase in population in any given area may result in the need to develop new or alter existing public services and associated facilities to accommodate increased demand. The Socioeconomics analysis focuses on the proposed project's impacts to public services such as law enforcement, schools, and hospitals. The analysis of proposed ISEGS impacts to fire protection service levels is discussed within the **Worker Safety and Fire Protection** section of the Staff Assessment.

Law Enforcement

The required construction and operational labor force would reside within the study area. Therefore, no population increase would occur as a result of the proposed project, thereby eliminating the need for an increase in law enforcement services or facilities in the study area. In addition, according to AFC section 5.10, the San Bernardino County Sheriff's Department, which has primary responsibility for policing the proposed ISEGS site, did not express any concerns about the need for increased services as a result of the proposed ISEGS. Therefore, construction and operation activities at the proposed ISEGS would not significantly impact the existing service levels of the San Bernardino County Sheriff's Department or the Los Vegas Municipal Police Department.

Schools

The proposed ISEGS is expected to employ a total of 90 full-time employees from within the San Bernardino County and Clark County labor forces. Because all construction and operational employees are expected to already reside within the study area, the proposed ISEGS would not result in any direct population growth to the area that could generate a need for expanded school facilities within the CCSD or BVUSD enrollment areas. No impacts to schools would occur.

Any development (industrial or residential) within the BVUSD boundaries is currently charged a one-time assessment fee of $0.33 per square foot of principal building area. The only project structure that would qualify as a principal building area would be the administration/storage building, which is the only habitable structure. The administration/storage building (the only structure that could be defined as an occupied structure) is 9,682 square feet in size. Therefore, the proposed ISEGS would pay a one-time fee of $3,195 in school impact fees to the BVUSD. This is considered a beneficial socioeconomics impact of the proposed project.

Hospitals

The proposed ISEGS would not directly or indirectly induce substantial population growth in the area. The Saint Rose Hospital - Siena Campus, serves the proposed ISEGS site. As all construction and operational employees are expected to already reside within the study area, no additional constraints or physical impacts would occur to the healthcare services or facilities provided by the Saint Rose Hospital - Siena Campus. Therefore, construction and operation of the proposed ISEGS would have no impacts to hospital facilities.

Closure and Decommissioning

As discussed above, all closure and decommissioning workers are expected to reside within the ISEGS area. Therefore, closure and decommissioning of the proposed ISEGS would not result in any direct population growth to the area that could generate a need for new or expanded public service facilities.

No Project / No Action Alternative

In the No Project / No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality (43 U.S.C. 1781 (b)) in conformance with applicable statutes, regulations, policy and land use plan.

The results of the No Project / No Action Alternative would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project.
- The benefits of the proposed project in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

If this project were not approved, renewable projects would likely be developed on other sites in the Mojave Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. Construction methods, resulting impacts, and regulatory requirements associated with other renewable projects would be similar to those identified for the proposed ISEGS. However, as such, socioeconomic impacts associated with construction and operation of other renewable projects could be expected to be either similar when compared to the proposed ISEGS (no significant impacts and providing positive fiscal benefits) or greater (resulting in significant impacts such as by causing a burden on community services). Furthermore, important public benefits discussed above under the fiscal and non-fiscal effects section and summarized below in **SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE Table 7** would not occur within the study area.

CUMULATIVE IMPACTS AND MITIGATION

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental

effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (California Code Regulation, Title 14, section 15130). NEPA states that cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR §1508.7).

There is the potential for substantial future development in the Ivanpah Valley area and throughout the southern California desert region. Analysis of cumulative impacts is based on data provided in the following maps and tables (see **Cumulative Scenario** section):

- Cumulative Impacts Figure 1, Regional Renewable Applications
- Cumulative Impacts Figure 2, Regional Renewable Applications (Detail)
- Cumulative Impacts Figure 3, Ivanpah Valley Existing and Future/Foreseeable Projects
- Cumulative Impacts Table 1, Regional Renewable Energy Projects
- Cumulative Impacts Table 2, Existing Development in the Ivanpah Valley
- Cumulative Impacts Table 3, Future Foreseeable Projects in the Ivanpah Valley Area.

The analysis in this section first defines the geographic area over which cumulative impacts related to socioeconomics could occur. The cumulative impact analysis itself describes the potential for cumulative impacts to occur as a result of implementation of the ISEGS project along with the listed local and regional projects.

Geographic Extent

Cumulative impacts can occur if implementation of the ISEGS project could combine with those of other local or regional projects. Cumulative impacts would occur locally if ISEGS project impacts combined with impacts of projects located within the Ivanpah Valley. Cumulative impacts could also occur as a result of regional development of some of the many proposed solar and wind development projects that have been or are expected to be under consideration by the BLM and the Energy Commission in the near future. Many of these projects are located within the California Desert Conservation Area, as well as on BLM land in Nevada.

The geographic extent of cumulative impacts related to socioeconomics includes San Bernardino County, California and Clark County, Nevada and the cities contained therein. This geographic extent is appropriate because local jurisdictions or districts provide socioeconomic factors, such as public services, and the labor force and housing market potentially impacted is expected to come primarily from within these counties.

Cumulative Impact Analysis

Local Projects

Despite the potential for construction schedule overlaps with known projects within the proposed ISEGS study area, no adverse cumulative socioeconomic effects are

anticipated from either the construction or operation of the proposed ISEGS. As discussed above, an assumed maximum peak labor force of 959 construction workers represents 0.4 percent of the total construction workforce within the study area. Operation of the proposed ISEGS would require only 90 full-time, permanent employees, which represents a small portion of the available local labor force. Therefore, because the proposed ISEGS requires such a small number of workers relative to the amount of available workers for both construction and operation, its cumulative contribution to socioeconomic impacts resulting from an influx of non-local workers and their dependents would not be cumulatively considerable and therefore, less than significant.

As shown in Cumulative Impacts Figure 3 (Ivanpah Valley Existing and Future/Foreseeable Projects), as identified in Cumulative Impacts Tables 2 (Existing Development in the Ivanpah Valley) and 3 (Future Foreseeable Projects in the Ivanpah Valley Area), only one identified existing or foreseeable local projects contains residential housing, a mixed-use development in Jean, Nevada (identified as Cumulative Project G in Cumulative Impacts Table 2). The number of housing units associated with this project is unknown. In addition, those existing and foreseeable local projects would create job stimulus within the local area that could increase population. Large development projects such as the Primm Outlet Mall, Colosseum Mine, and the Ivanpah Airport would likely result in an increase in population and require the need for new housing and expanded public service facilities. However, as the ISEGS project would not result in any project specific adverse socioeconomic impacts it would have no contribution to any potential local cumulative adverse socioeconomic impacts. Furthermore, because the proposed ISEGS would not result in any impacts to socioeconomic resources, it would not result in any individually minor but collectively significant actions taking place over a period of time that could result in cumulative socioeconomic impacts on a local level. In addition, the long-term payment of taxes and fees and distribution of O&M and payroll dollars is expected to have a significant cumulative benefit to San Bernardino County, California, and Clark County, Nevada, by increasing the amount of public funds available to the counties for community projects. The cumulative benefits would be increased when combined with the revenues accrued as a result of current and future reasonably foreseeable development projects as a result of the proposed ISEGS.

Regional Projects

Regional impacts would occur if impacts from the ISEGS combined with impacts of the future solar and wind development projects that are currently proposed southeastern California, southern Nevada, and western Arizona. Similar to the ISEGS project, these projects would be located in relatively isolated areas of the desert. These projects are identified in Cumulative Impacts Figure 2 (Regional Renewable Applications), as identified in Cumulative Impacts Tables 1 (Regional Renewable Energy Projects. Large scale renewable energy projects, such as Cogentrix Solar Services LLC: 1,000 MW solar generation facility on approximately 19,000 acres in Nevada, NextLight Renewable Power, LLC: two solar trough projects (one 200 MW project and one 500 MW project at the Nevada/California border), Ivanpah Energy Center 500 MW gas-turbine combined-cycle power plant in Primm, Nevada, and the Wind Energy power plant projects (75 MW on 2,330 acres and 50 MW on 3,360 acres) in Mountain Pass will

require a large construction workforce and lengthy construction duration. Construction workers would likely commute from larger urban centers in surrounding communities during construction activities. Solar energy generation and wind energy generation facilities do not require large numbers of operational staff, therefore it is very unlikely that these projects would induce substantial growth in any of the communities in which they are proposed to be constructed. As such, these projects would be extremely unlikely to generate the need for new housing or substantially affect revenues of local businesses or agencies. In fact, construction of these facilities would likely result in increased revenues to local businesses during construction. Therefore, while large scale regional renewable energy projects will occur within the ISEGS geographic area for socioeconomic effects, as the ISEGS project would not result in any project specific adverse socioeconomic impacts it would not cumulatively contribute or combine with those of the future solar and wind development projects proposed to be constructed in desert areas of southeastern California and southern Nevada to result in cumulatively considerable adverse socioeconomic impacts. Furthermore, because the proposed ISEGS would not result in any impacts to socioeconomic resources, it would not result in any individually minor but collectively significant actions taking place over a period of time that could result in cumulative socioeconomic impacts on a regional level.

COMPLIANCE WITH LORS

Energy Commission staff concludes that the proposed ISEGS would comply with all applicable LORS regulating socioeconomics during both facility construction and operation. Given the ISEGS projected 50-year life span, staff cannot speculate about LORS compliance for facility closure and decommissioning activities.

NOTEWORTHY PUBLIC BENEFITS

Important public benefits discussed under the fiscal and non-fiscal effects section are O&M capital expenditures, construction payroll, and annual property and sales taxes. **Socioeconomics AND ENVIRONMENTAL JUSTICE Table 7** provides a summary of economic benefits of the ISEGS.

SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE Table 7
Noteworthy Public Benefits
Related to Ivanpah Solar Electric Generating System

Fiscal Benefits	
Estimated annual property taxes	$2.2 million per year
State and local sales taxes: Construction	$6.0 million
State and local sales taxes: Operation	$2,090 per year
School Impact Fee	$3,195
Non-Fiscal Benefits	
Total capital costs	$1,100 million
Construction payroll	$197 million
Operations payroll	$5.4 million
Construction materials and supplies	$77 million
Operations and maintenance supplies	$4.0 million per year
Direct, Indirect, and Induced Benefits	
Estimated Direct Employment	
Construction	An average of 474 jobs per month
Operation	90 full-time jobs
Estimated Secondary Employment	
Construction	528 jobs
Operation	12 jobs
Estimated Secondary Income	
Construction	$20.5 million
Operation	$470,150

COMMENTS ON THE PSA

Comments were provided in writing on the contents of the Preliminary Staff Assessment (PSA) from agencies, organizations and members of the public. Public agencies, organizations, or members of the public provided no comments related to issues presented in the Socioeconomics section of the PSA.

CONCLUSIONS

No significant adverse socioeconomics impacts would occur as result of the construction or operation of the proposed ISEGS. Staff believes the proposed ISEGS would not cause a CEQA- or NEPA-significant adverse direct, indirect, or cumulative impact on population, employment, housing, public finance, local economies, or public services. The proposed ISEGS would benefit the two-county study area (San Bernardino County, California, and Clark County, Nevada) and the local project vicinity in terms of an increase in local expenditures, payrolls, and taxation during construction and operation of the facility. These activities would have a positive effect on the local and regional economy. Socioeconomic impacts of the ISEGS project would not combine with impacts of any past, present, or reasonably foreseeable local or regional (future solar and wind development projects that are currently proposed southeastern California, southern Nevada, and western Arizona) projects to result in cumulatively considerable local or regional impacts.

MITIGATION MEASURES/PROPOSED CONDITION OF CERTIFICATION

No conditions of certification are required for socioeconomic resources, as no significant adverse socioeconomics impacts would occur as a result of the proposed ISEGS.

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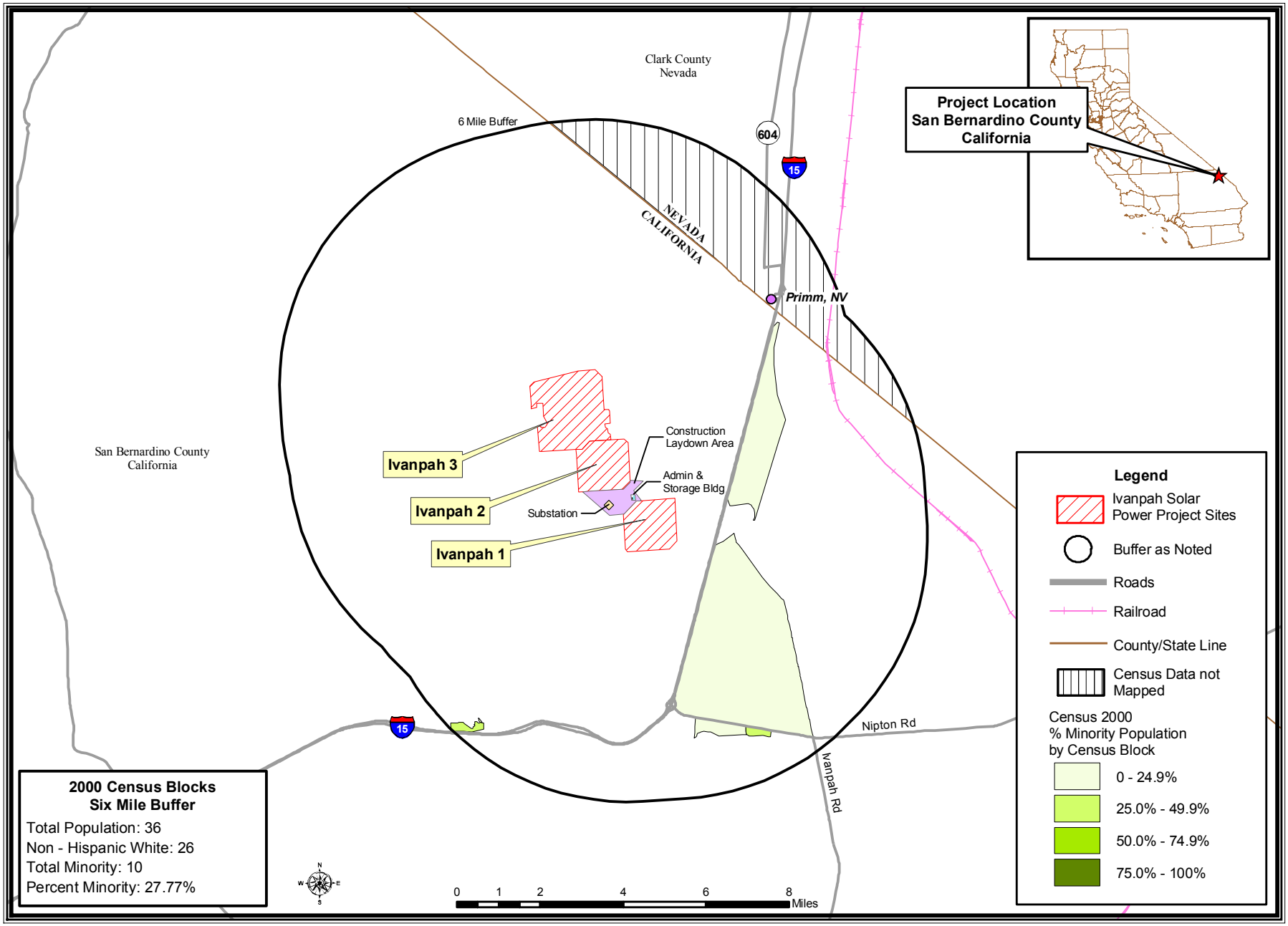
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SOCIOECONOMICS - FIGURE 1

Ivanpah Solar Power Project - Census 2000 Minority Population by Census Block - Six Mile Buffer

OCTOBER 2009



SOCIOECONOMICS

U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009

SOURCE: California Energy Commission Statewide Power Plant Maps 2009 - Census 2000 PL 94-171 Data - Matrix PL2

SOIL AND WATER RESOURCES

Prepared by Christopher Dennis, P.G., Paul Marshall, CHG, and Robert Dover

SUMMARY OF CONCLUSIONS

With the information provided to date, the Bureau of Land Management (BLM) and Energy Commission staff (hereafter jointly referred to as staff) have determined that construction, operation, and decommissioning of the proposed project could potentially impact soil and water resources. Where these potential impacts have been identified, staff has proposed mitigation measures to reduce identified impacts to levels that are less than significant. The mitigation measures, as well as specifications for laws, ordinances, regulations and standards (LORS) conformance, are included herein as conditions of certification. The conditions of certification referred to herein address the California Environmental Quality Act (CEQA) requirements for the Energy Commission's analysis and BLM's needs for a National Environmental Policy Act (NEPA) analysis. The project would conform with all applicable LORS. Staff's conclusions based on analysis of the information submitted to-date are as follows:

1. The proposed project would be located on an alluvial fan where flash flooding and mass erosion could impact the project. Project-related changes to the alluvial fan hydrology could result in impacts to adjacent land users and the Ivanpah playa. The applicant completed a hydrologic study and modeling of the alluvial fan. Based on this work and subsequent confirmatory and sensitivity modeling conducted by the BLM, scour analyses have been performed to support development of a project design that can withstand flash flood flows with minimal damage to site structures and heliostats. In addition, a Drainage, Erosion, and Sedimentation Control Plan (DESCP) has been developed to mitigate the potential storm water and sediment project-related impacts. However, the calculations and assumptions used to evaluate potential storm water and sedimentation impacts are imprecise and have limitations and uncertainties associated with them. Given the uncertainty associated with the calculations, the magnitude of potential impacts that could occur cannot be determined precisely. As discussed in the Biological Resources and Recreation sections, the potential effects associated with storm water and sedimentation impacts could adversely affect habitat for a threatened species (the desert tortoise), as well as recreational use of Ivanpah Playa. Should these impacts occur, they would likely be highly controversial. Based on these factors, the proposed project could result in impacts that would be significant with respect to CEQA significance criteria specified herein and NEPA significance criteria specified in 40 CFR 1508.27. Therefore, Condition of Certification **SOIL&WATER-5** has been developed that defines monitoring, inspection, and damage response requirements, as well as standards and procedures for re-considering the proposed storm water management approach if needed in the future.

2. The proposed project would use an air-cooled condenser for heat rejection and would recycle process wastewater from all plant equipment, including boilers and water treatment equipment, to the extent practicable. Recycling the wastewater would maximize reuse of process water and conserve freshwater. Use of this technology would substantially reduce water use and is consistent with water policy

and the constitutional requirement that State water resources be put to beneficial use to the fullest extent possible.

3. Impacts to groundwater supply and quality would be less than significant. In the Ivanpah Valley Groundwater Basin (IVGB), two substantial components of the basin's water balance are groundwater recharge through precipitation and groundwater loss through well pumping. Both precipitation and pumping in the basin will vary over the 50-year life of the proposed project. To ensure that the project's proposed use of groundwater does not significantly impact the beneficial uses and users of the groundwater in the basin, staff believes the applicant should be required to comply with San Bernardino County's Desert Groundwater Management Ordinance. The applicant would thus be required to develop a monitoring program and identify what changes are occurring in basin water levels. Staff believes the monitoring program should also be designed to incorporate data from monitoring of groundwater pumping related to the Primm Valley Golf Club's groundwater use. Substantial changes to groundwater levels caused by the proposed project and other pumping in the basin would be documented by this monitoring and reporting program in accordance with Condition of Certification **SOIL&WATER-6**.

Completion of staff's analysis of the proposed project is subject to the following:

- Satisfactory completion of the heliostat pole installation testing by the applicant to either confirm or update its current installation plans followed by further evaluation by staff of whether there would be any impacts related to the method of construction or failure of the heliostats due to storm water flows.

INTRODUCTION

This section of the Final Staff Assessment/Draft Environmental Impact Statement (FSA/DEIS) analyzes potential impacts to soil and water resources from the construction or operation of the Ivanpah Solar Electric Generating System (ISEGS) project. Where the potential of a significant impact is identified, staff has proposed mitigation to reduce the significance of the impact and, as appropriate, has recommended conditions of certification.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The following federal, state, and local environmental LORS have been established for the ISEGS project and similar facilities to ensure the best and appropriate use and management of both soil and water resources. Additionally, the requirements of these LORS are specifically intended to protect human health and the environment. The potential for project compliance with these LORS is a major component of staff's determination regarding the significance and acceptability of the ISEGS project with respect to the use and management of soil and water resources.

SOIL & WATER Table 1
Laws, Ordinances, Regulations, and Standards

Federal LORS	
Clean Water Act (33 U.S.C. Section 1257 et seq.)	The Clean Water Act (CWA) (33 USC § 1257 et seq.) requires states to set standards to protect water quality, which includes regulation of storm water and wastewater discharges during construction and operation of a facility. California established its regulations to comply with the CWA under the Porter-Cologne Water Quality Control Act of 1967. The CWA also establishes protection of navigable waters through Section 401. Section 401 certification through the Army Corps of Engineers and Regional Water Quality Control Board (RWQCB) is required if there are potential impacts to surface waters of the State and/or Waters of the United States, such as perennial and ephemeral drainages, streams, washes, ponds, pools, and wetlands. The Army Corps and RWQCB can require impacts to these waters to be quantified and mitigated.
Resource Conservation and Recovery Act, 40 CFR Part 260 et seq.	The Resource Conservation Recovery Act (RCRA) is a comprehensive body of regulations that give U.S. EPA the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also sets forth a framework for the management of non-hazardous solid wastes.
State LORS	
California Constitution, Article X, Section 2	This section requires that the water resources of the State be put to beneficial use to the fullest extent possible and states that the waste, unreasonable use or unreasonable method of use of water is prohibited.
The Porter-Cologne Water Quality Control Act of 1967, Water Code Sec 13000 et seq.	Requires the State Water Resources Control Board (SWRCB) and the nine RWQCBs to adopt water quality criteria to protect state waters. Those regulations require that the RWQCBs issue Waste Discharge Requirements specifying conditions for protection of water quality as applicable. Section 13000 also states that the State must be prepared to exercise its full power and jurisdiction to protect the quality of the waters of the State from degradation.
California Water Code Section 13050	Defines “waters of the State.”
California Water Code Section 13240, 13241, 13242, 13243, & Water Quality Control Plan for the Lahontan Region (Basin Plan)	The Basin Plan establishes water quality objectives that protect the beneficial uses of surface water and groundwater in the Region. The Basin Plan describes implementation plans and other control measures designed to ensure compliance with statewide plans and policies and provides comprehensive water quality planning. The following chapters are applicable to determining appropriate control measures and cleanup levels to protect beneficial uses and to meet the water quality objectives: Chapter 2, Present and Potential Beneficial Uses; Chapter 3, Water Quality Objectives, and the sections of Chapter 4, Implementation, entitled “Requirements for Site Investigation and Remediation,” “Cleanup Levels,” “Risk

	Assessment," "Stormwater Problems and Control Measures," Erosion and Sedimentation," "Solid and Liquid Waste Disposal to Land," and "Groundwater Protection and Management."
California Water Code Section 13260	Requires filing, with the appropriate RWQCB, a report of waste discharge that could affect the water quality of the state unless the requirement is waived pursuant to Water Code section 13269.
California Code of Regulations, Title 23, Division 3, Chapter 30	This chapter requires the submission of analytical test results and other monitoring information electronically over the internet to the SWRCB's Geotracker database.
State Water Resources Control Board General Permit CAS000002.	The SWRCB regulates storm water discharges associated with construction projects affecting areas greater than or equal to 1 acre to protect state waters. Under General Permit CAS000002, the SWRCB has issued a National Pollutant Discharge Elimination System (NPDES) General Permit for storm water discharges associated with construction activity. Projects can qualify under this permit if specific criteria are met and an acceptable Storm Water Pollution Prevention Plan (SWPPP) is prepared and implemented after notifying the SWRCB with a Notice of Intent.
State Water Resources Control Board 2003-003-DWQ	This general permit applies to the discharge of water to land that has a low threat to water quality. Categories of low threat discharges include piping hydrostatic test water.
California Code of Regulations, Title 22	Title 22, Division 4, Chapter 15 specifies Primary and Secondary Drinking Water Standards in terms of Maximum Contaminant Levels (MCLs). These MCLs include total dissolved solids (TDS) ranging from a recommended level of 500 milligrams per liter (mg/l), an upper level of 1,000 mg/l and a short term level of 1,500 mg/l. Other water quality MCLs are also specified, in addition to MCLS specified for heavy metals and chemical compounds.
California Code of Regulations, Title 23	Title 23, Division 3, Chapter 15 applies to waste discharges to land and requires the Regional Board issue Waste Discharge Requirements specifying conditions for protection of water quality as applicable.
Local LORS	
County of San Bernardino General Plan and Development Code	Grading in San Bernardino County is subject to terms and conditions of San Bernardino County's General Plan and Development Code. Because the proposed site is located on federal land, county regulations are not directly applicable to the project. However, once the project has been approved by BLM, BLM has the option to request assistance from San Bernardino County to determine and implement specific grading and soil erosion standards. If a county grading permit is required by the BLM, the grading plan would need to be completed in compliance with San Bernardino County's General Plan and Development Code.
California Safe Drinking Water Act and San Bernardino County Code Title 3, Division 3, Chapter 6, Public Water Supply Systems	Requires public water systems to obtain a Domestic Water Supply Permit. The California Safe Drinking Water Act requires public water systems to obtain a Domestic Water Supply Permit. Public water systems are defined as a system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out the year. California Department of Public Health (CDPH) administers the Domestic Water Supply Permit program, and has delegated issuance of Domestic Water Supply Permits for smaller public water systems in San Bernardino County to the County. Under the San Bernardino County Code Title 3, 5.15-6 Division 3, Chapter 6,

	Public Water Supply Systems, the County Department of Environmental Services monitors and enforces all applicable laws and orders for public water systems with less than 200 service connections. The proposed project would likely be considered a non-transient, non-community water system.
San Bernardino County Title 3, Division 3, Chapter 6,Article 5, Desert Groundwater Management	To help protect water resources in unregulated portions of the desert while not precluding its use, the County adopted this article. This article requires a permit to locate, construct, operate, or maintain a new groundwater well within the unincorporated, unadjudicated desert region of San Bernardino County. California Environmental Quality Act (CEQA) compliance must be completed prior to issuance of a permit, and groundwater management, mitigation, and monitoring may be required as a condition of the permit. The ordinance states that it does not apply to "groundwater wells located on Federal lands unless otherwise specified by inter-agency agreement." The BLM and County entered into a Memorandum of understanding (MOU) that provides that the BLM will require conformance with this code for all projects proposing to use groundwater from beneath public lands.
San Bernardino County Development Code Section 82.13.080, Soil Erosion and Sediment Control Plans/Permits	Section 82.13.080 establishes regulations and procedures to control human existing and potential induced accelerated erosion. Elements of this ordinance include project planning, preparation of Soil Erosion and Sediment Control Plans, runoff control, land clearing, and winter operations.
San Bernardino County Ordinance Code, Title 3, Division 3, Chapter 8, Waste Management, Article 5, Liquid Waste Disposal	This ordinance requires the following compliance for all liquid waste disposal systems: (1) compliance with applicable portions of the Uniform Plumbing Code and the San Bernardino County Department of Environmental Health (DEHS) standards; (2) approval by the DEHS and building authority with jurisdiction over the system; or (3) for alternative systems, approval by the DEHS, the appropriate building official of this jurisdiction, and the appropriate California RWQCB.
San Bernardino County Ordinance Code, Title 6, Division 3, Chapter 3, Uniform Plumbing Code	This ordinance describes the installation and inspection requirements for locating disposal/leach fields and seepage pits.
State Policies and Guidance	
Integrated Energy Policy Report (Public Resources Code, Div. 15, Section 25300 et seq.)	In the 2003 Integrated Energy Policy Report (IEPR), consistent with SWRCB Policy 75-58 and the Warren-Alquist Act, the Energy Commission adopted a policy stating they will approve the use of fresh water for cooling purposes by power plants only where alternative water supply sources and alternative cooling technologies are shown to be "environmentally undesirable" or "economically unsound."
State Water Resources Control Board Res. No. 68-16	The "Antidegradation Policy" mandates that: 1) existing high quality waters of the State are maintained until it is demonstrated that any change in quality will be consistent with maximum benefit to the people of the State, will not unreasonable affect present and anticipated beneficial uses, and will not result in waste quality less than adopted policies; and 2) requires that any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters, must meet WDRs which will result in the best practicable treatment or control of the discharge necessary to assure that: a) a pollution or nuisance will not occur and b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.

State Water Resources Control Board Res. 75-58	The principal policy of the SWRCB that addresses the specific siting of energy facilities is the Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Power Plant Cooling (adopted by the Board on June 19, 1976, by Resolution 75-58). This policy states that use of fresh inland waters should only be used for power plant cooling if other sources or other methods of cooling would be environmentally undesirable or economically unsound.
State Water Resources Control Board Res. No. 88-63	States that all groundwater and surface water of the State are considered to be suitable for municipal or domestic water supply with the exception of those waters that meet specified conditions.
State Water Resources Control Board Res. 2005-0006	Adopts the concept of sustainability as a core value for State Water Board programs and directs its incorporation in all future policies, guidelines, and regulatory actions.
State Water Resources Control Board Res. 2008-0030	Requires sustainable water resources management such as low impact development (LID) and climate change considerations, in all future policies, guidelines, and regulatory actions. Directs Regional Water Boards to "aggressively promote measures such as recycled water, conservation and LID Best Management Practices where appropriate and work with Dischargers to ensure proposed compliance documents include appropriate, sustainable water management strategies."
The California Safe Drinking Water and Toxic Enforcement Act	The California Health & Safety Code Section 25249.5 et seq. prohibits actions contaminating drinking water with chemicals known to cause cancer or possessing reproductive toxicity. The RWQCB administers the requirements of the Act.

SETTING

The ISEGS project would be located in the Ivanpah Valley in the eastern Mojave Desert in San Bernardino County, California, near the California/Nevada border (**Soil & Water Figure 1**). This part of the Mojave Desert is federal land administered by the BLM. Water resources in this area are extremely limited and vegetation sparse. Due to these limitations, there is a need for a higher degree of water use management and additional protection against accelerated soil erosion.

IVANPAH VALLEY

The proposed project would be developed on an alluvial fan in the Ivanpah Valley. The Ivanpah Valley extends across the California state line and into Nevada and is part of a larger hydrologic system that includes Jean Lake Valley (BSE2007a). Precipitation in the surrounding mountains provides the Ivanpah Valley with water. Surface water runoff of mountain precipitation flows through washes and discharges to and infiltrates into the alluvium-filled valley. The Ivanpah Valley is topographically closed. Excess surface flow drains to the Ivanpah, Roach, and Jean Dry Lakes where it evaporates and leaves behind a hard lakebed (desert playa). The Ivanpah playa is now a world-class landsailing location due to the topographic flatness of the playa and high winds that can develop in this area.

The Ivanpah Valley is approximately 560,000 acres in size. Jean and Primm are the largest communities in the valley. The ISEGS project would be located near Primm and the Primm Valley Golf Club, a 22-acre facility. The basin is bound by several mountains: the Clark Mountains, Ivanpah Mountains, McCullough Range, Spring Mountains, New

York Mountains, Sheep Mountain, and the Bird Spring Range. Several northwest-trending faults transect the basin: the State Line, Ivanpah, and Clark Mountain faults (DWR2003).

Groundwater from the IVGB is the primary natural water supply for the valley region. The groundwater occurs in the Quaternary alluvium of the basin, which has a maximum thickness of at least 8,000 feet (ENSR2007). Groundwater generally flows towards the northeast and may be impeded by the northwest trending faults (DWR2003). At the proposed project location, depth to groundwater appears to vary from approximately 215 to 715 feet below ground surface (bgs), with depth increasing upslope along the alluvial fan (Broadbent2002). Groundwater in the IVGB appears to be unconfined with several local semi-confined areas, such as in the vicinity of Jean Dry Lake (URS1990). Transmissivity of the IVGB aquifer, estimated from well tests, ranges from 2,300 to 100,000 gallons per day per foot (gpd/ft) (URS1990). Higher transmissivity values occur in the southern (California) portion of the basin (URS1990). On average, transmissivity across the IVGB appears to be on the order of 20,000 gpd/ft (URS1990). The storage capacity on the California side of the valley of the IVGB is estimated to be 3.09 million acre-feet (AF) (DWR2003). The storage capacity on the Nevada side of the basin has not been estimated.

Precipitation supplies water to the basin. There is no underflow water supply to the basin (Glancy1968). Recharge from precipitation occurs by infiltration of mountain runoff across the alluvial deposits and through ephemeral washes. Recharge from precipitation on the valley floor is minimal. Direct recharge from rainfall on the valley floor is substantially less than the potential rate of evapotranspiration and potential for soil moisture retention. When runoff or precipitation does reach the dry lakes, infiltration to groundwater is negligible and most of the water is removed by evaporation (Glancy1968). Groundwater discharge from the basin occurs mainly through pumping and underflow towards the Las Vegas Valley (Glancy1968).

The Ivanpah and Roach playas may seasonally contain surface water, but there are no perennial surface flows to these playas. During infrequent heavy rains, storm water eventually drains across the alluvial fans to the playas. Surface desiccation cracks are present in the Ivanpah playa, and large desiccation cracks may be located below the surface that cause sinkholes to develop (Broadbent2009). Seasonal springs are present along the base of the Clark Mountains, up slope and hydraulically upgradient from the proposed project site. These springs occur in areas of consolidated rock and are estimated to flow at a rate of no more than 5 gallons per minute (gpm). The discharge from the springs is inadequate to sustain surface flow for a substantial distance (Glancy1968).

The natural groundwater quality varies widely, but can be characterized as predominated by cations of sodium and calcium with a bicarbonate anion (DWR2003). Elevated concentrations of fluoride and sodium occur in parts of the basin (DWR2003). In the vicinity of the Ivanpah playa, the groundwater is saltier and characterized as sodium chloride (DWR2003). Total dissolved solids (TDS) in the IVGB range from 300 to 500 milligrams per liter (mg/l), and can be as high as 7,702 and 27,501 mg/l in the vicinity of Ivanpah playa and in the northern part of the basin (DWR2003). TDS at the

project site is estimated to be between 369 to 600 mg/l, based on water samples from Colosseum wells # 1 and #2 located near the proposed project site (Broadbent2002).

Molycorp Mine, operated by Molycorp Minerals LLC, is a lanthanide mining and milling operation. Molycorp Mine discharged wastewater through a pipeline to 'old' evaporation ponds in the Ivanpah playa between 1980 to 1987, and later discharged wastewater to 'new' evaporation ponds in the playa between 1988 to 1998 (RWQCB1998a). The RWQCB Cleanup and Abatement Order No. 6-98-20 requires abatement of a groundwater plume that developed beneath the old evaporation ponds. This plume contains TDS, nitrate, strontium, barium, and radium in concentrations above the California Maximum Contaminant Levels (MCLs) (RWQCB1998a). Nitrate levels above the MCLs are present in the groundwater beneath the new evaporation ponds (RWQCB1998b). Sediments at both ponds contain lanthanides and radionuclides (RWQCB1998b). Most of the non-natural contamination in the IVGB is the result of discharge to these ponds.

A wastewater treatment plant (WWTP) for the community of Primm, Nevada, is located approximately six miles northeast of the proposed project site on the Nevada side of the Ivanpah Valley. The plant processes wastewater from three casino properties, fast food outlets, a shopping mall, convenience stores, gas stations, a fire station, RV park, and an employee apartment complex (Nevada2008). The plant is capable of producing up to 1.0 million gallons per day (gpd) of secondary treated wastewater, but its actual operational discharge is about half this volume (NDEP2008). Up to 30,000 gpd of this wastewater is used as make up water at the Nevada Energy Bighorn power plant, approximately 1.8 miles northeast of the WWTP (BWPC2008; NDEP2009). The Nevada Energy plant is a 600-megawatt (MW) capacity, natural gas fired, combined-cycle facility (NDEP2009).

The beneficial uses of the surface water and groundwater in the Ivanpah Valley have been defined in the 2005 *Water Quality Control Plan for the Lahontan Region, North and South Basins* (the Basin Plan). The beneficial use designations for surface water and groundwater in the Ivanpah Valley are presented below in **Soil and Water Table 2**.

SOIL & WATER Table 2
RWQCB Basin Plan Beneficial Use Designation for the Ivanpah Valley

SURFACE WATER	
Beneficial Use Designation	**Description**
Groundwater Recharge	Beneficial uses of waters used for natural or artificial recharge of ground water for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers.
Flood Peak Attenuation/Flood Water Storage	Beneficial uses of riparian wetlands in flood plain areas and other wetlands that receive natural surface drainage and buffer its passage to receiving waters.
Wildlife Habitat	Beneficial uses of waters that support wildlife habitats including, but not limited to, the preservation and enhancement of vegetation and prey species used by wildlife, such as waterfowl.
Municipal and Domestic Supply	Beneficial uses of waters used for community, military, or individual water supply systems including, but not limited to, drinking water supply.
Agricultural Supply	Beneficial uses of waters used for farming, horticulture, or ranching, including, but not limited to, irrigation, stock watering, and support of vegetation for range grazing.
Freshwater Replenishment	Beneficial uses of waters used for natural or artificial maintenance of surface water quantity or quality (e.g., salinity).
Water Quality Enhancement	Beneficial uses of waters that support natural enhancement or improvement of water quality in or downstream of a water body including, but not limited to, erosion control, filtration and purification of naturally occurring water pollutants, streambank stabilization, maintenance of channel integrity, and siltation control.
Rare, Threatened, or Endangered Species	Beneficial uses of waters that support habitat necessary for the survival and successful maintenance of plant or animal species established under state and/or federal law as rare, threatened or endangered.
Cold Freshwater Habitat	Beneficial uses of waters that support cold water ecosystems including, but not limited to, reservation and enhancement of aquatic habitats, vegetation, fish, and wildlife, including invertebrates.
Warm Freshwater Habitat.	Beneficial uses of waters that support warm water ecosystems including, but not limited to, preservation and enhancement of aquatic habitats, vegetation, fish, and wildlife, including invertebrates.
Inland Saline Water Habitat	Beneficial uses of waters that support inland saline water ecosystems including, but not limited to, preservation and enhancement of aquatic saline habitats, vegetation, fish, and wildlife, including invertebrates.
Water Contact Recreation	Beneficial uses of waters used for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, and use of natural hot springs.
Noncontact Water Recreation	Beneficial uses of waters used for recreational activities involving proximity to water, but not normally involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, and aesthetic enjoyment in conjunction with the above activities.
Commercial and Sportfishing	Beneficial uses of waters used for commercial or recreational collection of fish or other organisms including, but not limited to, uses involving organisms intended for human consumption.

GROUNDWATER	
Municipal and Domestic Supply	Beneficial uses of waters used for community, military, or individual water supply systems including, but not limited to, drinking water supply.
Agricultural Supply	Beneficial uses of waters used for farming, horticulture, or ranching, including, but not limited to, irrigation, stock watering, and support of vegetation for range grazing.
Industrial Service Supply	Beneficial uses of waters used for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, geothermal energy production, hydraulic conveyance, gravel washing, fire protection, and oil well repressurization.
Freshwater Replenishment	Beneficial uses of waters used for natural or artificial maintenance of surface water quantity or quality (e.g., salinity).

Source: RWQCB2005.

The Basin Plan gives equal priority to each beneficial use of the surface water and groundwater. Included in the definition of surface water are playas and ephemeral washes. As presented in the table above, the desert washes provide beneficial functions and values such as groundwater recharge, flood peak attenuation and floodwater storage, and wildlife habitat.

PROPOSED PROJECT DESCRIPTION

The ISEGS project would be a 400-MW capacity solar electric generating system that would be constructed in three phases. Ivanpah 1 and 2 would be constructed as 100-MW capacity power plants and each would consist of approximately 55,000 heliostats made of 110,000 mirrors, double mounted on poles concentrically aligned in rows around a centralized solar power tower (CH2ML2009d). Ivanpah 3 would be constructed as a 200-MW capacity power plant, and would consist of approximately 104,000 heliostats made of 208,000 mirrors, double mounted on poles concentrically aligned in rows around five separate solar power towers (CH2ML2009d). Each heliostat would be approximately 7.2 feet high and 10.5 feet wide and would be equipped with a separate tracking and aiming system (CH2ML2009d). A one-quarter inch diameter cable, strung between heliostats above the ground, would transmit information to and from each heliostat. Ungraded access pathways would be established between every other concentric row of heliostats (CH2ML2009d). Dirt roads would be graded diagonally through the heliostat rows.

Construction of the proposed power plants would involve approximately 4,073 acres (6.4 square miles): 914 acres for Ivanpah 1, 920.7 acres for Ivanpah 2, and 1,836 acres for Ivanpah 3 (CH2ML2009d). In addition, the administration building, warehouse, substation, gas tap and metering stations, groundwater production wells, access roads and re-routed trails, and linear facilities would require approximately 402 acres. Approximately 321 acres would be temporarily disturbed by linear facilities, road improvements, and the laydown area. The total area of permanent disturbance would be approximately 3,713 acres, including linear facilities (CH2ML2009d). An additional 38.9 acres would be encompassed by the existing transmission line corridor (CH2ML2009d).

A power block would be located at the approximate center of project phases Ivanpah 1, 2, and 3. The power blocks of Ivanpah 1 and 2 would consist of a centralized solar power tower and receiver boiler, Rankin-cycle stream turbine-generator, an air-cooled condenser, concrete holding basins, and other auxiliary equipment (CH2ML2009d). The Ivanpah 3 power block would consist of the same elements as would Ivanpah 1 and 2, except it would have five solar power towers with the power block located at the central power tower (CH2ML2009d). The administration building, warehouse, and substation would be located between Ivanpah 1 and 2 in the logistics area. In addition, each power block would have a backup diesel-fired engine to power auxiliary equipment such as the boiler recirculation pumps and firewater pumps in the event of an emergency or when power is unavailable. Each power plant would also include a small natural gas fired startup boiler to provide heated water for plant startup and during times of cloud cover. This system is designed to minimize water use by using an air-cooled condenser for condensation of steam. Water consumption would primarily be used for boiler make up water and washing the heliostat mirrors.

Storm Water Potential

The existing storm water flow across the proposed project is generally towards the east across an alluvial fan that has developed in conjunction with the uplift and erosion of the Clark Mountains. Storm water is conveyed across the fan as sheet flow and through numerous ephemeral wash channels, and can reach the Ivanpah playa during heavy rain events. During major storm events, the ephemeral washes can flow for periods of a few hours to 24-hours with the possibility of flash floods and mass wasting. The ephemeral washes on the alluvial fan have been determined to be non-jurisdictional features by the Army Corps of Engineers under Section 404 of the Clean Water Act (USACE2009) and are, therefore, waters of the State. For further discussion on the jurisdictional determination, please refer to the **Biological Resources** section.

A total of 1,973 ephemeral washes were mapped in the project area and were categorized by the applicant on the basis of width. A summary of this categorization is presented below in **Soil and Water Table 3**.

SOIL & WATER Table 3
Summary of Ephemeral Washes at the Proposed Project Site
(All Washes Classified as Waters of the State)

Wash Category and Width	Number of Ephemeral Washes Mapped						
	Ivanpah 1	Ivanpah 2	Ivanpah 3	Utility Corridor	Colosseum Road	Substation and Admin. Area	Total
Category 1 36 to 85 feet	0	3	4	1	0	0	8
Category 2 21 to 35 feet	0	4	7	1	0	0	12
Category 3 11 to 20 feet	10	22	32	8	9	13	94
Category 4 5 to 10 feet	95	130	171	16	11	36	459
Category 5 1 to 4 feet	397	292	449	29	36	197	1,400
						Total	**1,973**

Source: CH2ML2008s and CH2ML2009d.

The size of the washes appears to increase topographically upgradient, with the greatest number of washes occurring in Ivanpah 3, followed by Ivanpah 1, then Ivanpah 2. This indicates that the highest volume and velocity storm water flows occur in Ivanpah 3. However, not all of the washes appear to be active and storm water flow likely migrates from one wash to create a new wash over time. No other wetlands or water were identified at the proposed project site (CH2ML2009d).

The proposed project is located in Federal Emergency Management Agency (FEMA) Zone D, which is classified as areas with possible flood hazards. Although a flood hazard analysis has not yet been conducted by FEMA for this area, a hydrologic study and modeling have been completed by the applicant. This work indicates that the alluvial fan has both active and inactive areas that can be subject to intense storm water flows (WYA2009a; WYA2009g). Storm water flow across the active portion of the fan is controlled by runoff generated within the Clark Mountain sub-watersheds above the

alluvial fan and from runoff generated on the alluvial fan itself (WYA2009c). Fifteen sub-watersheds, totaling 13,900 acres, were estimated to be contributing to storm water flows that could affect the proposed project (WYA2009c).

Soil Erosion Potential

The Natural Resources Conservation Service classifies soils at the project sites as Arizo loamy sand and Popups sandy loam (NRCS2008). According to the Unified Soils Classification System (USCS), the soils are clayey, silty sands (SC-SM) and silty, sandy gravels (GM). The Arizo loamy sand is excessively well drained and the Popups sandy loam is well drained. Development activities, including compaction associated with vehicle access, grading (in limited areas), removal of vegetation, and modification of precipitation patterns would generally result in reducing soil infiltration rates, and increasing the volume and velocity of runoff associated with storm events. If used, soil binders would also tend to reduce the soil infiltration rate (UNLV2002).

To reduce the impact of these development activities on infiltration and runoff, the applicant proposes to implement low impact development (LID) methods (CH2ML2009d). The goal of LID is to maintain the function and value of the natural drainage system while minimizing the risk of accelerated soil erosion and increased storm water runoff. By using the naturally developed drainage features and patterns, LID designs can reduce storm water infrastructure construction and long-term maintenance costs. Towards this end, the applicant has proposed the following methods (CH2ML2009d):

Vegetation. During construction, existing vegetation and plant roots would be left in place to the extent possible and cut only as necessary to allow clear movement of the heliostats. Native plants would be allowed to grow so long as their growth did not interfere with the heliostat operation or maintenance. An herbicide would be used to eradicate noxious weeds and non-native species.

Grading. Natural drainage features would be maintained to the extent possible. Grading would be designed to maintain natural sheet flow as much as practicable. Fill required in the heliostat fields would be compacted to closely match existing compaction, infiltration, and permeability. Hydro-mulch and soil binding and weighting agents would be used to protect areas disturbed by grading.

Even with these LID methods employed, project development would likely have effects that result in reduced storm water infiltration and increased runoff. Although grading would be minimized to the extent necessary, the project would still cut, move, and reuse approximately 135,000 cubic yards of soil (CH2ML2009d) in a 170-acre area of Ivanpah 3. An additional 110,000 cubic yards would be cut and moved through the remainder of the project. To minimize these impacts, all soil cut would be reused onsite. In addition, the applicant estimated that approximately 412,600 cubic yards of vegetation would be cut, mulched, and used in erosion control. Vehicles used in the development of the site and ongoing operations after construction is complete would include: a skid mounted, 23,500 pound (lb) GT-25XP Gyro Trac for mowing vegetation; a 48,000 lb Caterpillar 550 Wheel Harvester modified to be a heliostat mirror washing vehicle that could pull a

500-gallon water tank; a 47,000 lb sonic heliostat pole installer; golf cart sized utility vehicles; and a 60,126 lb Grove 540E crane for heliostat mirror installation.

Roads and Pathways. Access roads would be graded to follow existing topography. Ungraded maintenance pathways would be used to maintain and wash the heliostats. Vehicles designed to minimize soil compaction would be used (i.e., high flotation tires or tracks). The vehicles conducting the heliostat washing would travel at less than 10 mph to minimize dust generation. For additional information on dust management, please refer to the **Air Quality** section.

Post Installation and Heliostat Construction. The applicant is currently designing and evaluating methods of post installation and heliostat construction. The results are not available for this analysis, but are expected to be submitted to staff at a later date. The design and construction are expected to be consistent with the goal of LID.

Project Water Supply

All water for the construction and operation of the power plants would be drawn from one of two wells located on the northwest corner of Ivanpah 1 (CH2ML2009d). One well would be used as the primary water supply with the other well used as a backup for redundancy. A monitoring well would be installed approximately 2,300 feet northeast of the project's wells to monitoring the project's potential impact to local groundwater levels (CH2ML2009d). Pumped water would be stored for each power block in a 250,000 gallon combined raw water and fire water tank (CH2ML2009d). Approximately 100,000 gallons of this water would be designated for potable and process water use (CH2ML2009d).

Potable Water

During project construction, potable (primarily drinking) water would be provided by construction contractors purchased from an offsite source (CH2ML2009d). The project construction workforce size would be 474 persons on average and 959 persons during peak construction times (BSE2007a). The applicant estimates that each construction worker would require about 1 to 2 gallons of water per day (gpd) for a total of about 1,000 to 2,000 gpd during peak construction (CH2ML2009a). This equates to maximum need of about 3.3 AF for the construction of Ivanpah 1 or 2 and 2.7 AF for the construction of Ivanpah 3.[1]

During plant operation, potable water would either be brought into the project from a delivery service or pumped from one of the onsite groundwater wells and filtered and purified to meet the project's workforce potable water needs (CH2ML2009d). The estimated annual potable water demand during plant operation would be approximately 3 AF for all three project phases.

[1] 3.3 AF is calculated as 2,000 gpd times 27 months times 20 workdays per month.
2.7 AF is calculated as 2,000 gpd times 22 months times 22 workdays per month.

Construction Water

Groundwater from onsite wells would also be used to meet the project's construction water demands. Construction of each phase of the proposed project is expected to take 24 months. **Soil & Water Table 4** below presents a summary of the water that would be used during all three phases of construction. Groundwater would be used daily for dust suppression and vehicle washing. During hydrostatic testing of the project piping, up to 47,000 gallons of water could be used (CH2MHL2008t). The used water from this testing would either be trucked to a wastewater treatment and disposal facility or allowed to percolate/evaporate onsite, pending analytical results of the used water. If discharged to land, discharge of this water would be subject to the requirements of the State Water Resources Control Board's general permit number 2003-003-DWQ.

SOIL & WATER Table 4
Estimated Daily and Annual Construction Water Demands

Project Phase	Average Daily Construction Water Demand (gallons)			Water Supply Source
Ivanpah 1	99,333			New Onsite Groundwater Wells
Ivanpah 2	99,333			
Ivanpah 3	194,000			

Source: CH2MHL2008t.

Note: An additional 47,000 gallons could be used for hydrostatic testing of the proposed project's piping and additional water could be required for mirror washing if one project phase is constructed while another is operational.

Construction of each phase of the project would occur sequentially Grading is expected to take approximately four to five months for Ivanpah 1 and the common area, three to four months for Ivanpah 2, and five months for Ivanpah 3 (Stewart2009).

Operations Water

The project also proposes to use groundwater during plant operations. A maximum consumptive use has been estimated at approximately 18 AFY for each of the 100-MW plants and 37.5 AFY for the 200-MW plant. **Soil & Water Table 5** below summarizes the volume of water the project proposes to use for all power plant process and potable water needs. The applicant estimated the combined maximum annual use to be 76.4 AFY, but rounded this number up to 100 AFY in the AFC and supplemental documents (BSE2007a; CH2MHLI2009a).

SOIL & WATER Table 5
Estimated Annual Operational Water Demands Project Water Sources and Use[1]

Water Use	Water Source	Approximate Daily Average (gpm)[2]	Approximate Annual (AF)[3]
Ivanpah 1 100-MW Heliostat Process & Washing	Groundwater Wells	12.5	18
Ivanpah 2 100-MW Heliostat Process & Washing	Groundwater Wells	12.5	18
Ivanpah 3 200-MW Heliostat Process & Washing	Groundwater Wells	23	37.5
Potable Water Service (for employee use)	Groundwater Wells	1.8	2.9
Total Plant Operational Water Demand (all 3 phases combined)		49.8	76.4

Source: BSE2007a.
Note: Based on 3,640 hours of operation per year (10 hours per day, 7 days per week).

In Data Response Set ID, the applicant doubled the number of mirrors on each heliostat and changed the mirror array fields from what was originally proposed in the AFC (CH2ML2008g). This change in design resulted in increasing the proposed mirror surface area by 61.4 percent. However, the applicant did not revise the estimated annual water use to address the need for additional mirror washing, and stated that 100 AFY would provide sufficient water. During workshops, the applicant proposed a more open-ended limit to the volume of water the project could use, such as one that uses a rolling average, but also stated that 100 AFY would provide a sufficient volume of water for the proposed project.

Groundwater and water from the oil/water separator would be passed through a deionizing treatment system and mixing bed before being stored in a boiler make up tank (BSE2007a). Water from the boiler makeup water storage tank would provide the high quality, de-ionized water with no additives for mirror washing and steam production. Approximately 16,000 gallons of water per night would be used for mirror washing. To minimize the amount of water use, a pressure washer or other method would be used. **Soil and Water Table 6** presented below shows the expected volume of wash water that would be used during each wash cycle.

SOIL & WATER Table 6
Estimated Volume of Mirror Wash Water Used
(based on 2.5 gallons of water used for each heliostat)

Location	Number of Heliostats	Plant Area (acres)	Wash Water Volume (gallons per wash-cycle)	Wash Water Volume (gallons per acre per wash-cycle)
Ivanpah 1	55,000	913.5	137,500	151
Ivanpah 2	55,000	920.7	137,500	149
Ivanpah 3	104,000	1,836.3	260,000	142

Sources: CH2ML2008b; BSE2009a; CH2ML2009d

A wash cycle is defined by the applicant as the 2-week interval during which each heliostat within an array would be washed one time (BSE2007a). The applicant estimates that 100 heliostats can be washed per hour with 4 trucks working 10 hours per night at about 0.4 mile per hour (mph) (CH2ML2008b). Due to the high evaporation rates and minimal amount of water used, the applicant estimated that the wash water would evaporate at or just below the ground surface. The expected physical and chemical composition of the water reaching the ground surface is presented below in **Soil and Water Table 7**.

SOIL & WATER Table 7
Expected Mirror Wash Water Quality

Parameter	Concentration
Hardness as $CaCO_3$	0.005 mg/l
Copper	0.01 mg/l
Iron	0.03 mg/l
Silica	0.3 mg/l
Conductivity	<1µS/cm
pH	8.5

Source: CH2MHLl2008b.
Note: mg/l = milligrams per liter; µS/cm = microsiemens per centimeter.

Wastewater

Sanitary

The applicant decided to forego the package sanitary treatment system originally proposed in the AFC for the installation of a septic tank and leach field treatment system (CH2ML2009f). The sanitary wastewater from the sinks, showers, and toilets would be processed onsite by the septic and leach field system located near the administration building (CH2ML2009f). This system would be installed in accordance with San Bernardino County and RWQCB LORS and Best Management Practices (BMPs).

Residual sludge would be removed by a disposal service. Portable toilets would be located at each power block area (CH2ML2009d). These toilets would be serviced regularly under contract by a waste management company (CH2ML2009d). No wastewater would be discharged offsite (CH2ML2009d).

Process

All process water from plant floor drains, hub drains, sumps, and piping would be reused to the extent practical (BSE2007a). The process water would be sent through an oil/water separator and then stored in a raw water and fire water tank for later treatment and use in the steam boiler. Boiler blowdown would be discharged to a flash tank to control the concentration buildup of solids and silica (CH2ML2009d).

Contaminated Soil and Groundwater

The 'old' and 'new' Molycorp Mine wastewater discharge ponds are between four to six miles away from the proposed project site, in the southern part of the Ivanpah playa. A groundwater plume associated with these ponds contains elevated TDS, nitrate, strontium, barium, and radium concentrations and is currently being remediated under a RWQCB Cleanup and Abatement Order (RWQCB1998a; RWQCB1998b). In addition, between one to two miles downgradient from the proposed project site is the Ivanpah playa beneath which groundwater TDS is elevated beyond California acceptable drinking water standards. Please refer to the **Public Health & Safety** and **Waste Management** section for additional soil and groundwater contamination information.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

This section provides an evaluation of the expected direct, indirect, and cumulative impacts to soil and water resources that would be caused by construction, operation, and maintenance of the project. Staff's analysis of potential impacts consists of a description of the potential effect, an analysis of the relevant facts, and application of the threshold criteria for significance to the facts. If mitigation is warranted, staff provides a summary of the applicant's proposed mitigation and a discussion of the adequacy of the proposed mitigation. If necessary, staff presents additional or alternative mitigation measures and refers to specific conditions of certification related to a potential impact and the required mitigation. Mitigation is designed to reduce the effects of potential significant project impacts to a level that is less than significant.

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

Impacts leading to soil erosion or depletion or degradation of water resources, including beneficial uses, are among those staff believes could be most potentially significant soil and water resource issues associated with the proposed project. The thresholds of significance for these issues are discussed below.

Soil Resources

Staff evaluated the potential impacts to soil resources including the effects of construction and operation activities that could result in erosion and downstream transportation of soils and the potential contamination of soils and groundwater. There

are extensive regulatory programs in effect that are designed to prevent or minimize these types of impacts. These programs are effective, and absent unusual circumstances, an applicant's ability to identify and implement BMPs to prevent erosion or contamination is sufficient to ensure that these impacts would be less than significant. In addition, soils would be protected by the development and implementation of grading plans and a DESCP.

Although these programs and BMPs are generally effective on most projects, Staff considers that the proposed project does constitute an unusual circumstance. The proposed project is of a very large scale compared to other projects constructed on active alluvial fans in the past. Although modeling and calculations can be used in an attempt to estimate future scenarios and provide a basis for structural design parameters, these methods are based on assumptions and projections that are imprecise and untested in this environment. Should these assumptions and calculations be inaccurate, the consequences of flash flood damage or modified sedimentation and erosion rates may be significant. Staff has proposed conditions of certification that would mitigate these potential impacts. The LORS and policies presented in **Soil & Water Table 1** were used to determine the threshold of significance of project impacts with respect to CEQA.

Water Resources

Staff evaluated the potential of the project's proposed water use to cause a substantial depletion or degradation of groundwater resources, including beneficial uses. Staff considered compliance with the LORS and policies presented in **Soil & Water Table 1** and whether there would be a significant California Environmental Quality Act (CEQA) impact. Compliance with LORS and policies includes the Energy Commission's and State Water Resources Control Board's policy against using freshwater for power plant cooling unless other sources or other methods of cooling would be environmentally undesirable or economically unsound.

To evaluate if significant CEQA impacts to soil or water resources would occur, the following criteria were used. Where a potentially significant impact was identified, staff or the applicant proposed mitigation to ensure the impacts would be less than significant.

- Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding or substantial erosion or siltation on or offsite?
- Would the project create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff?
- Would the project place within a 100-year flood hazard area structures which would impede or redirect flood flows?
- Would the project violate any water quality standards or waste discharge requirements?

- Would the project substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?
- Would the project contribute to any lowering of groundwater levels in the groundwater wells of other public or private water users?
- Would the project contribute to any lowering of the groundwater levels such that protected species or habitats are affected?
- Would the project cause substantial degradation to surface water or groundwater quality?

DIRECT/INDIRECT IMPACTS AND MITIGATION

The direct and indirect impact and mitigation discussion presented below is divided into a discussion of impacts related to construction and a discussion of impacts related to operation. For each potential impact evaluation, staff describes the potential effect and applies the threshold criteria for significance to the facts. If mitigation is warranted, staff provides a summary of the applicant's proposed mitigation and a discussion of the adequacy of the proposed mitigation. In the absence of an applicant-proposed mitigation or if mitigation proposed by the applicant is inadequate, staff mitigation measures are recommended. Staff also provides specific conditions of certification related to a potential impact.

PROPOSED PROJECT - CONSTRUCTION IMPACTS AND MITIGATION

Construction of the proposed project would include soil excavation, grading, installation of utility connections, and the use of groundwater. Groundwater use would primarily be for dust suppression and hydrostatic testing of the project's piping connections. Potential impacts to soils related to increased erosion or release of hazardous materials are possible during construction. Potential storm water impacts could result if increased runoff flow rates and volume discharge from the site were to increase flooding and sedimentation downstream. The Ivanpah playa could be impacted by the deposition or depravation of sediments. Water quality could be impacted by discharge of hazardous materials released during construction. Project water demand could affect the quantity of available groundwater. Potential construction related impacts to soil, storm water, and water quality or quantity, including the applicant's proposed mitigation measures and staff's proposed mitigation measures are discussed below.

Soil Erosion Potential by Water and Wind

Construction of each phase of the project is expected to take approximately 24 months to complete. The total earth movement would be substantial with approximately 135,000 cubic yards of soil to be cut, moved, and reused in a 170-acre area of Ivanpah 3 (CH2ML2009d) and an additional 110,000 cubic yards of soil cut and moved throughout the remainder of the project. In total, approximately 245,000 cubic yards of soil would be cut and moved and an additional 412,600 cubic yards of vegetation would be cut and mulched (BSE2007a; CH2ML2009d). The mulched vegetation would be reused for

erosion control. The earth and vegetation work would primarily be for construction of the powerblock, underground utilities, and roadways, with additional vegetation cutting in areas to be occupied by heliostats.

These construction activities can lead to adverse impacts to soil resources including increased soil erosion, soil compaction, loss of soil productivity, and disturbance of soils crucial for supporting vegetation and ephemeral water dependant habitats. Activities that expose and disturb the soil leave soil particles vulnerable to detachment by wind and water. Soil erosion results in the loss of topsoil and increased sediment deposition downstream. To minimize the effects of construction to the soil, the applicant has proposed the use of construction vehicle's designed to minimize their impact to the soil. Most of the proposed vehicles are heavy and low impact tires or tracks have been proposed to be used to minimize compaction of the soil that could be caused by these vehicles.

The magnitude, extent, and duration of those impacts depends on several factors, including the exposure of the soils to water and wind, the soil types affected, and the method, duration, and time of year of construction activities. Prolonged periods of precipitation or high intensity and short duration runoff events coupled with earth disturbance activities can result in accelerated onsite erosion. In addition, high winds during grading and excavation activities can result in wind borne erosion leading to increased particulate emissions that adversely impact air quality. The implementation of appropriate erosion control measures would help conserve soil resources, protect downstream properties and resources, and protect air quality. Conditions of Certification in the **Air Quality** section provide mitigation that would prevent significant impacts from fugitive dust and soil erosion. Conditions of Certification **AQ-SC3** and **AQ-SC7** would limit vehicle speed to 10 miles per hour during project construction and require all unpaved roads and disturbed areas in the project and linear construction sites to be watered as frequently as necessary during grading and stabilized thereafter with a non-toxic soil stabilizer or soil weighting agent to comply with the dust mitigation objectives of Condition of Certification **AQ-SC4**. Condition of Certification **AQ-SC4** establishes performance standards for controlling fugitive dust and requirements for response should they be exceeded. The requirement to use soil weighting and bonding agents following grading would conserve freshwater by reducing the need for water as a means to control fugitive dust.

Soil losses would develop during construction and there would be ongoing soil loss after construction of the project. The linear utilities would result in soil disturbance by vehicles and other equipment during installation. Use of construction BMPs in these areas is expected to control soil loss during construction and to mitigate potential impacts to air and downstream properties and resources. Soil erosion and loss of soil due to project activities could be substantial and would need to be mitigated. The proposed erosion and sedimentation control measures include: preserving the existing vegetation to the extent possible; wetting or using soil binders or weighting agents active construction and laydown areas; controlling speed on unpaved surfaces; placing gravel in entrance ways; and use of straw bales, silt fences, and earthen berms to control runoff (BSE2007a; CH2ML2009c; CH2ML2009a). Staff recommends the development and implementation of a DESCP in accordance with Condition of Certification **SOIL&WATER-1** to ensure adequate BMPs are in place to mitigate potential erosion

and loss of soil. In addition, Condition of Certification **SOIL&WATER-2** would require the project owner to develop and implement a construction Storm Water Pollution Prevention Plan (SWPPP) and comply with the dredge and fill requirements in Appendix B, C, and D.

Project Water Supply

Potable water for the construction workforce would be supplied by construction contractors from an offsite source (CH2MHL2008t). Portable facilities would be used for sanitary needs and would operate without water. Construction water would be supplied by groundwater wells that would be drilled and constructed on site. The depth to groundwater at the project site is estimated to be between 215 to 715 feet bgs. Groundwater would not be encountered during grading activity. Staff recommends Condition of Certification **SOIL&WATER-3** to ensure that onsite groundwater wells would be constructed in accordance with state and local LORS.

The applicant estimates that daily water demand during construction would average 99,333 gpd for Ivanpah 1 and 2 and 194,000 gpd for Ivanpah 3 with up to an additional 47,000 gallons used during pipeline hydrostatic testing (CH2MHL2008t). The maximum water use for both construction and project operation would be 100 AFY. Condition of Certification **SOIL&WATER-4** would limit construction water use to 100 AFY, which is the proposed maximum water use for the project. This would ensure the applicants proposed water use is consistent with the volume of water use analyzed in the Proposed Project - Operation Impacts and Mitigation section below.

Wastewater

Improper handling or containment of construction wastewater could cause a broad dispersion of contaminants to soil or groundwater. Discharge of any non-hazardous construction-generated wastewater would require compliance with discharge regulations. Sources of wastewater would include equipment wash water and piping and vessel hydrostatic test water. Equipment wash water would be transported to an appropriate treatment facility. Hydrostatic test water would be reused to the extent possible and, pending analytical results of the water, would be discharged to land or trucked offsite to an appropriate treatment and disposal facility in accordance with the SWRCB Water Quality Order No. 2003-003-DWQ as a discharge to land with a low threat to groundwater and the requirements specified in Appendix B, C, and D.. Disposal requirements for the hydrostatic test water are still under review by the RWQCB. With the use of BMPs and compliance with LORS, staff concludes that there would be no significant impact from construction-generated wastewater.

PROPOSED PROJECT - OPERATION IMPACTS AND MITIGATION

Operation of the proposed project could lead to accelerated soil erosion and increased storm water runoff. The project's operation could also lead to potential water quality and water supply impacts. Soils may be potentially impacted through erosion or the release of hazardous materials used in the operation of the proposed project. Storm water runoff from the project could result in potential impacts if increased runoff flow rates and volumes discharged from the project increase erosion of the soil and increase downstream flooding. Water quality could be impacted by discharge of eroded

sediments from the project or discharge of hazardous materials released during operation. Water supply used for plant processes, heliostat mirror washing, and fire protection could lead to potential quantity or quality impacts to Ivanpah Valley groundwater resources. Potential impacts to water quality and water supply and the potential acceleration of soil erosion and increased storm water runoff related to the operation of the project, including the applicant's proposed mitigation measures and staff's proposed mitigation measures, are discussed below.

Soil Erosion and Storm Water Control

The proposed project would be located on an undeveloped alluvial fan. The storm water runoff either percolates into the soil of the alluvial fan or is conveyed through the alluvial fan wash channels or as sheet flow across the fan. Several project features would contribute to the potential for increased water erosion, including earth displacement, the long duration for construction, and changes to the properties of the soil. Construction of the proposed project would change natural drainages, remove natural vegetation and soil structure, and add impervious areas to the site, could cause an increase in storm water runoff.

Four different storm water control designs have been proposed by the applicant, each assuming a 24-hour, 100-year storm event. The first design proposed protecting the power blocks only with downgradient infiltration/evaporation basins. Under this design, all storm water flow on the upgradient side of the power blocks would be diverted around the power blocks to very large infiltration/evaporation basins on the downgradient side of the power blocks. This is a traditional design, suitable for most smaller projects. However, the proposed project would not have protected the heliostats during large storm events and may not have protected the power blocks during such large storm events. In addition, this design did not adequately address potential downstream impacts including natural sediment and surface water flows that maintain the Ivanpah playa.

The second and third designs proposed to capture and control all storm water that would enter the project on the upgradient side of the power blocks and heliostat fields. These designs would have involved the construction of very large storm water retention basins on the upgradient side of the Ivanpah 1, 2, and 3. The second design would have performed a dual function of releasing some storm water as sheet flow over the site, and diverting the remainder in channels around the site. The third design would have captured and released all storm water as sheet flow, with no diversion system. However, as staff were evaluating the specific details and potential impacts of these designs, the applicant proposed a complete re-evaluation of the design concept, and ultimately proposed a LID design. This fourth design involved minimizing storm water control and preserving the naturally developed storm water system to the extent practicable.

Under the fourth and final design, the principles of LID would be used to maintain natural drainage features and patterns to the extent feasible. Storm water and sediment flow would be managed in accordance with project-specific grading and drainage plans that were developed consistent with San Bernardino County, FEMA, and Clark County guidelines. The power blocks would be protected from storm water flows by

embankments, fill, and drainage channels that would divert flow around the power blocks (WYA2009g). The plans and guidelines would establish methods of when and how to control and manage storm water flow as it reaches, flows across, and then leaves the proposed project.

To support the final design parameters, the applicant conducted an onsite investigation of the hydrology of the project area and computer modeling of the storm flows and sedimentation rates. The potential storm water capture area for the project was determined by the applicant to be 21 square miles for Ivanpah 1, 6 square miles for Ivanpah 2, and 12 square miles for Ivanpah 3 (CH2MHL2008t). Runoff from these sub-watersheds was modeled by the applicant using the HEC-1 computer model developed by the Army Corps of Engineers (USACOE2009). Storm water flow across the alluvial fan was modeled using the Flo-2D computer model developed for FEMA (FEMA2009). Peak flows from these sub-watersheds was determined to range from 544 cubic feet per second (cfs) to 4,290 cfs. Flow velocities under the existing site conditions were found to be generally 3.5 feet per second (fps) or less. As might be expected, higher velocities were found to occur within the wash channels. Through the modeling, it was found that the flow velocities reduced as the flows translated into sheet flow or split into multiple channels on the alluvial fan (WYA2009c). Based on this analysis, the majority of storm water flow was found to occur in Ivanpah 1 and 3.

Storm water flow volume and velocity is affected by the surface infiltration rate and the roughness of the flow surface. Construction, operation, and decommissioning of the proposed project may modify the infiltration rate through several processes, including earthmoving, compaction, and use of dust suppressants. Although field vehicles modified with low impact tires or tracks have been proposed, it appears likely that even with the low impact tires or tracks, roads would develop over the life of the project that would affect storm water flow and its erosive capability. Mirror washing cycles would take two weeks to complete. An estimated mirror breakage rate of 0.1 mirrors per year is stated in the AFC, but it is likely much more (possibly in the thousands without mitigation and up to 50 with mitigation). The AFC states that broken mirrors would be replaced annually by one repair truck. However, the mirror repair activity would likely require several trucks. The AFC states that other repairs and security checks would be performed daily by one truck.

While the project is designed to minimize disturbance of vegetation during construction and operations, long-term response of vegetation to the site development is difficult to predict. Precipitation patterns would be modified and mirror wash water would change the soil water content and other characteristics. Mirrors would cover a large proportion of the land surface and, during precipitation events, would be placed in the flat horizontal position. Precipitation would run directly off the mirrors, and therefore, would not increase or substantially reduce the overall volume of precipitation reaching the ground surface. However, the precipitation runoff would concentrate at the edges of the mirrors, rather than being dispersed throughout the area. Likewise, the mirror wash water would likely concentrate along the drip line below the heliostats, cause minor erosion of the soil at the drip line, and promote non-native plant growth such as weeds. The applicant estimated that the physical and chemical makeup of the wash water would lead to only minor buildups of $CaCO_3$, copper, iron, and silica over the 50-year life of the project and that no wash water would flow offsite. Staff believes that the

combination of these effects would result in a less than significant modification of local hydrology when compared to the volume and velocity of storm water that flows from the Clark Mountains and onto the proposed project site.

Other long-term effects on vegetation would include soil compaction, shading of the sun beneath the heliostats, and changes to the soil structure by use of dust suppressants. Evaluation of the long-term impact of project development on vegetation is included within the Compliance Monitoring and Closure Plan. In general, any reduction in the amount of vegetation would tend to increase storm water runoff volumes, runoff velocities, and erosion rates. **Soil and Water Table 8** presented below summarizes the difference between pre-construction and post-construction for storm water runoff and peak discharge during a 100-year storm event as modeled by the applicant (WYA2009g).

SOIL & WATER Table 8
Change in Storm Water Runoff and Peak Flow Volume
Between Pre- and Post-Construction for a 100-Year Storm Event

Scenario	Runoff Volume (acre-feet)	Peak Discharge (cfs)
Pre-Construction	1,712	5,806
Post-Construction	1,722	5,817
Numerical Change	(1.68%)	(4.48%)

Source: WYA2009g.

As shown in the table above, the overall average change between the pre and post-project conditions in peak storm water flow was estimated by the applicant to increase 4.48 percent and the change in runoff volume was estimated to increase 1.68 percent. The greatest change modeled by the applicant occurred in the administration, area where extensive grading and compaction would be required, and where Ivanpah 3 adjoins Ivanpah 2 (WYA2009g). The overall change in storm water runoff and peak flow volume for a 100-year storm event is not significant. The change in volume and peak flow is a small percentage of the total storm water flow.

Water quality could also be impacted if the storm water drainage pattern concentrates runoff in areas that are not properly protected with BMPs and cause increased erosion and sediment discharge offsite and possibly into the Ivanpah playa. Conversely, if the storm water controls are too restrictive, there could be a reduction in the sediment supplied to the west side of the Ivanpah playa adjacent to Interstate 15. The applicant's analysis of the project's impact on sedimentation rates to the playa concluded that there would essentially be no net change in sediment transport and deposition due to construction of the proposed project (CH2ML2009d; CH2ML2009d).

The assumptions used in the applicant's modeling were reviewed by staff and modified in additional model runs performed by staff (AECOM2009a). To ensure that the modeling and calculations evaluated worst-case impacts associated with increased storm water flow volumes and velocities, conservative assumptions regarding soil

infiltration rates and roughness characteristics were made in the calculations. This included assumptions of extensive compaction associated with construction and complete denudation of vegetation due to shading and modified hydrology.

Staff's results are presented below in **Soil and Water Tables 9** and **10**. This analysis confirmed the applicant's conclusions regarding limited modification to storm water flow volumes, velocities, and downstream sedimentation rates. For a relatively frequent 10-year storm event, the total volume of storm water runoff would increase by about 1 percent with the peak discharge increasing approximately 3 percent due to construction and operation of the proposed project.

SOIL AND WATER RESOURCES Table 9
10 Year, 24-Hour Storm Event

Site Condition	Runoff Volume (acre-feet)	Peak Flow (cfs)	Maximum Velocity (feet per second)		Ivanpah 1 and 2 Potential Number of Heliostats Failing	Ivanpah 3 Potential Number of Heliostats Failing
			Flood Plain	Ephemeral Channel		
Pre-Construction	1,962	8,653	4.7	13.9		
Post-Construction	1,973	8,924	4.9	16.5	1,808	2,306
Numerical Difference	11 (1%)	271 (3%)	2 (4%)	11 (16%)		

Source: AECOM2009a.
Note: The 10-year storm event was not modeled by the applicant.

The results from the 100-year storm analysis are similar. This relatively minor increase in runoff volume can be attributed to the high volume of storm water that would be entering the project from the large catchment basins in the Clark Mountains. The volume of storm water runoff that would be generated at the project site is relatively small compared to the volume of storm water entering the site.

Staff's analysis also concurs with the conclusion that there would be no net sediment loss or gain. There would be no loss because the project design is intended to allow sediment to pass through the site in an uninterrupted manner, and would not include the construction of basins that would capture sediment. There would be no net sediment gain for two reasons: 1) the increase in storm water velocity on the proposed project site is not significant; and 2) the storm water entering the site from upstream areas is already saturated with sediment and has no ability to acquire more sediment. There would be no change in sedimentation or erosion downstream of the project site because the storm water flow volume and velocity leaving the site is not significantly changed.

SOIL AND WATER RESOURCES Table 10
100 Year, 24-Hour Storm Event

Site Condition	Runoff Volume (acre-feet)	Peak Flow (cfs)	Maximum Velocity (feet per second)		Ivanpah 1 and 2 Potential Number of Heliostats Failing	Ivanpah 3 Potential Number of Heliostats Failing
			Flood Plain	Ephemeral Channel		
Pre-Construction	4,242	18,939	7	14		
Post-Construction	4,637	19,204	9	25	13,889	18,172
Numerical Difference	395 (8.5%)	265 (1.4%)	2 (22%)	11 (44%)		
Post-Construction - Applicant Most Likely Case	---	---	5.9	26.6	3,934	4,260
Post-Construction - Applicant Worst Case	---	---	8.0	25.5	10,250	10,250

Source: AECOM2009a

In addition to development-related modification of storm water volumes, storm water velocities, and sedimentation rates, both the applicant and staff calculated the potential impact of storm water-related scour on constructed facilities, including the heliostat fields. The heliostat fields include a total of 428,000 mirrors mounted on 214,000 individual 6-inch diameter poles. Using the concept of low impact development, there would be no storm water diversion or detention systems to divert storm water away from the heliostat fields or to reduce the velocity of storm water as it enters the fields. Because the heliostats would be mounted on poles, which would be driven into unconsolidated sediments on the alluvial fan, general erosion, migration of channels, and local scour caused by storm water flows could remove sediment supporting individual poles and cause them to fall to the ground. Once on the ground during a storm event, the broken glass associated with the mirrors could further break and be transported downstream. Also, the heliostat structure itself and the associated wiring, could be transported downstream. Although the security fence located on the downstream side of the proposed project area could stop larger pieces from leaving the property, it would not stop small glass fragments. Also, the fence itself could be threatened by storm water flows and could not guarantee the onsite capture of all damaged materials.

To evaluate the potential for heliostat failure and downstream transport, staff conducted a local scour analysis of the potential impact of storm water velocities on individual heliostats (AECOM2009a). The analysis concluded that the scour from a 10-year storm could lead to the failure of more than 4,000 heliostats and more than 32,000 from a 100-year storm. The applicant has not conducted a direct calculation of the number of at-risk heliostats. However, staff has estimated the number of at-risk heliostats based on the

applicant's calculated storm water velocities, and the number could be more than 20,000 in a 100-year storm.

Up to six to nine feet of scour can occur at the project site. To test the potential effects of storm water flows and scour on the heliostats the applicant recently (August 2009) attempted to install and conduct load tests on heliostat poles. During this test, problems occurred where large rocks were encountered causing installation refusal and drilling equipment breakage and malfunction. The testing did not demonstrate poles could be installed at depths satisfactory to mitigate potential scour and failure. Satisfactory completion of heliostat pole installation testing by the applicant is necessary so staff can confirm the proposed method of installation is adequate to install the heliostats at a depth sufficient to mitigate failure and that there would be no impacts related to other methods of installation. Condition of Certification **SOIL&WATER-5** requires the heliostats to be reinforced to withstand up to six feet of scour. In addition, this condition requires the applicant to develop a Stormwater Damage Monitoring and Response Plan, which would include a plan to cleanup and mitigate failed heliostats. By requiring reinforcements of the heliostats, the estimated number of heliostat failures during a 10-year storm event would be reduced to approximately 10. During a 100-year event, this number would be reduced to approximately 50.

Provided the proposed method of installation is adequate to install poles at a depth sufficient to mitigate failure, staff believes the effects of erosion and storm water flow onto and off the proposed project can be mitigated through implementation of Conditions of Certification **SOIL&WATER-1**, **-2**, and **-5**. **SOIL&WATER-1** would require the project applicant to develop a DESCP to ensure protection of water quality and soil resources. **SOIL&WATER-2** would require the applicant to develop an Industrial SWPPP that meets the requirements specified in Appendix B, C, and D. Condition of Certification **SOIL&WATER-5** would require the applicant to develop a Storm Water Damage Monitoring and Response Plan to monitor the heliostats and mitigate potential impacts from heliostats damaged during storm events. In addition, as discussed in the **Recreation** section, Condition of Certification **SOIL&WATER-5** would require the project owner to establish a baseline and monitor for any changes in the surface texture and quality of the Ivanpah playa, Changes that could occur to the playa surface include a change in sedimentation or the introduction of man-made elements such as broken heliostat mirror shards.

Project Water Supply

The applicant has proposed to pump groundwater from one of two onsite wells for all potable water and plant operation needs. Staff has analyzed the project's proposed groundwater use to determine if it would cause substantial depletion or degradation of local or regional groundwater quality and supply. As discussed previously, the applicant doubled the proposed number of mirrors on each heliostat and changed the mirror array fields from what was originally proposed in the AFC. Although this change increased the total surface area of all the mirrors combined by approximately 61.4 percent, the applicant has stated that the project's water demand would not exceed 100 AFY (CH2ML2008g). The applicant has also stated during workshops that they would like to have the water supply metered on a five-year rolling average. Staff believes such an average is too uncertain in an environment where water supply is quite limited and

when project engineers can reasonably estimate the volume of water that would be required for the project's construction and operation. Computer modeling by the applicant of the potential impacts associated with the use of groundwater was based on an annual maximum use of 100 AFY.

Regional Groundwater Supply

In desert regions, estimation of groundwater recharge from precipitation is the controlling factor in estimating the balance of groundwater available for development in a given basin without causing significant impacts. **Soil and Water Table 11** presents a summary by various researchers of estimates of precipitation-derived recharge in the Ivanpah Valley. The estimates of recharge vary due to differences in the area calculated within which precipitation would occur and differences in calculations of how much precipitation translates into groundwater recharge.

SOIL & WATER Table 11
Groundwater Recharge Estimates

Researcher and Year	Estimated Groundwater Recharge (AFY)
Glancy 1968	1,607
Moore 1968	1,275
Geomega 2000	2,845
Donovan and Katzer 2000	5,800
ENSR 2008	2,806
Applicant AFC 2007	6,200
Energy Commission Staff 2009	5,223 to 6,538

Sources: AFC2007; ENSR2008.

The most recent recharge estimates were done by ENSR in 2008 and the Energy Commission staff in 2009. The ENSR recharge calculations differ from the applicant's because ENSR used the estimated areal extent of the Ivanpah Valley watershed that was developed by Glancy in 1968 and used the standard elevation limit of 5,000 feet above mean sea level (amsl) for precipitation in the Maxey-Eakin method. Both the applicant and Donovan/Katzer used a precipitation limit of 4,500 feet amsl. The applicant's watershed estimates were based on recent United States Geological Survey digital elevation maps, a more accurate way to define and measure the area of the watershed. Conducting our own Maxey-Eakin estimates of recharge, staff estimates recharge to be between 5,223 to 6,538 AFY. This range encompasses those of Donovan/Katzer and the applicant. Staff estimated annual groundwater recharge using the PRISM (PRISM2009) precipitation model data, a United States Department of Agriculture geospatial dataset, by using this model to estimate areas in various average annual precipitation zones to bracket the range of recharge for the basin.
Prior to development of water resources in the IVGB, a state of equilibrium was achieved in which the basin inflows (recharge from precipitation) equaled the outflows. Glancy (1968) indicates that, since groundwater levels are relatively deep in the IVGB, there is likely very little discharge or outflow due to evapotranspiration. Glancy also shows there are changes in groundwater levels between Ivanpah and Las Vegas Valley

and concludes that the predominant direction of flow is to the north from IVGB across a gap or boundary at the north end of Ivanpah Valley. Given the absence of evapotranspiration, and groundwater flow conditions between valleys, it appears the primary mechanism for outflow from IVGB is underflow to the north. These basin conditions suggest that since pre-historic time the IVGB has filled and water levels have increased to an elevation where underflow into the Las Vegas Valley has been established at a relatively steady rate. This rate of underflow can be considered to be in balance with the long-term volume of precipitation that becomes groundwater recharge in the IVGB. It can therefore be assumed that since the underflow constitutes all outflow, the inflow equals the outflow in the IVGB during prehistoric or pre-development conditions. Groundwater basin model simulations by ENSR (2007) also show that the effects on underflow due to current pumping in the basin would be minimal over a 200 year time period. This suggests that even with current and future project pumping the underflow can be assumed to be the same because the pumping is insignificant with respect to the time frame for response of the groundwater basin.

Using these relationships between inflow and outflow from the IVGB and staff's estimate of recharge in **Soil and Water Table 11**, staff developed the annual water balance for the IVGB shown below in **Soil and Water Table 12**. This water balance shows the annual sum of gains and losses within the groundwater basin based on pre-developed conditions, current pumping, and proposed future pumping in the IVGB based on no change in underflow.

SOIL & WATER Table 12
Ivanpah Valley Groundwater Basin Balance

Basin Inflows and Outflows	Pre-Development Basin Balance	Post Development Basin Balance	
		Existing Conditions	Estimated Future Conditions
Inflows (AFY)			
Recharge from Precipitation[1]	5,223 to 6,538	5,223 to 6,538	5,223 to 6,538
Underflow and Surface Water	0	0	0
Total Inflow	5,223 to 6,538	5,223 to 6,538	5,223 to 6,538
Outflows (AFY)			
Groundwater Pumping[2]			
Reoperation of the MolyCorp Mine	0	0	400
ISEGS Proposed Project	0	0	100
FirstSolar Photovoltaic Power Plant[3]	0	0	30
Ivanpah Energy Center	0	0	15
Primm Outlet Mall New Fast-Food Restaurant	0	0	15
NextLight Silver State North and South Photovoltaic Power Project	0	0	14
Interstate 15 Improvements[4]	0	0	10
Southern Nevada Supplemental Airport	0	0	0
DesertXpress Rail Line	0	0	0
Temporary Caltrans Batch Plant	0	0	0
Mixed-Use Development (near Jean)	0	0	0
Las Vegas Valley Water District Pipeline	0	0	0
SCE Transmission Line Upgrades	0	0	0
Wind Energy Projects – Clipper Wind and PPM Wind	0	0	0
Primm Valley GolfClub[6]	0	1,741	1,741
Primm Municipal & Casinos	0	1,470	1,470
Colosseum & Other Mining	0	1,060	1,060
Community of Jean & Jean Lake Valley	0	740	740
Industrial Water Use	0	150	150
Community of Goodsprings	0	120	120
Community of Desert	0	50	50
Domestic Water Use	0	40	40
Community of Nipton	0	30	30
Community of Calnerva	0	1	1
Total Groundwater Pumping	*0*	*5,402*	*5,986*
Water-Use Returns[6]	0	-1,987	-2,147
Total Outflow	0	3,415	3,839
Basin Balance (AFY)	**5,223 to 6,538**	**1,808 to 3,123**	**1,384 to 2,699**

Source: BSE2007a; CH2MHLI2009a

Notes:
1. Recharge from precipitation is reported as a range developed by staff based on variability in elevation and precipitation rates.
2. All pumping volumes are from the AFC, except the pumping volume for the Primm Valley Golf Club. The pumping volumes in the AFC were based on the 2007 ENSR report (ENSR2007).
4. The water supply for the proposed airport would be pumped in from the Las Vegas Valley. Return flow from this water supply is not included in the water budget.
3. Assumes maximum estimated groundwater use.
5. Pumping data from the May 2009 Ground-Water Monitoring Ten-Year Report for the Primm Valley Golf Club.
6. ENSR (2008) assumed a 30 percent return flow from the Primm Valley Golf Club and 40 percent return flow from municipal gray water infiltration. All water use return from potential future facilities were excluded except for that for the MolyCorp Mine return flow, which was estimated at 40 percent.

Staff estimates in Table 12 show that groundwater recharge or inflow exceeds both the current and future pumping rates in the basin. They also show that even with current pumping, project pumping, and foreseeable future project pumping, there is still a net gain in recharge to the IVGB.

Although a net gain in recharge can be shown, staff also note there are areas in the IVGB where substantial declines in groundwater levels have been observed. The declines occur in areas where current and past pumping wells have been located in the basin consisting of primarily wells used for irrigation of the Primm Valley Golf Course and the Primm municipal and casino wells. Monitoring of the declines is currently required by the County of San Bernardino because of concern for potential basin impacts.

These declines and resulting basin storage losses can be expected given the relatively slow response time for the basin suggested in the ENSR (2007) 200 year model simulations. The magnitude of historical storage losses can be estimated by evaluating the areal extent of groundwater level declines, of up to 40 feet, that have been observed in the basin since 1953 (BSE2007a). To evaluate the declines, the applicant spatially averaged the extent and magnitude of the declines and used an assumed specific yield for the aquifer to estimate the change in basin storage for the 53-year period of record (1953 to 2005). Using this method they estimated a reduction in basin storage of 1,300 AFY (BSE2007a).

This reduction in basin storage and water levels could translate into basin-wide impacts. As water levels equilibrate and stabilize based on current and future pumping over time the local declines would spread and result in lowering of basin-wide water levels. In the case of IVGB, this equilibration time is largely a function of the time and duration of pumping, areal extent of the basin, aquifer characteristics, and nature of the boundary where underflow occurs. The quantification of basin wide water level declines that would occur is currently difficult to predict, however, because little is known about the boundary where underflow occurs. Staff believes that although the magnitude of long-term potential declines cannot be predicted, the ENSR 2007 modeling results and aquifer characteristics suggest the time for basin wide water levels to decline substantially can take centuries and potential impacts during the life of the project and reasonably foreseeable projects would not be significant.

Staff also evaluated potential impacts to other basins that receive a component of inflow from the IVGB such as Las Vegas Valley. The 200-year groundwater model simulations by ENSR (2007) showed the underflow to the Las Vegas Valley would only be reduced by 8 percent over the next 200-years based on current pumping. Project pumping and reasonably foreseeable project pumping would increase the total basin pumping by 11 percent. This is a minimal increase and would not substantially change the reduction in flow to Las Vegas Valley or other basin users. In summary, staff believes the project and cumulative pumping from existing and proposed projects would not substantially deplete groundwater supplies or interfere substantially with groundwater recharge. Further analysis of potential impacts from water level declines and local drawdown are discussed below.

Local Groundwater Supply

Analysis of potential changes in groundwater levels from project pumping was necessary in order to evaluate whether there would be any impacts to other groundwater wells. Drawdown or a decrease in groundwater levels due to groundwater pumping can result in significant impacts when the pumping results in lower groundwater levels in nearby wells. These impacts can be both short- and long-term. Interference or drawdown can result in increased pumping lifts and declines in well productivity. Mitigation of these impacts could require costly modifications including the cost of lowering pumps, the cost of deepening a well, and well redevelopment costs. Substantial increases in pumping lift can also cause substantial increases in energy costs.

The magnitude of groundwater drawdown impact is controlled by five factors: (1) the rate of pumping; (2) the duration of pumping; (3) the depth of the well screens (water-intake depth of well); (4) aquifer parameters; and (5) aquifer boundary conditions. Aquifer parameters, such as specific yield and hydraulic conductivity, are controlled by layering and thickness of the water bearing materials such as gravel, sand, silt, and clay. The composition and flow characteristics of an aquifer can vary widely.

To accurately determine the impact of pumping specific to the project, calculations of drawdown must be based on the aquifer conditions within the vicinity of the pumping wells. The applicant developed a two-dimensional groundwater-flow model that uses local aquifer conditions and the expected well construction configuration to evaluate the potential project-related pumping and recharge impacts. A summary of the parameters used in the model are presented below in **Soil & Water Table 13**.

SOIL & WATER Table 13
Groundwater Model Parameters and Corresponding Values

Parameter	Value
Horizontal Hydraulic Conductivity	2 feet per day
Vertical Hydraulic Conductivity	0.2 feet per day
Specific Storage	0.00001
Specific Yield	0.05
Aquifer Thickness	1,000 feet
Transmissivity	15,000 gallons per day per foot
Depth to Screen Top	300 feet
Depth to Screen Bottom	400 feet
Pumping Rate	100 AF per year

Source: BSE2007a.

Based on the results of this groundwater modeling, the project's groundwater pumping is expected to cause local groundwater levels to decline over the project's 50-year life (CH2ML2008g). The expected groundwater level declines due to the project's pumping are:

- 2.1 feet at 0.5 mile from the project pumping well;
- 1.4 feet at 1 mile from the project pumping well; and
- 0.8 feet at 2 miles from the project pumping well.

The nearest groundwater wells are the Colosseum wells (Nos. 1 and 2) used for the Primm Valley Golf Club, approximately one mile northeast of the proposed project wells (CH2ML2008g). A summary of the well construction details for these wells is presented below in **Soil and Water Table 14.** These wells penetrate primarily sands and gravels to a depth of 566 to 693 feet below ground surface. The wells are screened beginning at about 290 to 350 feet bgs and extend to roughly the total well depth. Groundwater levels in these wells occur at approximately 2,500 feet amsl (Broadbent2009). Based on what staff believes are reasonable aquifer parameters, the applicant's modeling results show that the groundwater levels in the Colosseum wells would decline by less than 2 feet over the 50-year life of the project (BSE2007a). This magnitude of drawdown is much less than the monthly and annual fluctuations in water levels due to pumping of the Primm Valley golf course wells. Staff believes the limited amount of drawdown over the life of the project, <0.04 feet/year, would not have a measurable impact on the yield of the Colosseum wells.

Staff notes that at Colosseum Well #1, water level measurements show the difference between the 10-year average groundwater elevation and the top of the screened interval in Colosseum well #1 is approximately 3.4 feet. Measurements in 2007/2008 suggest, the groundwater level in Colosseum well #1 may be below the top of the well screen, during some times of the year. Where drawdown lowers water levels below well screen elevations there is the potential for impacts due to incrustation and sedimentation of a well. Incrustation and sedimentation would result in increased maintenance costs and shortened life of the well and pump components. Because part of the well screen of Colosseum well #1 may already be exposed during current pumping, significant impacts may already be occurring. Staff believes the two-foot incremental drawdown from the project's proposed pumping over the 50-year life of the project would not likely significantly contribute to potential impacts already occurring at the Colosseum well.

Staff also evaluated whether drawdown from project pumping would contribute to exceedance of the significance elevations established for golf course pumping by the County of San Bernardino. The significance criteria or 'significance elevations' for groundwater levels established by San Bernardino County (County) for the Colosseum wells is presented in **Soil and Water Table 14** (Broadbent2009). These significance elevations were established by the County as a basis for determining whether there would be any impacts from pumping the Colosseum wells. For the pumping in the Colosseum wells, a significant impact occurs when groundwater levels in these wells reaches 2,487 and 2,493 feet amsl, respectively (Broadbent2009). Average groundwater elevations in the Colosseum wells #1 and #2 have been 2,507 and 2,513

feet amsl and recent groundwater levels were 2,503 and 2,507 feet amsl during 2007/2008 (Broadbent2009). Based on the 2007/2008 groundwater levels in the Colosseum wells, 16 feet of groundwater remained in Colosseum well #1 and 14 feet in well #2 before the significance criteria threshold would be reached.

Staff believes the estimated contribution of the project's proposed pumping over the 50-year life of the project to impacting operation of Colosseum Well# 1 and reaching or exceeding the 'significance elevations' is limited and should not contribute to significant impacts in the basin. Staff is concerned, however, that there may be substantial variability in the aquifer and the local drawdown estimated by the ENSR model may not be precise. To ensure there are no unanticipated changes in drawdown due to project pumping, staff believes the applicant should be required to develop a groundwater monitoring program similar to that required for the Colosseum wells used for the Primm Valley Golf Course. Condition of Certification **SOIL&WATER-6** would require the applicant to comply with the County of San Bernardino's Desert Groundwater Management Ordinance and implement a monitoring plan that would characterize baseline water levels in the project vicinity, characterize aquifer materials, integrate water level measurement with the existing monitoring network, and provide for analysis of the project effects on water levels in the area. Staff proposes to coordinate with the County of San Bernardino to evaluate golf course pumping impacts and the contribution of the proposed project pumping to determine what mitigation, if any, would be needed by the applicant.

SOIL & WATER Table 14
Well Construction Details

Well	Distance from the Proposed Project Wells (miles)	Total Well Depth (feet bgs)	Screen Interval (feet bgs)	Wellhead Elevation (feet amsl)	Groundwater Average Elevation (feet amsl)	Difference between average groundwater elevation and Top of Screen (feet)	Well Purpose
Colosseum #1	0.98	566	290-556	2,793.60	2,507	3.4	Golf Course - Primary
Colosseum #2	0.82	693	350-674	2,801.36	2,513	62	Golf Course - Primary
PVGC7	1.86	695	345-685	2,689.08	2,515	171	Golf Course - Backup
PVGC8	1.91	695	345-585	2,679.58	2,514	179	Golf Course - Backup
PVGC9	2.00	460	290-450	2,670.98	2,514	133	Monitoring
Stateline	2.03	300	---	---	2,521	---	---
Yates	3.04	120	---	---	2,520	---	---
M-8	4.68	---	125-230	---	---	---	Monitoring
M-13	1.13	750	530-750	---	---	---	Monitoring
M-14	1.29	300	190-300	---	---	---	Monitoring

Source: Broadbent2009.

Other wells in the vicinity of the proposed project would not be impacted by the project's use of groundwater. To provide a baseline and document groundwater levels changes related to the project's proposed use of groundwater, staff recommends Condition of Certification **SOIL&WATER-6**. This condition would require the project to monitor and document groundwater levels to establish a groundwater level baseline and to monitor groundwater level changes over time in conjunction with the ongoing groundwater monitoring at the Primm Valley Golf Club.

To ensure the proposed project does not consume more than 100 AFY and is consistent with the volume analyzed, staff proposes Condition of Certification **SOIL&WATER-4** to limit the amount of groundwater the project could use during operations to 100 AFY. Given the potential for shorter- or longer-term variability in the basin balance and localized drawdown impacts, staff believes the project should conduct groundwater monitoring in conjunction with the ongoing groundwater monitoring at the Primm Valley Golf Club, which monitors and reports the groundwater levels in the vicinity of the proposed project. As discussed above and below in the section on Groundwater Quality, Condition of Certification **SOIL&WATER-6** would require the project to develop a groundwater level monitoring and reporting plan and integration with the Primm Valley Golf Course's existing groundwater monitoring and reporting program.
The seeps and springs located in the Clark Mountain are ephemeral and located upgradient and over three miles away from the project's proposed pumping wells. The seeps and springs derive their water from precipitation further upgradient in the Clark Mountains and beyond the potential reach of any cone of depression that would result from the project's proposed groundwater pumping. No significant impact to the seeps or springs is expected.

Groundwater Quality

Water quality can be impacted by migration of low quality or contaminated water towards pumping wells and by sustained pumping of the groundwater basin. By providing a measure of water salinity, TDS is a primary indicator of the natural quality of groundwater and is a measure of acceptance for the use of groundwater as a drinking water source. Water with TDS concentrations greater than 2,000 mg/l is generally considered undrinkable. In California, the recommended Secondary MCL or 'Consumer Acceptance Contaminant Level' for TDS is 500 mg/l, and upper and short term ranges can be 1,000 and 1,500 mg/l, respectively. The TDS concentrations in the IVGB range from 300 to 27,501 mg/l (DWR2003).

TDS at the project site is estimated to be 369 to 600 mg/l (Broadbent2002). Past Molycorp Mining operations have resulted in elevated TDS, nitrate, strontium, barium, and radium levels in the groundwater at their discharge ponds in the Ivanpah lakebed (RWQCB1998a). The old and new Molycorp evaporation ponds are between 4 and 6 miles from the proposed project site (CH2ML2008a). Based on TDS measurements, Broadbent in 2002 found that pumping in the wells, used for the Primm Golf Course might induce the lower quality groundwater from the playa to move towards the pumping wells near the Ivanpah playa. In addition, sustained overdraft of a groundwater basin can lead to water quality impacts. This can occur due to encroachment of pumping on lower saline portions of an aquifer. Substantial declines in water level of an

unconfined aquifer can also induce flow from low quality perched groundwater zones or flows from more saline portions of the aquifer such as from beneath the Ivanpah playa.

The applicant conducted groundwater modeling analysis to determine if pumping from the project wells would affect the groundwater gradient and velocity at the old and new Molycorp evaporation ponds (CH2ML2008a). The modeling estimated a project pumping induced groundwater gradient of less than 0.00003 feet per foot (ft/ft) and induced velocity of less than 0.1 feet per year (ft/yr) at the old and new evaporation ponds (CH2ML2008a). The predicted changes to the groundwater gradient and velocity are negligible. Therefore, no significant impacts related to the Molycorp evaporation ponds are expected to occur to water quality or ongoing remediation efforts.

Staff understands that use of the wells at the Primm Valley Golf Club has been reduced due to intrusion of brackish water that was not suitable for landscape irrigation (Broadbent2002). The cause of the intrusion was believed to be due to pumping induced migration of saltier groundwater underlying the playa to the east. Groundwater modeling conducted by the applicant indicates that the combined effects of the Primm Valley Golf Club pumping and pumping at the proposed project site would only result in local changes to groundwater levels and minor changes to groundwater quality (CH2ML2009e). The parameters used in the model were the same as those presented in **Soil and Water Table 13** with the addition of 1,660 AFY of groundwater pumping at the Primm Valley Golf Club. A groundwater monitoring report for the Primm Valley Golf Club for the 10-year span of 1997 to 2007 indicates there have been no appreciable groundwater declines or increase in TDS as a result of increasing pumping at the Primm Valley Golf Club (Broadbent2009).

The numerous ephemeral washes that provide drainage to the Clark Mountains that cross the proposed project site are considered surface water in the RWQCB's Basin Plan (RWQCB2005). These washes provide beneficial functions and values for groundwater recharge, flood peak attenuation and floodwater storage, and wildlife habitat. Development of the project would impact the function and value of these washes as wildlife habitat (please refer to **Biological Resources** for more information). Other than wildlife habitat, all other beneficial uses of these washes would not be significantly impacted. The proposed project would be allowing nearly all of the storm water to flow through the site relatively unimpeded. Current modeling estimates that the proposed project would result in a change in peak flow of 1.4 percent and a change in runoff volume of 8.5 percent. Due to the volume of storm water flow onto the site from the Clark Mountains, changes to the soil that would occur due to compaction, removal of vegetation, and additions of impervious surface areas (increased runoff and decreased infiltration) would not significantly affect the volume or velocity of storm water runoff or rates of sedimentation.

As previously discussed, staff believes there would be no impacts to current groundwater users and that current and future pumping in the basin would not result in overdrafting of the groundwater basin such that the beneficial uses would be impacted. The quality of the water would not be significantly impacted by the project and the maximum drawdown would be 2.1 feet at a half mile from the projects pumping and 0.8 feet at 2 miles from the projects pumping. The wells closest to the proposed project wells are located approximately one mile to the northeast. These well would experience

a water level decline of less than 2 feet. Use of the groundwater would comply with existing LORS. Therefore, there would be no significant impact to any other beneficial use or users of the groundwater.

Wastewater

The applicant proposes two separate wastewater collection systems for the proposed project. The first system would collect all wastewater generated from operation of the plant equipment and recycle and reuse that water to the extent practicable (BSE2007a). A wastewater collection system would return water from all general plant drains back to the raw water storage tank. Water that may contain oil or grease would first be routed to an oil/water separator before going to the raw water storage tank. Staff proposes Condition of Certification **SOIL&WATER-7** to ensure that the collection and recycling of this wastewater would be managed in accordance with applicable BMP's and LORS.

The second system would collect and treat all sanitary wastewater from sinks, toilets, and other sanitary facilities. Because there are no sanitary sewer connections, the sanitary wastewater would be processed through a septic system and discharged to a leach field. Solids would be periodically removed by a professional service. The maximum average daily wastewater flow to the leach field is expected to be 700 gallons (CH2ML2009e). No significant water or soil related impacts are expected to occur due to wastewater if the project owner complies with proposed Conditions of Certification **SOIL&WATER-7** and **-8**. **SOIL&WATER-7** describes reuse and disposal requirements for wastewater and **SOIL&WATER-8** provides the requirements for the installation of the proposed septic tank and leach field.

Project Closure and Decommissioning Impacts and Mitigation

After the end of the project's useful life, it would be decommissioned as described in the applicant's Draft Closure, Revegetation, and Rehabilitation Plan (CH2ML2009q). The facility would be removed to a depth of three feet below grade, original contours restored, and the site revegetated. However, the removal of the existing facility could cause substantial disturbance to soil and water resources. The project closure would require many of the same resource protection plans as required for construction, and thus, staff concludes that the impacts to soil and water resources would be less than significant.

NO PROJECT / NO ACTION ALTERNATIVE

The No Project / No Action Alternative is a proposed action that would not be undertaken. Under this alternative, the BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality in conformance with applicable statutes, regulations, policy and land use plan.

The results of the No Project / No Action Alternative would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project.

- The benefits of the proposed project in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

If this project is not approved, renewable projects would likely be developed on this and other sites in the Mojave Desert, or in adjacent states, as developers strive to provide renewable power that complies with utility requirements and state/federal mandates. For example, there are three large solar projects proposed on BLM land in Nevada within a few miles of the proposed ISEGS site. In addition, as of August 2009 there were 66 applications for solar projects covering 611,692 acres pending with BLM in the California Desert District. The No Project/No Action Alternative would not cause any significant impacts to Soil and Water Resources.

CUMULATIVE IMPACTS AND MITIGATION

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (California Code Regulation, Title 14, section 15130). National Environmental Policy Act (NEPA) states that cumulative effects can result from individually minor but collectively significant actions taking place over a period of time (40 CFR §1508.7). There is the potential for future development in the Ivanpah Valley area and throughout the southern California desert region. Cumulative impacts can occur if implementation of the proposed project could combine with those of other local or regional projects. The locations of existing and reasonably foreseeable developments in the Ivanpah Valley are presented in the **Cumulative Scenario** section of this document including **Cumulative Scenario Figure 3**.

Storm Water and Sediment. Construction and operation of the proposed project, including the grading, filling, and rerouting of ephemeral streams, would disturb approximately 4,100 acres of land and increase the transport of storm water and colloidal sediment to the Ivanpah playa. Smaller scale projects previously constructed in the project vicinity include the Union Pacific railroad track, a power transmission line, Interstate Highway 15, the Nevada Energy Bighorn power plant, Molycorp evaporation ponds, the Primm Valley Golf Club, and commercial development in Primm. Storm water and sediment transport impacts from these developments to the Ivanpah playa have been less than significant.

The construction and operation of reasonably foreseeable projects within the project vicinity that could result in increase storm water and sediment transport impacts are listed below in **Soil and Water Table 15**. However, all of these projects would be subject to existing LORS and would be designed to avoid, manage, and mitigate potential storm water and sediment impacts. Likewise, the proposed project has been designed to be in compliance with existing LORS and would use a storm water and sediment pass though design that would result in a minor increase of sediment downgradient of the proposed project. Therefore, staff believes that the construction and operation of the proposed ISEGS project would not result in a cumulative impact to

downgradient resources from erosion, storm water, or sediment aggradation or degradation.

Groundwater Consumption. A summary of reasonably foreseeable projects in the Ivanpah Valley and their potential water use is presented below in **Soil and Water Table 15**. These projects and cumulative impacts were analyzed in detail in the Regional Groundwater Supply section above.

SOIL & WATER Table 15
Large-Scale Projects under Development or Reasonably Foreseeable in the Ivanpah Valley

Potential New Groundwater Users	Estimated Water Use	
	During Construction	During Operation
Desert Xpress Rail Line A proposed high-speed rail from Victorville to Las Vegas.	Unknown (limited duration)	Negligible
Interstate 15 Improvements Includes: (1) a proposed point-of-entry inspection station near the California-Nevada border; (2) a 12-mile-long northbound truck descending lane and pavement rehabilitation; and (3) re-grading of median slopes.	Unknown (limited duration)	<10 AFY
Temporary Caltrans Batch Plant The batch plant would be used during widening of the I-15 Highway.	Negligible	Negligible
Mixed-Use Development (near Jean) Demolition of the Nevada Landing Casino and redevelopment of this and adjoining land as a 166-acre master-planned community of affordable housing, commercial businesses, shops, and a new-hotel casino. This development is contingent on the construction of the new Ivanpah Valley Airport.	Unknown (limited duration)	Unknown
Ivanpah Energy Center A 500-MW, air-cooled, gas-turbine, combined-cycle power plant. Although the facility would be using up to 50 AFY of water, this water would be recycled water from the WWTP.	Unknown (limited duration)	15 AFY from an Undisclosed Groundwater Source 35 AFY from Recycled Water
Las Vegas Valley Water District Pipeline Proposed construction and operation of a water supply pipeline from the existing 2420 Zone Bermuda Reservoir (located in southern Las Vegas) to Jean, Primm, the Southern Nevada Correctional Center, and the proposed Ivanpah Valley Airport.	Unknown (limited duration)	Negligible The use of imported surface water in the Ivanpah Basin would result in additional discharges of wastewater. At least a portion of this wastewater would likely infiltrate to the groundwater basin, increasing groundwater recharge in the basin.
Southern Nevada Supplemental Airport (Ivanpah Valley Airport) The proposed airport is anticipated to use water supplied by the Las Vegas Valley Water District pipeline for both construction and operation activities	None	None
Wind Energy Projects – Clipper Wind and PPM Wind	Unknown (limited duration)	Negligible
SCE Transmission Line Upgrades	Unknown (limited duration)	Negligible

Reoperation of the Molycorp Mine	Negligible	400 AFY
NextLight Silver State North and South Photovoltaic Power Plant (250-MW)	Unknown (limited duration)	Estimated 14 AFY
FirstSolar Photovoltaic Power Plant	Unknown (limited duration)	Estimated 6 to 30 AFY
Primm Outlet Mall New Fast-Food Restaurant To be located adjacent to the Primm Outlet Mall	Negligible	Estimated at 15 AFY

Sources: BSE2007a; BLM.

Water supply uses during construction of Ivanpah 1, 2, and 3 would be limited in duration and quantity. The applicant estimates that the annual average water demand during construction of Ivanpah 1 and 2 would be 111 AFY, and 217 AFY for Ivanpah 3, with up to an additional 47,000 gallons used for hydrostatic testing of the projects piping. Each power plant is estimated to take 24 months to complete.

During operation, the project would use groundwater for potable and plant processes at the rate of approximately 100 AFY. Over the next 50 years, the use of groundwater in the IVGB is expected to increase. However, the project's groundwater use would contribute only 1.8 percent to the existing and only 1.7 percent of the reasonable foreseeable cumulative pumping volume in the IVGB. Staff believes the project's proposed contribution to the cumulative groundwater pumping in the IVGB is not significant. Information provided in **Soil and Water Table 15** further supports staff's conclusion that the project's groundwater use would not result in a cumulative impact. The reasonably foreseeable groundwater use in the IVGB as presented in **Soil and Water Table 15** may increase nominally by 450 to 470 AFY. With this nominal increase, water use in the IVGB would not exceed the estimated annual recharge, and therefore, would not result in significant long-term impacts. For further analysis of potential cumulative impacts, see the section on Regional Groundwater Supply above.

COMPLIANCE WITH LORS

CLEAN WATER ACT

Staff has determined that the proposed project would satisfy the requirements of the RWQCB with the adoption of the following Conditions of Certification: 1) Development of the DESCP in accordance with **SOIL&WATER-1**; 2) Development of a Storm Water Damage Monitoring and Response Plan in accordance with **SOIL&WATER-5**; and 3) Compliance with wastewater discharge requirements in accordance with **SOIL&WATER-2** and as specified in Appendix B, C, and D. In addition, the applicant would be required to comply with California Department of Fish and Game's Streambed Alteration Agreement requirements in accordance with Condition of Certification **BIO-20**.

SWRCB RESOLUTION 75-58, ENERGY COMMISSION'S 2003 INTEGRATED ENERGY POLICY REPORT, AND THE WARREN-ALQUIST ACT

The California Energy Commission, under legislative mandate specified in the *2003 Integrated Energy Policy Report (IEPR)*, would approve the use of fresh water for cooling purposes by power plants it licenses only where alternative water supply sources and alternative cooling technologies are shown to be environmentally undesirable or economically unsound. SWRCB Resolution 75-78 states that fresh inland waters should only be used for power plant cooling if other sources or other methods of cooling would be environmentally undesirable or economically unsound. . The Warren-Alquist Act promotes all feasible means of water conservation. Each of the proposed power plants include a steam turbine using an air-cooled condenser, which achieves maximum water conservation associated with cooling. Therefore, the proposed project complies with the requirements of SWRCB Resolution 75-78, the Energy Commission's 2003 Integrated Energy Policy Report (IEPR), and the Warren-Alquist Act.

PUBLIC RESOURCES CODE, SECTIONS 25300 THROUGH 25302

Through compliance with Conditions of Certification **SOIL&WATER-4**, information required by staff to conduct assessments and forecasts of potable and industrial water consumption by power plants is achieved.

SAN BERNARDINO COUNTY ORDINANCE 3872 (CODE TITLE 3, DIVISION 3, CHAPTER 6, ARTICLE 5)

To help protect groundwater resources in San Bernardino County, the County enacted Ordinance 3872. This ordinance requires a permit to locate, construct, operate, or maintain a new groundwater well within the unincorporated, unadjudicated desert region of San Bernardino County. CEQA compliance must also be completed prior to issuance of a permit. The article does not apply to "groundwater wells located on Federal lands unless otherwise specified by inter-agency agreement." The BLM and County entered into a MOU that provides that the BLM will require conformance with Article 5 for all projects proposing to use groundwater from beneath public lands. The MOU provides that the County and BLM will work cooperatively together to ensure conformance with applicable LORs by project developers on BLM land. As part of meeting the requirements of the County's permitting process, the County may require the project owner to prepare a groundwater monitoring plan in accordance with the County's "*Guidelines for Preparation of a Groundwater Monitoring Plan*" dated January 1998. Condition of Certification **SOIL&WATER-6** would require the project owner to ensure that all onsite groundwater wells would be installed in accordance with the County of San Bernardino requirements and to submit a well construction packet to the County for comment and written evaluation. The project owner would also be required to submit well completion reports to the DWR in accordance with the DWR well completion reporting requirements.

NOTEWORTHY PUBLIC BENEFITS

Staff has not identified any noteworthy public benefits of the proposed project that are associated with soil and water resources.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

The agency and public comments that were received relating to soil and water resources and have been incorporated into this FSA section. A summary of those comments is presented below.

Lahontan Regional Water Quality Control Board
October 18, 2007 and October 25, 2007

Comment: The RWQCB identified site-specific and general RWQCB requirements for the proposed project and outlined the RWQCB's requirements for the project's proposed discharge of secondarily treated water for landscape irrigation.

> Response: These requirements have not been included because the applicant no longer proposes to use treated wastewater for landscape irrigation.

County of San Bernardino
October 25, 2007

Comment: The County of San Bernardino asked the Energy Commission to consider the groundwater quality and quantity impacts related to the proposed project.

> Response: Potential impacts to groundwater quality and quantity have been discussed in detail in this document. Staff has proposed Condition of Certification **Soil and Water-6**, which requires the applicant to develop a monitoring program to evaluate groundwater basin changes and integrate the program with the County's existing program for monitoring of groundwater extractions at the Primm Valley Golf Course. Please refer to the Project Water Supply sections for both project construction and operations for additional information.

Jenny Wilder
January 14, 2009

Comment: This comment concerned the proposed project's potential impact to groundwater volume and levels: "I am concerned about the use of the ground water for the ISEGS. The area is desert, where rain water is typically measured in inches, not feet ... How much ground water is available and how long is it expected to last without recharging? What will be the impact on the natural resources with a reduction in the ground table? Will the wells be metered? Bright Source must be held fully accountable for all the negative impacts to this beautiful area."

> Response: Groundwater is a resource that is available for development so long as its use is lawful and does not cause significant impacts to the environment. Staff estimated the volume of basin recharge and current and future outflows as shown in

Soil and Water Table 15. This table shows the average annual recharge in the basin exceeds estimated outflows, indicating that in average years, the basin volume of storage would increase and there would be no basin impacts. Staff has also proposed Condition of Certification **SOIL&WATER-4**, which would require the project's operational groundwater use be metered and limited to 100 AFY for construction and operation of the proposed project. As discussed in the text above, the project's proposed groundwater use would be in compliance with existing LORS and conditions developed to identify and mitigate potential impacts.

Defenders of Wildlife
January 23, 2009

Comment: This comment concerned the potential impact of the proposed project's groundwater use to ephemeral seeps and springs located in the Clark Mountains. These ephemeral seeps and springs are used by bighorn sheep as a seasonal water supply.

Response: The seeps and springs located in the Clark Mountain are ephemeral and located upgradient and over three miles away from the project's proposed pumping wells. The seeps and springs derive their water from precipitation further upgradient in the Clark Mountains and beyond the potential reach of any cone of depression that would result from the project's proposed groundwater pumping. No significant impact to the seeps or springs is expected.

In the **Biological Resources** section of this document, staff has concluded that construction and operation of the ISEGS project could reduce foraging opportunities for bighorn on the alluvial fan. Implementation of staff's proposed Condition of Certification **BIO-19** would compensate for the project's contributions to cumulative impacts to bighorn sheep by creation of a new water source in the eastern part of the Clark Mountain range or in the State Line Hills, outside of designated wilderness. This artificial water source would attract bighorn sheep and expand foraging opportunities in the lower elevations of the mountains to replace areas of the alluvial fan lost to ISEGS facilities and the zone of disturbance on the north. This water source would also serve to attract the bighorn during seasonal movements and keep them in the mountainous portion of the wildlife corridor.

The Wilderness Society and Natural Resources Defense Council
January 23, 2009

Comment: Wilderness Society and Natural Resources Defense Council support the inclusions of conditions of certification to ensure that BMPs are in place to mitigate soil wind and water erosion. Their comment also expressed the need for analysis of the construction potable water supply and potential impact of the project's groundwater pumping could have to the potential migration of brackish groundwater from beneath the Ivanpah playa.

Response: The construction potable (primarily drinking) water supply would be purchased and brought onto the project site by construction contractors. The primary water supply used during construction for initial dust control and compaction would be groundwater from the two onsite wells. The potential migration of the brackish

groundwater from beneath the Ivanpah playa has been modeled by the applicant. Staff asked the applicant to further analyze the potential for brackish groundwater migration and associated impacts. The additional groundwater modeling by the applicant included the combined effect of groundwater pumping for the proposed project in combination with groundwater pumping for the Primm Valley Golf Club. The modeling showed that there would be no significant impact as a result of this pumping. Water quality monitoring from 1997 to 2007 also shows there has been little change in water quality due to current groundwater pumping. Staff concurs with the applicant's analysis. Please refer to the Groundwater Quality section for more information.

Craig Deutsche
January 21, 2009

Comment: This comment states that trying to complete a staff assessment without all of the data seems unsupportable.

Response: Staff has now acquired most of the information needed to produce this FSA/DEIS. Outstanding information needed by staff is itemized in the Conclusions section.

Basin and Range Watch
January 31, 2009

Comment: Would the use of herbicides create a risk of impact to the groundwater?

Response: Herbicides would be used in accordance with a Weed Management Plan developed for the proposed project and BLM-approved standards and would be in accordance with **Biological Resources** Condition of Certification **BIO-13**. These plans are designed to mitigate any potential impacts. The risk of impact to the groundwater would not be significant.

Comment: Would recycled sanitary wastewater used in landscape irrigation seep into groundwater and pollute desert tortoise habitat?

Response: The sanitary wastewater system has been changed by the applicant from a package treatment plant to a septic tank and leach field system. This system would be constructed in accordance with existing LORS and would not significantly impact desert tortoise habitat. Please see the **Biological Resources** section for further analysis of potential impacts to desert tortoise habitat.

Comment: Would there be any toxins or pollutants in the evaporation ponds at each of the projects three phases (Ivanpah 1, 2, and 3) that possibly may harm birds or wildlife and will these evaporation ponds have liners?

Response: The concrete holding basins would only be used on a temporary or emergency basis. Wastewater would not normally be discharged to these basins. Events that could trigger use of the basin include: temporarily holding of hydrostatic test water and emergency outfall from one of the plant processes. Any water discharged to the basins would be treated as appropriate and reused, or disposed of

as required by applicable regulations. Please refer to the **Biological Resources** and **Waste Management** sections for more information.

Comment: Has the applicant provided a sedimentation analysis to the Energy Commission?

Response: In May 2009, the applicant completed a storm water runoff and sediment transport report and docketed this report in May 19, 2009 as part of Data Response, Set 2I (CH2ML2009d).

Comment: How will large floods be managed and would hazardous waste be released across desert tortoise habitat?

Response: Storm water management design would allow most of the storm water to follow the existing naturally developed storm water drainage. Storm water flow would be diverted around the power blocks and administration building area. Hazardous waste generated during construction and plant operations would be properly transported, handled, contained and disposed in accordance with BMPs developed for the proposed project and project specific conditions of certification in the **Hazardous Waste** and **Waste Management** sections, and in compliance with LORS.

Comment: Will this amount of water use combined with other projects in Ivanpah Valley such as the Primm Golf Course negatively impact groundwater resources used by desert plants, succulents, animals, nearby springs?

Response: The project's proposed groundwater use, when combined with other groundwater uses in the Ivanpah Valley, would not cause a significant impact to desert plants, succulents, animals, or nearby springs. As discussed above, the mountain springs would be unaffected by the project's use of groundwater. Please refer to the Local Groundwater Supply and Cumulative Impacts and Mitigation section for more information.

Comment: Ivanpah Valley is already overdrafted from groundwater pumping. How does this justify pumping even more water in an arid region?

Response: Staff analysis of the groundwater basin balance indicates the current and future annual water use does not exceed average annual groundwater recharge (please see **Soil and Water Table 12** and **15**). Water level declines that have been observed appear to be due to drawdown around existing wells. These declines do not necessarily suggest that there is a net loss in basin storage. The project's proposed groundwater use would comply with conditions of certification and existing LORS. The project's use of groundwater individually or cumulatively would not significantly impact the quantity of groundwater in the Ivanpah Valley. To ensure there are no impacts, staff has recommended Conditions of Certification **SOIL&WATER-3**, **-4**, and **-6**. Please refer to the Cumulative Impacts and Mitigation section for more information.

Comment: How will herbicide spraying be controlled so that toxins do not blow into adjacent deserts or accumulate in dust that blows into desert habitats nearby during windstorms.

Response: Herbicides would be used in accordance with a Weed Management Plan as would be developed according to **Biological Resources** Condition of Certification **BIO-13** for the proposed project and in accordance with BLM-approved standards. This plan considers potential for wind dispersion and addresses these types of potential impacts.

Lynn Davis
February 4, 2009

Comment: The comment concerns accelerated water loss when California needs a sustainable, long-range water conservation strategy.

Response: The proposed project's water use has been analyzed for both local and cumulative water quality and water quantity impacts. No significant impacts to the water quantity and quality are expected to occur. Please refer to the Cumulative Impacts and Mitigation section for more information. Further, the applicant proposes to use dry cooling for each of the three power plants, which does not require water as would an evaporative cooling process. The proposed water use is consistent with water conservation policies of the SWRCB and Energy Commission, and other applicable LORS.

CONCLUSIONS

With the information provided to date, staff have determined that construction, operation, and decommissioning of the proposed project could potentially impact soil and water resources. Where these potential impacts have been identified, staff has proposed mitigation measures to reduce identified impacts to levels that are less than significant. The mitigation measures, as well as specifications for LORS conformance, are included herein as conditions of certification. Conditions of Certification referred to herein serve the purpose of both the Energy Commission's Conditions of Certification for purposes of the CEQA and BLM's Mitigation Measures for purposes of the NEPA. With these mitigation measures implemented, the project would conform with all applicable LORS. Staff's conclusions based on analysis of the information submitted to-date are as follows:

1. The proposed project would be located on an alluvial fan where flash flooding and mass erosion could impact the project. Project-related changes to the alluvial fan hydrology could result in impacts to adjacent land users and the Ivanpah playa. The applicant completed a hydrologic study and modeling of the alluvial fan. Based on this work and subsequent confirmatory and sensitivity modeling conducted by the BLM, scour analyses have been performed to support development of a project design that can withstand flash flood flows with minimal damage to site structures and heliostats. In addition, a DESCP has been developed to mitigate the potential storm water and sediment project-related impacts. However, the calculations and assumptions used to evaluate potential storm water and sedimentation impacts are

imprecise and have limitations and uncertainties associated with them. Given the uncertainty associated with the calculations, the magnitude of potential impacts that could occur cannot be determined precisely. As discussed in the Biological Resources and Recreation sections, the potential effects associated with storm water and sedimentation impacts could adversely affect habitat for a threatened species (the desert tortoise), as well as recreational use of Ivanpah Playa. Should these impacts occur, they would likely be highly controversial. Based on these factors, the proposed project could result in impacts that would be significant respect to CEQA significance criteria specified herein and NEPA significance criteria specified in 40 CFR 1508.27 Therefore, Condition of Certification **SOIL&WATER-5** has been developed that defines monitoring, inspection, and damage response requirements, as well as standards and procedures for re-considering the proposed storm water management approach if needed in the future.

2. The proposed project would use an air-cooled condenser for heat rejection and would recycle process wastewater from all plant equipment, including boilers and water treatment equipment, to the extent practicable. Recycling the wastewater would maximize reuse of process water and conserve freshwater. Use of this technology would substantially reduce water use and is consistent with water policy and the constitutional requirement that State water resources be put to beneficial use to the fullest extent possible.

3. Impacts to groundwater supply and quality would be less than significant. In the Ivanpah Valley Groundwater Basin, two substantial components of the basin's water balance are groundwater recharge through precipitation and groundwater loss through well pumping. Both precipitation and pumping in the basin will vary over the 50-year life of the proposed project. To ensure that the project's proposed use of groundwater does not significantly impact the beneficial uses and users of the groundwater in the basin, staff believes the project should become part of the existing groundwater monitoring and reporting program developed by San Bernardino County for the Primm Valley Golf Club. Substantial changes to groundwater levels caused by the proposed project would be documented by this monitoring and reporting program in accordance with Condition of Certification **SOIL&WATER-6**.

Completion of staff's analysis of the proposed project is subject to the following:

- Satisfactory completion of the heliostat pole installation testing by the applicant to either confirm or update its current installation plans followed by further evaluation by staff of whether there would be any impacts related to the method of construction or failure of the heliostats due to storm water flows.

MITIGATION MEASURES/PROPOSED CONDITIONS OF CERTIFICATION

DRAINAGE EROSION AND SEDIMENTATION CONTROL PLAN

SOIL & WATER-1: Prior to site mobilization, the project owner shall obtain both BLM's Authorized Officer and the CPM's approval for a site specific DESCP that

ensures protection of water quality and soil resources of the project site and all linear facilities for both the construction and operation phases of the project. This plan shall address appropriate methods and actions, both temporary and permanent, for the protection of water quality and soil resources, demonstrate no increase in off-site flooding potential, and identify all monitoring and maintenance activities. The project owner shall complete all necessary engineering plans, reports, and documents necessary for both BLM's Authorized Officer and the CMP to conduct a review of the proposed project and provide a written evaluation as to whether the proposed grading, drainage improvements, and flood management activities comply with all requirements presented herein. The plan shall be consistent with the grading and drainage plan as required by Condition of Certification **CIVIL-1** and shall contain the following elements:

Vicinity Map: A map shall be provided indicating the location of all project elements with depictions of all major geographic features to include watercourses, washes, irrigation and drainage canals, major utilities, and sensitive areas.

Site Delineation: The site and all project elements shall be delineated showing boundary lines of all construction areas and the location of all existing and proposed structures, underground utilities, roads, and drainage facilities. Adjacent property owners shall be identified on the plan maps. All maps shall be presented at a legible scale

Drainage: The DESCP shall include the following elements:

a. Topography. Topography for offsite areas are required to define the existing upstream tributary areas to the site and downstream to provide enough definition to map the existing storm water flow and flood hazard. Spot elevations shall be required where relatively flat conditions exist.

b. Proposed Grade. Proposed grade contours shall be shown at a scale appropriate for delineation of onsite ephemeral washes, drainage ditches, and tie-ins to the existing topography.

c. Hydrology. Existing and proposed hydrologic calculations for onsite areas and offsite areas that drain to the site; include maps showing the drainage area boundaries and sizes in acres, topography and typical overland flow directions, and show all existing, interim, and proposed drainage infrastructure and their intended direction of flow.

d. Hydraulics. Provide hydraulic calculations to support the selection and sizing of the onsite drainage network, diversion facilities and BMPs.

Watercourses and Critical Areas: The DESCP shall show the location of all onsite and nearby watercourses including washes, irrigation and drainage canals, and drainage ditches, and shall indicate the proximity of those features to the construction site. Maps shall identify high hazard flood prone areas.

Clearing and Grading: The plan shall provide a delineation of all areas to be cleared of vegetation, areas to be preserved, and areas where vegetation would be cut to allow clear movement of the heliostats. The plan shall provide elevations, slopes, locations, and extent of all proposed grading as shown by contours, cross-sections, cut/fill depths or other means. The locations of any disposal areas, fills, or other special features shall also be shown. Existing and proposed topography tying in proposed contours with existing topography shall be illustrated. The DESCP shall include a statement of the quantities of material excavated at the site, whether such excavations or fill is temporary or permanent, and the amount of such material to be imported or exported or a statement explaining that there would be no clearing and/or grading conducted for each element of the project. Areas of no disturbance shall be properly identified and delineated on the plan maps.

Soil Wind and Water Erosion Control: The plan shall address exposed soil treatments to be used during construction and operation of the proposed project for both road and non-road surfaces including specifically identifying all chemical based dust palliatives, soil bonding, and weighting agents appropriate for use at the proposed project site that would not cause adverse effects to vegetation; BMPs shall include measures designed to prevent wind and water erosion including application of chemical dust palliatives after rough grading to limit water use. All dust palliatives, soil binders, and weighting agents shall be approved by both BLM's Authorized Officer and the CPM prior to use.

Project Schedule: The DESCP shall identify on the topographic site map the location of the site-specific BMPs to be employed during each phase of construction (initial grading, project element construction, and final grading/stabilization). Separate BMP implementation schedules shall be provided for each project element for each phase of construction.

Best Management Practices: The DESCP shall show the location, timing, and maintenance schedule of all erosion- and sediment-control BMPs to be used prior to initial grading, during project element excavation and construction, during final grading/stabilization, and after construction. BMPs shall include measures designed to control dust and stabilize construction access roads and entrances. The maintenance schedule shall include post-construction maintenance of treatment-control BMPs applied to disturbed areas following construction.

Erosion Control Drawings: The erosion-control drawings and narrative shall be designed, stamped and sealed by a professional engineer or erosion-control specialist.

Agency Comments: The DESCP shall include copies of recommendations, conditions, and provisions from the County of San Bernardino, California Department of Fish and Game (CDFG), and Lahontan Regional Water Quality Control Board (RWQCB).

Monitoring Plan: Monitoring activities shall include routine measurement of the volume of accumulated sediment in the onsite drainage ditches, and

storm water diversions and the requirements specified in Appendix B, C, and D.

Verification: The DESCP shall be consistent with the grading and drainage plan as required by Condition of Certification **CIVIL-1**, and relevant portions of the DESCP shall clearly show approval by the chief building official (CBO). In addition, the project owner shall do all of the following:

a. No later than ninety (90) days prior to start of site mobilization, the project owner shall submit a copy of the DESCP to the County of San Bernardino, the RWQCB, the BLM's authorized officer, and CMP for review and comment. Both BLM's Authorized Officer and the CPM shall consider comments received from San Bernardino County and RWQCB.

b. During construction, the project owner shall provide an analysis in the monthly compliance report on the effectiveness of the drainage-, erosion- and sediment-control measures and the results of monitoring and maintenance activities.

c. Once operational, the project owner shall provide in the annual compliance report information on the results of storm water BMP monitoring and maintenance activities.

d. Provide BLM's Authorized Officer and the CPM with two (2) copies each of all monitoring or other reports required for compliance with San Bernardino County, CDFG, and RWQCB.

WASTE DISCHARGE REQUIREMENTS

SOIL&WATER-2: The project owner shall comply with the requirements specified in Appendix B, C, and D for dredge and fill, wastewater, and storm water discharges associated with construction and industrial activity. The project owner shall develop, obtain both BLM's Authorized Officer and CPM approval of, and implement a construction Storm Water Pollution Prevention Plan (SWPPP) for the construction of the project and an Industrial SWPPP for operation of the project.

Verification: At least sixty (60) days prior to construction, the project owner shall submit to both BLM's Authorized Officer and the CPM a copy of the construction SWPPP for construction of the project for review and approval. **Verification**: At least sixty (60) days prior to commercial operation, the project owner shall submit to both BLM's Authorized Officer and the CPM a copy of the Industrial SWPPP for operation of the project for review and approval prior to commercial operation. The project owner shall retain a copy on site. The project owner shall submit copies to both BLM's Authorized Officer and the CPM of all correspondence between the project owner and the RWQCB regarding the WDRs for discharge of storm water associated with construction and industrial activity within ten (10) days of its receipt or submittal. Copies of correspondence shall include the Notice of Intent sent by the project owner to the SWRCB.

PROJECT GROUNDWATER WELLS

SOIL&WATER-3: Pre-Well Installation. The project owner shall construct and operate up to two onsite groundwater wells that produce water from the IVGB. The project owner shall ensure that the wells are completed in accordance with all applicable state and local water well construction permits and requirements. Prior to initiation of well construction activities, the project owner shall submit a well construction packet to the County of San Bernardino, in accordance with the County of San Bernardino Code Title 2, Division 3, Chapter 6, Article 5, containing all documentation, plans, and fees normally required for the county's well permit, with copies to both BLM's Authorized Officer and the CPM. The project shall not construct a well or extract and use groundwater until the County of San Bernardino provides a written concurrence that the proposed well construction and operation activities would comply with all applicable county well requirements, and both BLM's Authorized Officer and the CPM provides approval to construct and operate the well.

Post-Well Installation. The project owner shall provide documentation to both BLM's Authorized Officer and the CPM that the well has been properly completed. In accordance with California's Water Code section 13754, the driller of the well shall submit to the DWR a Well Completion Report for each well installed. The project owner shall ensure the Well Completion reports are submitted. The project owner shall ensure compliance with all county water well standards and requirements for the life of the wells and shall provide BLM's Authorized Officer and the CPM with two (2) copies each of all monitoring or other reports required for compliance with the County of San Bernardino water well standards and operation requirements, as well as any changes made to the operation of the well.

Verification: The project owner shall do all of the following:

1. No later than sixty (60) days prior to the construction of the onsite groundwater wells, the project owner shall submit to both BLM's Authorized Officer and the CPM a copy of the water well construction packet submitted to the County of San Bernardino.

2. No later than thirty (30) days prior to the construction of the onsite water supply wells, the project owner shall submit a copy of written concurrence received from the County of San Bernardino that the proposed well construction activities comply with all county well requirements and meet the requirements established by the county's water well permit program.

3. No later than sixty (60) days after installation of each well at the project site, the project owner shall ensure that the well driller submits a Well Completion Report to the DWR with a copy provided to both BLM's Authorized Officer and the CPM. The project owner shall submit to the CPM together with the Well Completion Report a copy of well drilling logs, water quality analyses, and any inspection reports.

4. During well construction and for the operational life of the well, the project owner shall submit two (2) copies each to BLM's Authorized Officer and the CPM of any

proposed well construction or operation permit changes within ten (10) days of submittal to or receipt from the County of San Bernardino.

5. No later than fifteen (15) days after completion of the onsite water supply wells, the project owner shall submit documentation to BLM's Authorized Officer, the CPM, and the RWQCB that well drilling activities were conducted in compliance with Title 23, California Code of Regulations, Chapter 15, Discharges of Hazardous Wastes to Land, (23 CCR, sections 2510 et seq.) requirements and that any onsite drilling sumps used for project drilling activities were removed in compliance with 23 CCR section 2511(c).

CONSTRUCTION AND OPERATIONS WATER USE

SOIL&WATER-4: The project owner proposes to construct and operate the project in phases, beginning with Ivanpah 1, then Ivanpah 2, and ending with Ivanpah 3. The proposed project's use of groundwater during each year of construction shall not exceed more than the following:

A. 200 AFY during the construction of either Ivanpah 1 or 2; and
250 AFY for all construction and operations activities shall not exceed 100 acre-feet per year. Prior to the use of groundwater for construction, the project owner shall install and maintain metering devices as part of the water supply and distribution system to document project water use and to monitor and record in gallons per day the total volume(s) of water supplied to the project from this water source. The metering devices shall be operational for the life of the project.

Verification: Beginning six (6) months after the start of construction, the project owner shall prepare a semi-annual summary of amount of water used for construction purposes. The summary shall include the monthly range and monthly average of daily water usage in gallons per day.

At least sixty (60) days prior to the start of construction of the proposed project, the project owner shall submit to both BLM's Authorized Officer and the CPM a copy of evidence that metering devices have been installed and are operational.

The project owner shall prepare an annual summary, which will include daily usage, monthly range and monthly average of daily water usage in gallons per day, and total water used on a monthly and annual basis in acre-feet. For years subsequent to the initial year of operation, the annual summary will also include the yearly range and yearly average water use by source. For calculating the total water use, the term "year" will correspond to the date established for the annual compliance report submittal.

STORM WATER DAMAGE MONITORING AND RESPONSE PLAN

SOIL&WATER-5: The project owner shall ensure that all heliostats are designed to withstand storm water scour of up to 6.5 feet or greater as estimated by a Pylon Insertion Depth and Heliostat Stability Report to be completed by the applicant. The project owner shall also develop a Storm Water Damage Monitoring and Response Plan to evaluate potential impacts from storm water, including heliostats that fail due to storm water flow or otherwise break

and scatter mirror debris on to the ground surface. The Storm Water Damage Monitoring and Response Plan shall include the following elements:

- Detailed maps showing the installed location of all heliostats within each project phase.
- Each heliostat should be identified by a unique ID number marked to show initial ground surface at its base, and the depth of the pylon below ground.
- Minimum Depth Stability Threshold to be maintained of pylons to meet long-term stability for applicable wind, water and debris loading effects;
- Above and below ground construction details of a typical installed heliostat.
- BMPs to be employed to minimize the potential impact of broken mirrors to soil resources.
- Methods and response time of mirror cleanup and measures that may be used to mitigate further impact to soil resources from broken mirror fragments.
- Monitoring, documenting, and restoring the Ivanpah playa surface when impacted by sedimentation or broken mirror shards.

Monitor and Inspect Periodically, Before First Seasonal and After Every Storm Event:

- Security and Tortoise Exclusion Fence: Inspect for damage and buildup of sediment or debris
- Heliostats within Drainages or subject to drainage overflow: Inspect for tilting, mirror damage, depth of scour compared to pylon depth below ground and the Minimum Depth Stability Threshold, collapse, and downstream transport.
- Drainage Channels: Inspect for substantial migration or changes in depth, and transport of broken glass.
- Constructed Diversion Channels: Inspect for scour and structural integrity issues caused by erosion, and for sediment and debris buildup.
- Ivanpah Playa Surface: Inspect for changes in the surface texture and quality from sediment buildup, erosion, or broken glass.

Short-Term Incident-Based Response:

- Security and Tortoise Exclusion Fence: repair damage, and remove built-up of sediment and debris.
- Heliostats: Remove broken glass, damaged structure, and wiring from the ground, and for pylons no longer meeting the Minimum Depth Stability Threshold, either replace/reinforce or remove the mirrors to avoid exposure for broken glass.
- Drainage Channels: no short-term response necessary unless changes indicate risk to facility structures.

- Constructed Diversion Channels: repair damage, maintain erosion control measures and remove built-up sediment and debris.

Long-Term Design-Based Response:

- Propose operation/BMP modifications to address ongoing issues. Include proposed changes to monitoring and response procedures, frequency, or standards.
- Replace/reinforce pylons no longer meeting the Minimum Depth Stability Threshold or remove the mirrors to avoid exposure for broken glass.
- Propose design modifications to address ongoing issues. This may include construction of active storm water management diversion channels and/or detention ponds.

Inspection, short-term incident response, and long-term design-based response may include activities both inside and outside of the approved right-of-way. For activities outside of the approved right-of-way, the applicant will notify BLM and acquire environmental review and approval before field activities begin.

Verification: At least sixty (60) days prior to commercial operation, the project owner shall submit to both BLM's Authorized Officer and the CPM a copy of the Storm Water Damage Monitoring and Response Plan for review and approval prior to commercial operation. The project owner shall retain a copy of this plan onsite at the power plant at all times. The project owner shall prepare an annual summary of the number of heliostats failed, cause of the failure, and cleanup and mitigation performed for each failed heliostat.

GROUNDWATER LEVEL MONITORING AND REPORTING PLAN

SOIL&WATER-6: The project owner shall submit a Groundwater Level Monitoring and Reporting Plan to San Bernardino County for review and both BLM's Authorized Officer and the CPM for review and approval in accordance with the County of San Bernardino Code Title 2, Division 3, Chapter 6, Article 5 (Desert Groundwater Management Ordinance). The Groundwater Level Monitoring and Reporting Plan shall provide detailed methodology for monitoring background and site groundwater levels. Monitoring shall include pre-construction, construction, and project operation water use. The primary objective for the monitoring is to establish pre-construction and project related groundwater level trends that can be quantitatively compared against observed and simulated trends near the project pumping well and near potentially impacted existing wells.

Prior to project construction, monitoring shall commence to establish pre-construction base-line conditions and shall incorporate the existing monitoring and reporting data collected for the Primm Valley Golf Club. The monitoring network shall be designed to incorporate the ongoing monitoring and reporting program established for the Primm Valley Golf Course. The

monitoring plan and network may make use of existing wells in the basin that would satisfy the requirements for the monitoring program.

Verification: The project owner shall complete the following:

1. At least six (6) months prior to construction, a Groundwater Level Monitoring and Reporting Plan shall be submitted to the County of San Bernardino for review and comment, and a copy of the County's comments and the plan shall be submitted to both BLM's Authorized Officer and the CPM for review and approval. The plan shall include a scaled map showing the site and vicinity, existing well locations, and proposed monitoring locations (both existing wells and new monitoring wells proposed for construction). The map shall also include relevant natural and man-made features (existing and proposed as part of this project). The plan also shall provide: (1) well construction information and borehole lithology for each existing well proposed for use as a monitoring well; (2) description of proposed drilling and well installation methods; (3) proposed monitoring well design; and, (4) schedule for completion of the work.

2. At least four (4) months prior to construction, a Well Monitoring Installation and Groundwater Level Network Report shall be submitted to both BLM's Authorized Officer and the CPM. The report shall include a scaled map showing the final monitoring well network. It shall document the drilling methods employed, provide individual well construction as-builds, borehole lithology recorded from the drill cuttings, well development, and well survey results. The well survey shall measure the location and elevation of the top of the well casing and reference point for all water level measurements, and shall include the coordinate system and datum for the survey measurements. Additionally, the report shall describe the water level monitoring equipment employed in the wells and document their deployment and use.

3. As part of the monitoring well network development, all newly constructed monitoring wells shall be permitted and constructed consistent with San Bernardino County and State specifications.

4. At least three (3) months prior to project construction, all water level monitoring data shall be provided to both BLM's Authorized Officer and the CPM. The data transmittal shall include an assessment of pre-project water level trends, a summary of available climatic information (monthly average temperature and rainfall records from the nearest weather station), and a comparison and assessment of water level data relative to the assumptions and spatial trends simulated by the applicant's groundwater model.

5. After project construction and during project operations, the project owner shall submit the monitoring data annually to both BLM's Authorized Office and the CPM. The summary shall document water level monitoring methods, the water level data, water level plots, and a comparison between pre- and post-project start-up water level trends. The report shall also include a summary of actual water use conditions, monthly climatic information (temperature and rainfall), and a comparison and assessment of water level data relative to the assumptions and spatial trends simulated by the applicant's groundwater model.

WASTEWATER COLLECTION SYSTEM REQUIREMENTS

SOIL&WATER-7: The project owner shall recycle and reuse all process wastewater streams to the extent practicable. Prior to transport and disposal of any facility operation wastewaters that are not suitable for treatment and reuse onsite, the project owner shall test and classify the stored wastewater to determine proper management and disposal requirements. The project manager shall ensure that the wastewater is transported and disposed of in accordance with the wastewater's characteristics and classification and all applicable LORS (including any CCR Title 22 Hazardous Waste and Title 23 Waste Discharges to Land requirements).

Verification: Prior to transport and disposal of any facility operation wastewaters that are not suitable for treatment and reuse onsite, the project owner shall test and classify the stored wastewater to determine proper management and disposal requirements. The project manager shall ensure that the wastewater is transported and disposed of in accordance with the wastewater's characteristics and classification and all applicable LORS (including any CCR Title 22 Hazardous Waste and Title 23 Waste Discharges to Land requirements).

SEPTIC SYSTEM AND LEACH FIELD REQUIREMENTS

SOIL&WATER-8: Prior to the start of construction, the project owner shall comply with the County of San Bernardino and Appendix B, C, and D requirements for the construction and operation of the project's proposed sanitary waste septic system and leach field. Project construction shall not proceed until documentation equivalent to the County's required wastewater treatment system permits are issued by the County and approved by both BLM's Authorized Officer and the CPM. The project owner shall remain in compliance with the County requirements for the life of the project.

Verification: The project owner will submit all necessary information and the appropriate fee to the County of San Bernardino to ensure that the project has complied with the County's and Appendix B, C, and D sanitary waste disposal facilities requirements. A written assessment prepared by the County of San Bernardino of the project's compliance with these requirements must be provided to the CPM sixty (60) days prior to the start of operation.

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SOIL AND WATER RESOURCES - Appendix A

Acronyms Used in the Soil and Water Resources Section

amsl	above mean sea level	IEPR	Integrated Energy Policy Report
AF	acre-feet	ISEGS	Ivanpah Solar Electric Generating System
AFY	acre-feet per year	IVGB	Ivanpah Valley Groundwater Basin
BLM	Bureau of Land Management	lbs	pounds
bgs	below ground surface	LID	Low Impact Development
BMP	Best Management Practices	LORS	laws, ordinances, regulations, and standards
CDPH	California Department of Public Health	MCL	maximum contaminant level
CEQA	California Environmental Quality Act	mg/l	milligrams per liter
cfs	cubic feet per second	mph	miles per hour
CPM	Compliance Project Manager	MOU	Memorandum of Understanding
DESCP	Drainage, Erosion, and Sediment Control Plan	MW	megawatt
DTSC	Department of Toxic Substances Control	NEPA	National Environmental Policy Act
DWR	Department of Water Resources	NPDES	National Pollutant Discharge Elimination System
ESA	Environmental Site Assessment	RCRA	Resource Conservation and Recovery Act
FEMA	Federal Emergency Management Agency	REC	Recognized Environmental Condition
ft/day	feet per day	ROC	Record of Conversation
fps	feet per second	RWQCB	Regional Water Quality Control Board
FSA	Final Staff Assessment	SWPPP	Storm Water Pollution Prevention Plan
ft/ft	feet per foot	SWRCB	State Water Resources Control Board
ft/yr	feet per year	TDS	total dissolved solids
gpd	gallons per day	µS/cm	microsiemens per centimeter
gpd/ft	gallons per day per foot	USCS	Unified Soil Classification System
gpm	gallons per minute	WWTP	wastewater treatment plant

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SOIL AND WATER RESOURCES - Appendix B

FACTS FOR WASTEWATER DISCHARGE

1. Reason for Action and Regulatory Authority

   The applicant filed an Application for Certification (AFC) with the California Energy Commission (Energy Commission) on August 31, 2007. The AFC proposed the construction and operation of the Ivanpah Solar Electric Generating System (ISEGS) project in the Ivanpah Valley in San Bernardino County, California. In conjunction with ISEGS project construction, the applicant proposes to discharge wastes, dredged, and/or fill material to State waters. Additionally, construction and operation of the ISEGS project would have the potential to impact water quality via storm water runoff.

   Under the Warren-Alquist Act, and Governor's Executive Order S-14-08, the Energy Commission has the authority to streamline permitting for renewable energy generation facilities. The Lahontan Regional Water Quality Control Board (Lahontan RWQCB) requirements for this project would be issued to the applicant through the Energy Commission's certification process.

   In a May 28, 2009 letter, the U.S. Army Corps of Engineers determined that the drainages on the site are not waters of the United States (U.S.). However, the drainages affected by the Project are waters of the State, as defined by California Water Code (Water Code) section 13050, and are subject to State requirements in accordance with Water Code section 13260 and to the Water Quality Control Plan for the Lahontan Region (Basin Plan). All actions impacting or potentially impacting these drainages, including dredge and fill activities and construction and industrial activities, would be regulated through these requirements, which would be incorporated in the Energy Commission's certification process.

2. Waste Discharge Requirements History

   The ISEGS project would be a new facility. There are no previous Lahontan RWQCB actions for the ISEGS project or location. The *Facts, Requirements,* and *Surface Water Monitoring and Reporting Program* for waste discharge address storm water, dredge and fill, and groundwater requirements for the proposed ISEGS project are presented herein.

3. Climate

   The Mojave Desert has a typical desert climate, i.e., extreme daily temperature changes, low annual precipitation, strong seasonal winds, and mostly clear skies. The annual highest temperature in the Mojave Desert exceeds 100 degrees Fahrenheit. Winter temperatures are more moderate, with mean maximum temperatures in the 60s and lows in the 30s. For the period of 1971 to 2000, the average annual precipitation in the vicinity of the ISEGS project ranged from 5 to 7 inches. Most of the precipitation occurs between December and March. However, occasional heavy precipitation occurs in the summer due to thunderstorms.

4. Site Geology

   a. Setting

      The ISEGS project would be located in the Basin and Range Geomorphic Province, which is characterized by an extensional tectonic regime, i.e., block-faulted mountain ranges separated by down-dropped, sediment filled basins. The proposed project site is on the western flank of the Ivanpah Valley in the eastern Mojave Desert. Ivanpah Valley is an elongate, internally draining, structural basin, which extends north into Las Vegas Valley. The ISEGS project would be situated on the mid portion of a bajada (a broad apron of coalesced alluvial fans) on the east side of the Clark Mountains.

   b. Faulting and Seismicity

      The active northwest-trending State Line, Ivanpah, and Clark Mountain faults transect the Ivanpah Valley.

   c. Soils

      The proposed ISEGS project surface is covered by coarse-grained, gravelly soils that are characterized by the Natural Resource Conservation Service as well drained to excessively well drained with negligible to medium runoff potential.

5. Groundwater

   The Ivanpah Valley is underlain by the Ivanpah Valley Groundwater Basin (Department of Water Resources Basin No. 6-30). The north-south trending basin extends into Nevada and includes Jean Lake Valley at its northern extent. It is bounded by bedrock mountains, which have shed the detritus that forms the unconsolidated alluvial deposits of the basin. These deposits appear to extend to depths of 8,000 feet or more near the axis of the basin.

   Groundwater in the basin appears to be largely unconfined. In the vicinity of the ISEGS project, the depth to groundwater ranges from approximately 200 to 700 feet below ground surface. The shallower depth to groundwater occurs in the topographically lowest portion of the proposed ISEGS project, near Ivanpah Lake. In the western portion of the proposed ISEGS project area, which is topographically higher on the bajada, the depth to groundwater is the greatest. The groundwater flow direction is generally east toward Ivanpah Lake.

   Groundwater quality in the groundwater basin is generally good, although total dissolved solids (TDS) can be high in some areas. TDS at the ISEGS project site is estimated to be between 300 to 600 milligrams per liter (mg/L). TDS levels increase in the proximity of Ivanpah Lake.

   The applicant plans to install two groundwater wells and to use the wells to supply water during construction and operation. The ISEGS project would use a dry-cooling technology to avoid the use of water for power plant cooling.

6. Surface Water and Storm Water

Ivanpah Valley is an arid, internally draining basin. In the southern portion of the valley, surface water flow is toward Ivanpah Lake, a predominately dry lakebed. Numerous ephemeral channels (i.e., washes) drain from the Clark Mountains, across the bajada surface where the ISEGS project would be located, and terminate at Ivanpah Lake. The ephemeral washes are characterized by natural processes that, to varying degrees, support native desert wash vegetation and provide wildlife habitat.

Surface water drainage at the proposed ISEGS project area is a complex network of interconnected or anastomosing channels. The channels represent ephemeral washes that only flow when storm events generate runoff from the Clark Mountains. During such events, the proposed ISEGS project site can be subject to flash flooding and mass erosion. A hydrologic study and modeling performed by the applicant and the U. S. Bureau of Land Management (BLM) found that the 100-year flood event would inundate most of the proposed ISEGS project area through canalized and sheet flows, and would be primarily erosive in nature.

7. Land Uses and Existing Site Conditions

The proposed ISEGS project site and adjacent areas are federal lands managed by the BLM's California Desert District and are used for low intensity livestock grazing. The Primm Valley Golf Club is approximately 0.5 miles east of the proposed ISEGS project area.

The 4,073-acre ISEGS project consists of a relatively undisturbed Mojave creosote bush scrub environment, which supports a diversity of plant communities and a high diversity of wildlife, including the Federal and State Endangered desert tortoise.

8. Description of Dredge and Fill Impacts to State Waters

The ISEGS project involves the proposed discharge of structural materials and/or earthen wastes (fill) as described in Table 1.

SOIL AND WATER RESOURCES APPENDIX B - TABLE 1
Dredge and Fill Impacts to Waters of the State*

		Linear Impacts[4] (feet):	Impact Area (acres)	Fill Volume (cubic yards)	Dredge Volume (cubic yards)
30-foot-wide asphalt roads (including 3-foot shoulder)	Amount	11,639	---	---	---
	Temporary[1]		0.995	0	0
	Long-term[2]		0.5	806	806
	Permanent[3]		1.346	2,172	2,172
24-foot-wide asphalt roads	Amount	4,433	---	---	---
	Temporary		0.13	0	0
	Long-term		0.31	500	500
	Permanent		0.059	95	95
15-foot-wide dirt roads	Amount	2,022	---	---	---
	Temporary		0	0	0
	Long-term		0.192	0	0
	Permanent		0	0	0
12-foot-wide dirt roads	Amount	16,171	---	---	---
	Temporary		0.154	0	0
	Long-term		2.19	0	0
	Permanent		0.113	0	0
12-foot-wide rerouted trails	Amount	1,194	---	---	---
	Temporary		0	0	0
	Long-term		0.061	0	0
	Permanent		0.188	0	0
12-foot-wide gravel road	Amount	487	---	---	---
	Temporary		0	0	0
	Long-term		0	0	0
	Permanent		0.028	0	0
10-foot-wide heliostat maintenance paths	Amount	154,800	---	---	---
	Temporary		0	0	0
	Long-term		21.57	0	0
	Permanent		0	0	0
10-foot-wide heliostat arrays	Amount	158,285	---	---	---
	Temporary		21.8	0	0
	Long-term		0.031	0	0
	Permanent		0	0	0
Natural gas line corridor	Amount	7,380	---	---	---
	Temporary		0.939	0	0
	Long-term		0	0	0
	Permanent		0	0	0
Gas and water utility lines	Amount	1,126	---	---	---
	Temporary		0.215	2,828	2,828
	Long-term		0.19	0	0
	Permanent		0	0	0

SOIL AND WATER RESOURCES APPENDIX B - TABLE 1
Dredge and Fill Impacts to Waters of the State*

		Linear Impacts[4] (feet):	Impact Area (acres)	Fill Volume (cubic yards)	Dredge Volume (cubic yards)
Metering sets	Amount	80	---	---	---
	Temporary		0	0	0
	Long-term		0.005	0	0
	Permanent		0	0	0
Power blocks, diversion channels and berms	Amount	17,177	---	---	---
	Temporary		0	0	0
	Long-term		1.284	1,419	503
	Permanent		0.15	75	289
Gen-tie lines and towers	Amount	0	---	---	---
	Temporary		0	0	0
	Long-term		0	0	0
	Permanent		0	0	0
Administration/Maintenance Building	Amount	3,618	---	---	---
	Temporary		0	0	0
	Long-term		0.444	666	0
	Permanent		0	0	0
Substation	Amount	4,670	---	---	---
	Temporary		0	0	0
	Long-term		0	0	0
	Permanent		0.572	845	0
Construction laydown, staging and stockpiling	Amount		---	---	---
	Temporary		2.674	0	0
	Long-term		0	0	0
	Permanent		0	0	0
Perimeter fence installation	Amount	0	---	---	---
	Temporary		76	0	0
	Long-term		0	0	0
	Permanent		0	0	0
TOTAL DREDGE AND FILL IMPACTS	**Amount**	**383,082**			
	Temporary		**26.91**	**2,828**	**2,828**
	Long-term		**26.78**	**3,391**	**1,809**
	Permanent		**2.46**	**3,187**	**2,556**

NOTES:

*Table 1 is based on Ivanpah Solar Electric Generating System's Data Response to Energy Commission, Set 1P, *Beneficial Use and Dredge/Fill Analyses for Waters of the State,* September 9, 2009

[1] Temporary impacts are associated with construction activities, and these areas would be restored upon completion c construction.

[2] Long-term impacts would continue for the duration of ISEGS project operations, which is estimated at approximately 50 years. At ISEGS project decommissioning, these areas would be rehabilitated and revegetated.

[3] Permanent impacts are associated with roads and structures that would remain following ISEGS project closure.

[4] Note that linear distances are likely overestimated since there is redundancy among values for temporary, long-term, and permanent impacts.

9. Mitigation Plan

See Condition of Certification **Biology-20** for a description of the compensation requirements for impacts to waters of the State.

10. Storm Water Discharges

The existing slope and drainage of the proposed ISEGS project site have not been previously modified from their natural state. Topographically, the proposed site is relatively uniform and slopes down to the east at a gradient of approximately 5 percent. Grading would be minimized to the extent feasible (i.e., restricted to the three power blocks, support area, and areas with higher topographic relief in the northern portion of the proposed site). Outside of those specified areas, existing conditions would be largely maintained during construction and operation.

The *Requirements* contained in Attachment 3 regulate construction-related and industrial-related waste discharges in storm water runoff and other discharges that would be associated with ISEGS project. The requirements also direct the applicant to maintain pre-development infiltration, surface retention, and recharge rates in order to minimize post-development impacts to offsite water bodies and underlying groundwater. The applicant would be required to avoid adverse effects of altering the hydrologic characteristics (i.e., avoid hydromodification) of the ISEGS project area by site design and construction practices.

a. *Construction Storm Water Management*
The ISEGS project would be divided into three power-generating phases, referred to as Ivanpah 1, 2, and 3. The project phases would be built sequentially and the applicant estimates that construction would be ongoing for a total of 24 months for each phase. Under the Storm Water Pollution Prevention Plan (SWPPP) and Drainage, Erosion, and Sediment Control Plan (DESCP), site grading would be minimized and most storm water would be allowed to flow unimpeded across the site in existing channels and as sheet flow. The applicant would implement Best Management Practices (BMPs) as described in the SWPPP and DESCP to prevent water quality impacts during construction.

b. *Post-Construction Storm Water Management*
Impacts to the onsite ephemeral washes would be minimized through the implementation of a low impact development approach (i.e., measures that maintain or mimic pre-development hydrology) as described in the DESCP. Storm water diversion structures would only be constructed around the substation and the three power blocks. The applicant proposes to manage storm water, erosion, and sedimentation at the completed ISEGS project through a comprehensive system of source controls, treatment BMPs, and site design. The final storm water management system must replicate pre-development hydrographs for the 2-year through the 10-year, 24-hour storm events. At a minimum, the applicant would adhere to detention and retention requirements of State Water Resources Control Board's *Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction Activity, General Permit No CAS00002*; *Waste Discharge Requirements For Discharges of Storm Water Associated With Industrial Activities, General Permit No. CAS00001*; and all subsequent revisions and amendments to these general permits.

11. Wastewater Discharges

    Wastewater generated by ISEGS project operation would be from three sources: wastewater generated after the piping and vessel hydrostatic testing, wastewater generated from washing the heliostats and, domestic waste discharged to onsite septic systems. The hydrostatic test water would either be trucked to a licensed treatment facility or disposed to land under a low threat to groundwater waiver in accordance with SWRCB Water Quality Order 2003-003-DWQ. The excess heliostat wash water would drain to the ground surface beneath the heliostats where it would evaporate. The septic systems would be sited and designed in accordance to the Basin Plan and San Bernardino County requirements.

12. Receiving Waters

    The receiving waters are the "minor surface waters of the Ivanpah Hydrologic Area" (Hydrologic Subunit 612.00) and groundwaters of the Ivanpah Groundwater Basin (Department of Water Resources No. 6-30).

13. Basin Plan

    The Lahontan RWQCB adopted the Basin Plan, which became effective on March 31, 1995. The *Requirements* and *Surface Water Monitoring and Reporting Program*, Attachments 2 and 3, respectively, implement the Basin Plan.

14. Beneficial Uses - Surface Waters

    The Basin Plan designates beneficial uses for surface waters in each watershed of the Lahontan Region. The beneficial uses listed for minor surface waters of the Ivanpah Hydrologic Area include:

    a. municipal and domestic water supply (MUN),

    b. agricultural supply (AGR),

    c. groundwater recharge (GWR),

    d. water contact recreation (REC-1),

    e. non-contact water recreation (REC-2),

    f. commercial and sportsfishing (COMM),

    g. warm freshwater habitat (WARM),

    h. wildlife habitat (WILD).

15. Beneficial Uses - Groundwaters

    The Basin Plan designates beneficial uses for groundwaters in each watershed of the Lahontan Region. Beneficial uses of groundwaters of the Ivanpah Groundwater Basin include:

    a. municipal and domestic water supply (MUN),

b. agricultural supply (AGR),

c. industrial surface supply (IND),

d. freshwater replenishment (FRSH).

16. Non-Degradation

The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16 (*Statement of Policy with Respect to Maintaining High Quality of Waters in California*). Resolution No. 68-16 requires that existing quality of waters be maintained unless degradation is justified based on specific findings or facts. The Basin Plan implements and incorporates by reference State antidegradation policies.

17. Other Considerations and Requirements for Discharge

Pursuant to Water Code section 13241, the *Facts, Requirements*, and *Surface Water Monitoring and Reporting Program* take into consideration:

a. *Past, present, and probable future beneficial uses of water*.
These requirements identify past, present, and probable future beneficial uses of water as described in Facts Nos. 14 and 15. The proposed discharge would not adversely affect present or probable future beneficial uses of the receiving waters.

b. *Environmental characteristics of the hydrologic unit and the groundwater basin under consideration, including the quality of water available thereto*.
Facts Nos. 3 through 7 describe the environmental characteristics and quality of waters in the hydrologic unit and groundwater basin.

c. *Water quality conditions that could reasonably be achieved through the coordinated control of all factors that affect water quality in the area.*
These requirements would not result in changes to groundwater quality. Adverse effects to surface water quality would be minimized.

d. *Economic considerations*.
The Energy Commission's certification authorizes the applicant to implement closure and post-closure maintenance actions at the ISEGS project as proposed by the applicant. These requirements accept the applicant's proposed actions as meeting the best practicable control method for protecting water quality from impacts from the ISEGS project.

e. *The need for developing housing in the region*.
The applicant is not responsible for developing housing in the region.

f. *The need to develop and use recycled water*.
The water requirements for the ISEGS project would be minimized by the incorporation of dry-cooling technology. Additionally, there are no feasible sources of recycled water in the vicinity of the proposed ISEGS project.

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SOIL AND WATER RESOURCES - Appendix C

REQUIREMENTS FOR WASTEWATER DISCHARGE

I. DISCHARGE SPECIFICATIONS

A. Storm Water Discharges

Waste in discharges of storm water must be reduced or prevented to achieve the best practicable treatment level using controls, structures, and management practices. The applicant shall comply with all requirements (with the exception of purely administrative requirements, e.g., filing a Notice of Intent) contained in State Water Resources Control Board's (SWRCB) *Waste Discharge Requirements For Discharges of Storm Water Runoff Associated With Construction Activity, General Permit No. CAS00002*; *Waste Discharge Requirements For Discharges of Storm Water Associated With Industrial Activities, General Permit No. CAS00001*; and all subsequent revisions and amendments.

These requirements do not preclude the applicant from requirements imposed by municipalities, counties, drainage districts, and other local agencies regarding discharges of storm water to separate storm sewer systems or other water, conveyances, and water bodies under their jurisdiction.

B. Receiving Water Limitations

Receiving water limitations are narrative and numerical water quality objectives contained in the Water Quality Control Plan for the Lahontan Region (Basin Plan). As such, the objectives are required to be met.

1. Surface Water Objectives

   The discharge of waste to surface waters shall not cause or contribute to a violation of the following water quality objectives for waters of the Ivanpah Hydrologic Unit (No. 612.00).

   a. *Ammonia*

      Ammonia concentrations shall not exceed the values listed in Tables 3-1 through 3-4 of the Basin Plan for the corresponding conditions in these tables. Tables 3-1 through 3-4 of the Basin Plan are incorporated into these requirements by reference.

   b. *Bacteria, Coliform*

      i. Waters shall not contain concentrations of coliform organisms attributable to anthropogenic sources, including human and livestock wastes.

      ii. The fecal coliform concentration during any 30-day period shall not exceed a log mean of 20/100 milliliter (ml) nor shall more than 10 percent of all samples collected during any 30-day period exceed 40/100 ml. The log mean shall ideally be based on a minimum of not

less than five samples collected as evenly spaced as practicable during any 30-day period. However, a log mean concentration exceeding 20/100 ml, or one sample exceeding 40/100 ml, for any 30-day period shall indicate violation of this objective even if fewer than five samples were collected.

c. *Biostimulatory Substances*

Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect the water for beneficial uses.

d. *Chemical Constituents*

i. Waters designated as MUN (municipal and domestic supply) shall not contain concentrations of chemical constituents in excess of the primary or secondary maximum contaminant levels (MCL) based upon drinking water standards specified in provisions of the California Code of Regulations (CCR), Title 22, Division 4, Chapter 15, hereby incorporated by reference into these requirements. This incorporation-by-reference is prospective including future changes to the incorporated provisions as the changes take effect.

ii. Waters shall not contain concentrations of chemical constituents in amounts that adversely affect the water for beneficial uses.

e. *Chlorine, Total Residual*

For the protection of aquatic life, total chlorine residual shall not exceed either a median value of 0.002 milligrams/liter (mg/L) or a maximum value of 0.003 mg/L. Median values shall be based on daily measurements taken within any six-month period.

f. *Color*

Waters shall be free of coloration that causes nuisance or adversely affects the water for beneficial uses.

g. *Dissolved Oxygen*

i. The dissolved oxygen concentration as percent saturation shall not be depressed by more than 10 percent, nor shall the minimum dissolved oxygen concentration be less than 80 percent of saturation.

ii. For waters with the beneficial uses of COLD (cold freshwater habitat) or WARM (warm freshwater habitat), the minimum dissolved oxygen

concentration shall not be less than that specified in Table 3-6 of the Basin Plan. Table 3-6 of the Basin Plan is incorporated herein by reference.

h. *Floating Materials*

i. Waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect the water for beneficial uses.

ii. The concentrations of floating material shall not be altered to the extent that such alterations are discernible at the 10 percent significance level.

i. *Oil and Grease*

i. Waters shall not contain oils, greases, waxes or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect the water for beneficial uses.

ii. The concentration of oils, greases, or other film or coat generating substances shall not be altered.

j. *Pesticides*

i. For the purposes of these requirements, pesticides are defined to include insecticides, herbicides, rodenticides, fungicides, pesticides and all other economic poisons. An economic poison is any substance intended to prevent, repel, destroy, or mitigate the damage from insects, rodents, predatory animals, bacteria, fungi, or weeds capable of infesting or harming vegetation, humans, or animals (California Agriculture Code 12753).

ii. Pesticide concentrations, individually or collectively, shall not exceed the lowest detectable levels, using the most recent detection procedures available. There shall not be an increase in pesticide concentrations found in bottom sediments. There shall be no detectable increase in bioaccumulation of pesticides in aquatic life.

iii. Waters designated as MUN shall not contain concentrations of pesticides or herbicides in excess of the limiting concentrations set forth in the CCR, Title 22, Division 4, Chapter 15. This incorporation-by-reference is prospective including future changes to the incorporated provisions as the changes take effect.

k. *pH*

In fresh waters with designated beneficial use of COLD or WARM, changes in normal ambient pH levels shall not exceed 0.5 pH units.

l. *Radioactivity*

i. Radionuclides shall not be present in concentrations that are deleterious to human, plant, animal, or aquatic life nor which result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life.

ii. Waters designated as MUN shall not contain concentrations of radionuclides in excess of the limits specified by the more restrictive of the CCR Title 22 Division 4, Article 5 sections 64441 et seq. This incorporation-by-reference is prospective including future changes to the incorporated provisions as the changes take effect.

m. *Sediment*

The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect the water for beneficial uses.

n. *Settleable Materials*

Waters shall not contain substances in concentrations that result in deposition of material that causes nuisance or that adversely affects the water for beneficial uses. The concentration of settleable materials shall not be raised by more than 0.1 milliliters/liter.

o. *Suspended Materials*

i. Waters shall not contain suspended materials in concentrations that cause nuisance or that adversely affect the water for beneficial uses.

ii. The concentration of total suspended materials shall not be altered to the extent that such alterations are discernible at the 10 percent significance level.

p. *Taste and Odor*

Waters shall not contain taste or odor-producing substances in concentrations that impart undesirable tastes or odors to fish or other edible products of aquatic origin, that cause nuisance, or that adversely affect the water for beneficial uses. The taste and odor shall not be altered.

q. *Temperature*

i. The natural receiving water temperature of all waters shall not be altered unless it can be demonstrated to the satisfaction of the Bureau of Land Management's (BLM's) Authorized Officer and Compliance Project Manager (CPM) that such an alteration in temperature does not adversely affect the water for beneficial uses.

ii. For waters designated COLD, the temperature shall not be altered. For waters designated WARM, water temperature shall not be altered

by more than 5 degrees Fahrenheit above or below the natural temperature.

r. *Toxicity*

i. All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life.

ii. The survival of aquatic life in surface waters subjected to a waste discharge, or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge, or when necessary, for other control water that is consistent with the requirements for "experimental water" as defined in the most recent edition of *Standard Methods for the Examination of Water and Wastewater* (American Public Health Association, et al.).

s. *Turbidity*

Waters shall be free of changes in turbidity that cause nuisance or adversely affect the water for beneficial uses. Increases in turbidity shall not exceed natural levels by more than 10 percent.

2. Groundwater Objectives

The discharge of waste to groundwaters shall not cause, or contribute to, a violation of the following water quality objectives for waters of the Ivanpah Groundwater Basin (Department of Water Resources No. 6-30).

a. Bacteria, Coliform

In groundwaters designated as MUN, the median concentration of coliform organisms over any seven-day period shall be less than 1.1/100 ml.

b. Chemical Constituents

i. Groundwaters designated as MUN shall not contain concentrations of chemical constituents in excess of the primary or secondary MCLs based upon drinking water standards specified in provisions of the CCR, Title 22, Division 4, Chapter 15, hereby incorporated by reference into these requirements. This incorporation-by-reference is prospective including future changes to the incorporated provisions as the changes take effect.

ii. Groundwaters shall not contain concentrations of chemical constituents in amounts that adversely affect the water for beneficial uses.

c. Radioactivity

Groundwaters designated as MUN shall not contain concentrations of radionuclides in excess of the limits specified by the more restrictive of the

CCR Title 22 Division 4, Article 5 sections 64441 et seq. This incorporation-by-reference is prospective including future changes to the incorporated provisions as the changes take effect.

d. Taste and Odor

Waters shall not contain taste or odor-producing substances in concentrations that cause nuisance or that adversely affect beneficial uses. For groundwaters designated MUN, at a minimum, concentrations shall not exceed adopted secondary MCLs based upon drinking water standards specified in provisions of the CCR, Title 22, Division 4, Chapter 15, hereby incorporated by reference into these requirements. This incorporation-by-reference is prospective including future changes to the incorporated provisions as the changes take effect.

II. PROHIBITIONS AND REQUIREMENTS

The discharge of wastes and fill associated with the ISEGS project must not violate the following waste discharge prohibitions. These waste discharge prohibitions do not apply to discharges of storm water when wastes in the discharge are controlled through the application of management practices or other means and the discharge does not cause a violation of water quality objectives. The Energy Commission expects that control measures would be implemented in an iterative manner as needed to meet applicable receiving water quality objectives.

A. REGIONWIDE PROHIBITIONS

1. The discharge of waste[(i)] that causes violation of any narrative water quality objective contained in the Basin Plan, including the Nondegradation Objective, is prohibited.

2. The discharge of waste that causes a violation of any numeric water quality objective contained in the Basin Plan is prohibited.

3. Where any numeric or narrative water quality objective contained in the Basin Plan is already being violated, the discharge of waste that causes further degradation or pollution is prohibited.

4. The discharge of untreated sewage, garbage, or other solid wastes into surface waters of the Lahontan Region is prohibited. (For the purposes of this prohibition, “untreated sewage” is that which exceeds secondary treatment standards of the Federal Water Pollution Control Act, which are incorporated in the Basin Plan in section 4.4 under “Surface Water Disposal of Sewage Effluent.”)

Definitions:

(i) “Waste” is defined to include any waste or deleterious material including, but not limited to, waste earthen materials (such as soil, silt, sand, clay, rock, or other organic or mineral material) and any other waste as defined in the California Water Code § 13050(d).

5. For municipal[ii] and industrial[iii] discharges:

   a. The discharge, bypass, or diversion of raw or partially treated sewage, sludge, grease, or oils to surface waters is prohibited.

   b. The discharge of wastewater except to the designated disposal site (as defined and in accordance with California Water Code [Water Code] section 13000 et seq.) is prohibited.

   c. The discharge of industrial process wastes[iv] to surface waters designated for the Municipal and Domestic Supply (MUN) beneficial use is prohibited. The discharge of industrial process wastes to surface waters not designated for the MUN use may be permitted if such discharges comply with the *General Discharge Limitations* in section 4.7 of the Basin Plan and if appropriate findings under State and federal anti-degradation regulations can be made.

   Prohibitions 5(b) and 5(c) do not apply to industrial storm water. For control measures applicable to industrial storm water, see section 4.3 of the Basin Plan, entitled "Stormwater Runoff, Erosion, and Sedimentation," specifically the requirements, which mandate the use of best available technology economically available (BAT) and best conventional pollution control technology (BCT) to reduce pollutants, and any more stringent controls necessary to meet water quality standards. Compliance with the requirements of a variety of laws and regulations for the control of hazardous materials and hazardous wastes may help to reduce potential storm water pollutants. Such programs include State and local laws to control toxic air pollutants, hazardous material storage and emergency response planning, the workers' right-to-know program, and hazardous waste source reduction and management review.

   Prohibitions 5(b) and 5(c) do not apply to surface water disposal of treated groundwater. For control measures applicable to surface water disposal of treated ground water, see Lahontan Regional Water Quality Board Order No. R6T-2004-0025.

[ii] "Municipal waste" is defined in section 4.4 of the Basin Plan.

[iii] "Industry" is defined in section 4.7 of the Basin Plan.

[iv] "Industrial process wastes" are wastes produced by industrial activities that result from one or more actions, operations, or treatments which modify raw material(s) and that may (1) add to or create within the effluent, waste, or receiving water a constituent or constituents not present prior to processing, or (2) alter water temperature and/or the concentration(s) of one or more naturally occurring constituents within the effluent, waste or receiving water. Certain non-storm water discharges may occur at industrial facilities that are not considered to be industrial process wastes for the purposes of Prohibition 5(c). Examples include: fire hydrant flushing, atmospheric condensates from refrigeration and air conditioning systems, and landscape watering.

B. ISEGS Project Discharge Prohibitions

1. Activities and waste discharges associated with the ISEGS project must not cause or threaten to cause a nuisance or pollution as defined in Water Code section 13050.

2. The discharge, including discharges of fill material, must be limited to that described in the applicant's final *Drainage, Erosion*, *and Sediment Control Plan*.

3. The discharge or deposition of any wastes into channels, surface water, or any place where it would be discharged or deposited where it would be eventually transported to surface waters, including the 100-year floodplain, must not contain or consist of any substance in concentrations toxic to animal or plant life.

4. The discharge or deposition of any wastes into channels, surface water, or any place where it would be discharged or deposited where it would be eventually transported to surface waters, including the 100-year floodplain, must not contain or consist of oil or other floating materials from any activity in quantities sufficient to cause deleterious bottom deposits, turbidity, or discoloration in surface waters.

5. The discharge of waste, as defined in the Water Code that causes violation of any narrative water quality objective contained in the Basin Plan is prohibited.

6. The discharge of waste that causes violation of any numeric water quality objective contained in the Basin Plan is prohibited.

7. Where any numeric or narrative water quality objective contained in the Basin Plan is already being violated, the discharge of waste that causes further degradation or pollution (as defined in Water Code section 13050) is prohibited.

8. The discharge of septic tank pumpings (septage) or chemical toilet wastes to other than a sewage treatment plant or a waste hauler is prohibited.

C. Requirements

1. The applicant shall develop a final Storm Water Pollution Prevention Program (SWPPP) that is consistent with the requirements of State Water Board's *General Permit No. CAS00001* and *General Permit No. CAS00002*. This SWPPP, or any future revision to this SWPPP, shall be implemented after approval by the BLM's Authorized Officer and CPM.

2. The applicant must, at all times, maintain appropriate types and sufficient quantities of material on site to contain any spill or inadvertent release of materials that may cause a condition of pollution or nuisance if the materials reach waters of the State.

3. Discharges of wastewater generated by the ISEGS project's operations are not allowed to be released to the offsite environment.

4. The applicant must permit BLM's Authorized Officer and CPM or its authorized representative upon presentation of credentials:

   a. Entry onto ISEGS project premises;

   b. Access to copy any record required to be kept under the terms and conditions of the Final Staff Assessment (FSA);

   c. Inspection of any treatment equipment, monitoring equipment, or monitoring method required by the FSA;

   d. Sampling of any discharge or surface water covered by the FSA.

5. The applicant must immediately notify the BLM's Authorized Officer and CPM by telephone whenever an adverse condition occurs as a result of this discharge. Such a condition includes, but is not limited to, a violation of the conditions of the FSA, a significant spill of petroleum products or toxic chemicals, or damage to control facilities that would cause noncompliance. A written notification of the adverse condition must be provided to the BLM's Authorized Officer and CPM within two weeks of occurrence. The written notification must identify the adverse condition, describe the actions necessary to remedy the condition, and specify a timetable, subject to any modifications by BLM's Authorized Officer and CPM, for the remedial actions.

6. The applicant must comply with the *Surface Water Monitoring and Reporting Program* Attachment 3.

III PROVISIONS

A. Special Provisions for Fill Impacts to State Waters

1. Detailed final grading plans must be provided to the BLM's Authorized Officer and CPM a minimum of 90 days prior to commencement of construction activities.

2. Construction equipment must be clean and free from oil, grease, and loose metal material and must be removed from service if necessary to protect water quality.

3. Restoration of temporary disturbances and temporary discharges of fill to waters of the State must be achieved immediately following completion of work in an area of the temporary impacts. Restoration must include implementing measures to fully restore conditions to support all beneficial uses for the water body temporarily impacted in the shortest feasible time. Restoration must include, but is not limited to, grading to pre-project contours and revegetation with native species. The applicant must implement Best

Management Practices (BMPs) to control erosion and runoff from areas associated with temporary fills.

4. Mitigation for 29.2 acres of permanent and long-term impacts must be proposed prior to initiation of construction and approved by the BLM's Authorized Officer and CPM.

5. No debris, cement, concrete (or wash water there from), oil, or petroleum products must be allowed to enter into or be placed where it may be washed from the ISEGS project site by rainfall or runoff into waters of the State. When operations are completed, any excess material must be removed from the ISEGS project work area and any areas adjacent to the work area where such material may be transported into waters of the State.

6. No equipment may be operated in areas of flowing or standing water; no fueling, cleaning, or maintenance of vehicles or equipment must take place within any areas where a discharge to ephemeral channels or other waters of the State may occur; construction materials and heavy equipment must be stored outside of the channel perimeter of the waters of the State. When work within the boundaries of waters of the State is necessary, the entire stream flow must be diverted around the work area, temporarily, as needed to control waste discharge.

7. The applicant must immediately notify the BLM's Authorized Officer and CPM by telephone whenever an adverse condition occurs as a result of this discharge. Such a condition includes, but is not limited to, a violation of these conditions of certification, a significant spill of petroleum products or toxic chemicals, or damage to control facilities that would cause noncompliance. A written notification of the adverse condition must be provided to the BLM's Authorized Officer and CPM within two weeks of the occurrence. The written notification must identify the adverse condition, describe the actions necessary to remedy the condition, and specify a timetable subject to any modifications by BLM's Authorized Officer and CPM for the remedial actions.

B. Special Provisions for Storm Water

1. The applicant must ensure that storm water discharges and non-storm water discharges do not cause or contribute to an exceedance of any applicable water quality standards.

2. Industrial storm water discharges must use best available technology economically available (BAT) and best conventional pollution control technology (BCT) to reduce pollutants, and any more stringent controls necessary to meet water quality standards.

3. Post-construction storm water flows (volume and velocity) emanating from the ISEGS project site must not exceed two (2) percent of the volume and five (5) percent of the peak velocity discharge of the predevelopment levels. Runoff from newly constructed impervious areas that is greater than predevelopment

levels must be treated and detained to predevelopment runoff levels. Methods such as *low impact development* may be used to achieve this requirement (see State Board Resolution No. 2008-0030).

4. The applicant must implement BMPs to prevent or reduce the discharge of wastes associated with water contacting construction materials or equipment.

5. The applicant must provide effective cover, mulch, fiber blankets, or other erosion control for soils disturbed by construction activities.

6. The applicant must provide BMPs for erosion stabilization for all areas of disturbed soil regardless of time of year, including erosion from rainfall, non-storm water runoff, and wind.

7. The applicant must stabilize to prevent erosion all finished slopes, open space, utility backfill, and graded or filled lots within two weeks from when excavation or grading activity has been completed.

8. The applicant must control runon from offsite areas, route flows away from disturbed areas in a manner that does not cause onsite or offsite erosion, and provide controls to minimize runon and problems from storm water flows to the ISEGS project area from offsite areas.

9. The applicant must, at all times, maintain effective perimeter controls (i.e., control around the ISEGS project area and all areas where there could be erosion or sediment discharges from the site), and stabilize all construction entrances/exits sufficiently to control erosion and soil or sediment discharges from the site.

10. The applicant must properly install and effectively maintain all BMPs for storm drain inlets and perimeter controls, runoff control BMPs, and stabilized entrances/exits.

11. The applicant must ensure that construction activity traffic to and from the ISEGS project is limited to entrances and exits that employ effective controls to prevent offsite tracking of soil.

12. The applicant must ensure that all storm drain inlets, perimeter controls, runoff control BMPs, and pollutant controls at entrances and exits are maintained and protected from activities that could reduce their effectiveness.

13. The applicant must comply with the following source control requirements:

    a. Maintain vegetative cover to the extent possible by developing the ISEGS project in a way that reduces the amount of soil exposed to erosion at any time.

    b. Inspect and remove accumulated deposits of soil at all inlets to the storm drain system at frequent intervals during rainy periods.

c. Provide buffer strips and/or vegetation protection fencing between the active construction area and any water bodies.

d. Provide “good housekeeping” measures for construction materials, waste management, vehicle storage and maintenance, and landscape materials at all times including, but not limited to, the list of required measures in Attachment 2 of the *Surface Water Monitoring and Reporting Program*, (Attachment 3), which is made a part of these requirements.

14. The applicant must maintain, in perpetuity, post-construction control and treatment measures for storm water, or must identify in writing to the BLM’s Authorized Officer and CPM, the entity that is legally responsible for maintaining the post-construction controls at the ISEGS project site.

15. The applicant shall have in place adequate emergency response plans in order to clean up any spill or release of any waste at the ISEGS project site.

SOIL AND WATER RESOURCES - Appendix D

SURFACE WATER MONITORING AND REPORTING PROGRAM FOR WASTEWATER DISCHARGE

I. MONITORING

A. General Requirements

1. The applicant must comply with the "General Provisions for Monitoring and Reporting," which is attached to and made part of this Monitoring and Reporting Program (Attachment A).

2. In addition to General Provision 1 of Attachment A, the following provisions apply to sampling and analysis under this program:

   a. Quality assurance/quality control (QA/QC) procedures must be followed and a QA/QC plan must be included in the Sampling and Analysis Plan (SAP) that is provided to the California Energy Commission (Energy Commission). The SAP may be part of the Storm Water Pollution Prevention Program (SWPPP).

   b. The applicant may conduct their own field analysis of pH and turbidity if the applicant has sufficient capability (qualified and trained employees, properly calibrated and maintained field instruments, etc.) to adequately perform the field analysis.

   c. All monitoring instruments and equipment (including an applicant's own field instruments for measuring pH and turbidity) must be calibrated and maintained in accordance with manufacturer's specifications to ensure accurate measurements.

   d. With the exception of field analyses conducted by the applicant for pH and turbidity, all analyses must be sent to and conducted at a laboratory certified for such analysis by the California Department of Public Health.

3. The applicant must comply with the "Good Housekeeping Best Management Practices," which is attached to and made part of this Monitoring and Reporting Program (Attachment B).

B. Construction Site Storm Event Water Monitoring

The applicant must monitor site precipitation continuously and keep a record of storm events that produce more than 0.5 inch of precipitation at the site. During storms and/or within one business day after each 0.5 inch of precipitation from a storm event, the applicant must visually observe and document observations of storm water discharges from the site. For visual observations, the applicant must look for and document the presence or absence of floating and suspended materials, a sheen on the surface, discolorations, turbidity, odors, and source(s) of any observed pollutants.

The applicant must visually observe and document observations of the discharge of stored or contained storm water that is discharged subsequent to a storm

event. The applicant is only required to visually observe such discharges if they occur during daylight hours. Stored or contained storm water that will likely discharge after operating hours due to anticipated precipitation must be observed prior to the discharge to determine whether controls and best management practices (BMPs) are in place and functioning as required.

For the purposes of these requirements, a “potential storm event” is defined as any storm event with a 30 percent or greater chance of precipitation as predicted by the National Weather Service’s nearest weather station for the local climate zone. Forty-eight (48) hours prior to each potential storm event, the applicant must visually observe and implement appropriate corrective action for:

1. all storm water drainage areas, to identify any spills, leaks, or uncontrolled pollutant sources,

2. all BMPs (see Attachment 3B), to identify whether they have been properly installed and maintained, and

3. any storm water storage and containment areas, to detect leaks and ensure maintenance of adequate freeboard.

   Within one business day after each storm event that produces precipitation of 0.5 inch or more, the applicant must conduct a post-storm event inspection to:

   a. identify whether BMPs were adequately designed, implemented, and effective,

   b. identify if and where additional BMPs are needed, and where BMPs are in need of maintenance.

   Within one business day after the initial 0.5 inch of precipitation from a storm event, and every 1 inch thereafter, the applicant must collect and analyze samples of storm water discharged from any detention basins. If no discharge occurs from a basin, no sample is required, but the absence of discharge must be documented.

   Storm water sampling and analyses must be performed in accordance with the following requirements:

   a. The applicant must analyze the samples for pH and turbidity.

   b. The applicant is not required to physically collect samples or conduct visual observations during dangerous weather conditions or outside of scheduled site operation hours.

   The applicant must perform sampling of storm water discharges from all drainage areas associated with construction activity. The storm water discharge collected and observed must represent the worst quality storm water discharge in each drainage area based on visual observation of the water and upstream conditions. For example, if there has been concrete work recently in an area, or drywall scrap is exposed to the rain, a pH sample must

be taken of drainage from the relevant work area. Similarly, if muddy water is flowing through some parts of a silt fence, samples must be taken of the muddy water even if most water flowing through the fence is clear.

C. Construction Site Monitoring

1. On a daily basis, the applicant must inspect all public and private paved roads serving the ISEGS project and daily remove, by vacuuming or sweeping, visible accumulations of sediment or other construction activity-related materials that are deposited on the roads. All inspections under this provision must be documented in writing.

2. The applicant must ensure that inspections and observations at locations where runoff may discharge from the ISEGS project site are performed weekly, and at least once each 24-hour period during extended storm events, to identify any problems and/or BMPs that:

   a. need maintenance to operate effectively,

   b. have failed, or

   c. are inadequate to achieve effective control.

3. The applicant must visually observe construction areas and each drainage area for the presence of (or indication of prior) non-storm water discharges and their sources to ensure that all BMPs are in place and effective.

   a. One visual observation must be conducted quarterly in each of the following periods: January through March, April through June, July through September, and October through December. Visual observations are only required during daylight hours (sunrise to sunset).

   b. Visual observations must document evidence of any non-storm water discharge, pollutant characteristics (floating and suspended material, sheen, discoloration, turbidity, odor, etc.), and source. The applicant must maintain onsite records indicating the personnel performing the visual observation, the dates and approximate time each drainage area and non-storm water discharge was observed, and the response taken to eliminate non-storm water discharges and to reduce or prevent pollutants from contacting non-storm water discharges.

4. The applicant must monitor and report runon from surrounding areas that may contribute to exceedances or excursions from requirements (violations).

D. Post-Construction Monitoring

On a semi-annual basis, the applicant must inspect and document inspections of post-construction treatment controls at the ISEGS project. Maintenance must be provided to address any controls that are not in compliance with requirements.

E. Receiving Water Monitoring

1. Receiving water sampling must be conducted at the sample locations designated in the final SWPPP.

2. Twice monthly and at no less than 10-day intervals from November through May of each year, the applicant must sample the ISEGS project's receiving waters with grab samples. The samples must be analyzed, at a minimum, for the following constituents:

   a. Turbidity,

   b. Temperature,

   c. Dissolved Oxygen,

   d. Suspended Solids,

   e. Total Dissolved Solids, and

   f. pH.

   If no water is present (documented by photographs), no sampling is required.

3. The applicant must also sample the receiving waters for the above parameter(s) when discharge from any detention basin occurs.

II. REPORTING

A. Required Program Reports

1. The applicant must develop and implement a final SWPPP, as described in II.B, below, and provide the final SWPPP to the Bureau of Land Management's (BLM's) Authorized Officer and CPM 90 days prior to commencement of construction activities. The SWPPP must include receiving water monitoring locations as required above.

2. The applicant must provide a Sampling and Analysis Plan (SAP) as referenced in I.A, above, to the BLM's Authorized Officer and CPM 90 days prior to commencement of construction activities. The SAP may be part of the SWPPP as described under I.A.2.

B. Storm Water Pollution Prevention Program

1. The final SWPPP must be developed and implemented to address the following objectives:

   a. To demonstrate that the site is in compliance with these requirements (*Requirements* in Attachment 2 and this *Monitoring and Reporting Program*). To determine whether immediate corrective actions, additional BMP implementation, or SWPPP revisions are necessary to reduce pollutants and wastes in storm water discharges and non-storm water discharges; and

b. To determine whether BMPs included in the SWPPP are effective in preventing or reducing pollutants in storm water discharges.

2. The applicant must develop a final SWPPP that includes all monitoring procedures and instruction, location maps, forms, and checklists as required in these requirements and this MRP.

C. Storm Water Pollution Prevention Plan Annual Report

1. The applicant must prepare and provide an annual report no later than January 30 of each year.

2. The Annual Report must include a summary and evaluation of all sampling and analysis results, original laboratory reports, a summary of all corrective actions taken during the compliance year, and identification of any recommended compliance activities or corrective actions that were not implemented.

3. The Annual Report must include all records and reports of visual observations and sample collection exceptions, the analytical method, method reporting unit, and method detection limit of each analytical parameter.

D. Records

1. The applicant must maintain records on site of all visual observations, personnel performing the observations, observation dates, weather condition, locations observed, and corrective actions taken in response to the observations.
2. All inspections and observations pursuant to Section I.C. above must be documented in writing and must include:
   a. Inspector's name, title, and signature.

   b. Inspection date and date the inspection report was written.

   c. Weather information: estimate of beginning of storm event, duration of event, time elapsed since last storm, and approximate amount of rainfall (inches).

   d. A list and description of BMPs evaluated and any deficiencies noted. If there are no deficiencies, the report must indicate (under penalty of perjury) that the ISEGS project is in compliance with these discharge requirements.

   e. Report the presence of noticeable odors or any visible sheen on the surface of any discharges.

   f. Corrective actions required, including any changes necessary to comply with requirements, and implementation dates for completing corrective actions.

g. Photographs taken during the inspection.

3. Records of all storm water monitoring information and copies of all reports (including Annual Reports) required by these requirements must be retained for a period of at least three years from the date of the sample, measurement, report, or application. This period may be extended when requested by the BLM's Authorized Officer and CPM. Records must be retained on site while construction is ongoing. The records must include:

   a. The date, place, time of project inspections, sampling, visual observation, and/or measurement, including precipitation;

   b. The individual(s) who performed the project inspections, sampling, visual observations, and/or measurement;

   c. The date and approximate time of analyses;

   d. The individual(s) and company who performed the analyses;

   e. A summary of all analytical results from the last five years, the method detection limits and reporting units, and the analytical techniques or methods used;

   f. QA/QC records and results;

   g. Non-storm water discharge inspections and visual observations and storm water discharge visual observation records; and

   h. Visual observation and sample collection exception records.

ATTACHMENT A

GENERAL PROVISIONS
FOR
MONITORING AND REPORTING

1. Sampling And Analysis

   a. All analyses shall be performed in accordance with the current edition(s) of the following documents:

      i. Standard Methods for the Examination of Water and Wastewater, American Public Health Association, et al.

      ii. Methods for Chemical Analysis of Water and Wastes, USEPA

   b. All analyses shall be performed in a laboratory certified to perform such analyses by the California Department of Public Health or a laboratory approved by the BLM's Authorized Officer and CPM. Specific methods of analysis must be identified on each laboratory report.

   c. Any modifications to the above methods to eliminate known interferences shall be reported with the sample results. The methods used shall also be reported. If methods other than the methods listed above are used, the exact methodology must be submitted for review and must be approved by the BLM's Authorized Officer and CPM prior to use.

   d. The applicant shall establish chain-of-custody procedures to insure that specific individuals are responsible for sample integrity from commencement of sample collection through delivery to an approved laboratory. Sample collection, storage, and analysis shall be conducted in accordance with an approved SAP. The most recent version of the approved SAP shall be kept at the ISEGS project.

   e. The applicant shall calibrate and perform maintenance procedures on all monitoring instruments and equipment to ensure accuracy of measurements, or shall insure that both activities will be conducted.

   f. A grab sample is defined as an individual sample collected in fewer than 15 minutes.

   g. A composite sample is defined as a combination of no fewer than eight individual samples obtained over the specified sampling period at equal intervals. The volume of each individual sample shall be proportional to the discharge flow rate at the time of sampling. The sampling period shall equal the discharge period, or 24 hours, whichever period is shorter.

2. Operational Requirements

   h. *Sample Results*

      The applicant shall maintain all sampling and analytical results including: strip charts; date, exact place, and time of sampling; date analyses were performed;

sample collector's name; analyst's name; analytical techniques used; and results of all analyses. Such records shall be retained for a minimum of three years. This period of retention shall be extended during the course of any unresolved litigation regarding this discharge, or when requested by the BLM's Authorized Officer and CPM.

i. *Operational Log*

An operation and maintenance log shall be maintained at the ISEGS project. All monitoring and reporting data shall be recorded in a permanent log book.

3. Reporting

j. For every item where the requirements are not met, the applicant shall submit a statement of the actions undertaken or proposed which will bring the discharge into full compliance with requirements at the earliest time, and shall submit a timetable for correction.

k. All sampling and analytical results shall be made available to the BLM's Authorized Officer and CPM upon request. Results shall be retained for a minimum of three years. This period of retention shall be extended during the course of any unresolved litigation regarding this discharge, or when requested by the BLM's Authorized Officer and CPM.

l. The applicant shall provide a brief summary of any operational problems and maintenance activities to the BLM's Authorized Officer and CPM with each monitoring report. Any modifications or additions to, or any major maintenance conducted on, or any major problems occurring to the wastewater conveyance system, treatment facilities, or disposal facilities shall be included in this summary.

m. Monitoring reports shall be signed by:

iii. In the case of a corporation, by a principal executive officer at least of the level of vice-president or his duly authorized representative, if such representative is responsible for the overall operation of the ISEGS project from which the discharge originates;

iv. In the case of a partnership, by a general partner;

v. In the case of a sole proprietorship, by the proprietor; or

vi. In the case of a municipal, state or other public project, by either a principal executive officer, ranking elected official, or other duly authorized employee.

n. Monitoring reports are to include the name and telephone number of an individual who can answer questions about the report.

ATTACHMENT B

GOOD HOUSEKEEPING BEST MANAGEMENT PRACTICES

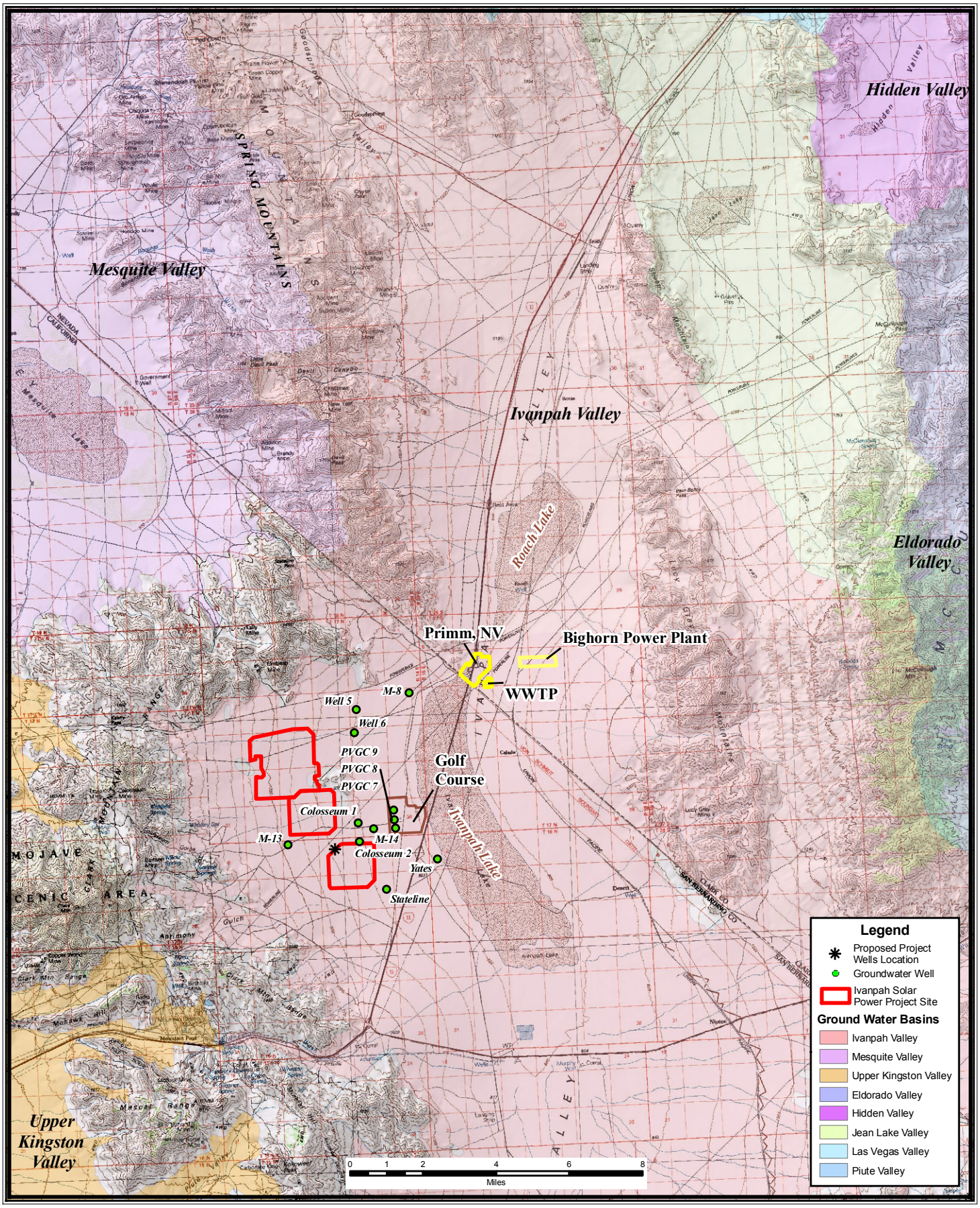
1. Good housekeeping measures for construction materials include:
   a. Maintaining an inventory of the products used and/or expected to be used and the end products that are produced and/or expected to be produced.
   b. Covering and berming loose stockpiled construction materials (e.g. soil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.).
   c. Storing chemicals in watertight containers or in a bermed storage shed (completely enclosed) with appropriate secondary containment.
   d. Minimizing contact of construction materials with precipitation.
   e. Implementing BMPs to reduce or prevent the offsite tracking of loose construction and landscape materials.
2. Good housekeeping measures for waste management include:
   a. Preventing disposal of any rinse/wash waters or materials into the storm drain system.
   b. Berming sanitation facilities (e.g. Porta Potties) and preventing them from being kept within the curb and gutter or on sidewalks or adjacent to a storm drain.
   c. Cleaning or replacing sanitation facilities and inspecting them regularly for leaks and spills.
   d. Covering waste disposal containers when they are not in use and preventing them from overflowing.
   e. Berming and securely protecting stockpiled waste material from wind and rain at all times unless actively being used where a spill or spills would enter surface drainage systems.
   f. Implementing procedures to deal with hazardous and non-hazardous spills.
   g. Preparing and implementing a spill response and implementation plan prior to commencement of construction activities, including:
      i. Locations of onsite equipment and materials for cleanup of spills and leaks.
      ii. Procedures to follow in the event of spill or leak that includes immediate cleanup.
      iii. Locations and procedures of disposing of waste materials.
      iv. Identification of and training for spill response personnel.

h. Lining and berming of concrete washout areas so there is no leakage or overflow into the underlying soil or the surrounding areas. Washout areas must be positioned away from drain inlets and waterways and be clearly labeled.

3. Good housekeeping measures for vehicle storage and maintenance include:
   a. Not allowing oil, grease, or fuel to leak in to the soil.
   b. Placing all equipment or vehicles to be fueled, maintained and/or stored in a designated area fitted with appropriate BMPs.
   c. Cleaning leaks immediately and disposing of leaked materials and sorbents properly.
   d. Fixing leaks immediately or removing equipment for service.
4. To assess the potential pollutant sources and identify all areas of the site where good housekeeping or additional BMPs are necessary to reduce or prevent pollutants in storm water discharges and non-storm water discharges, the applicant must assess and report on the following:
   a. The quantity, physical characteristic (liquid, powder, solid, etc.), and locations of each potential pollutant source handled, produced, stored, recycled, or disposed of at the site.
   b. The degree to which pollutants associated with those materials may be exposed to and mobilized by contact with storm water.
   c. The direct and indirect pathways that pollutants may be exposed to storm water discharges and non-storm water discharges. This must include an assessment of past spills or leaks, non-storm water discharges, and discharges from adjoining areas.
   d. Sampling, visual observation, and inspection records.
   e. Effectiveness of existing BMPs to reduce or prevent pollutants in storm water discharges and non-storm water discharges.

SOIL & WATER - FIGURE 1

Ivanpah Solar Power Project - Local Ground Water Basins



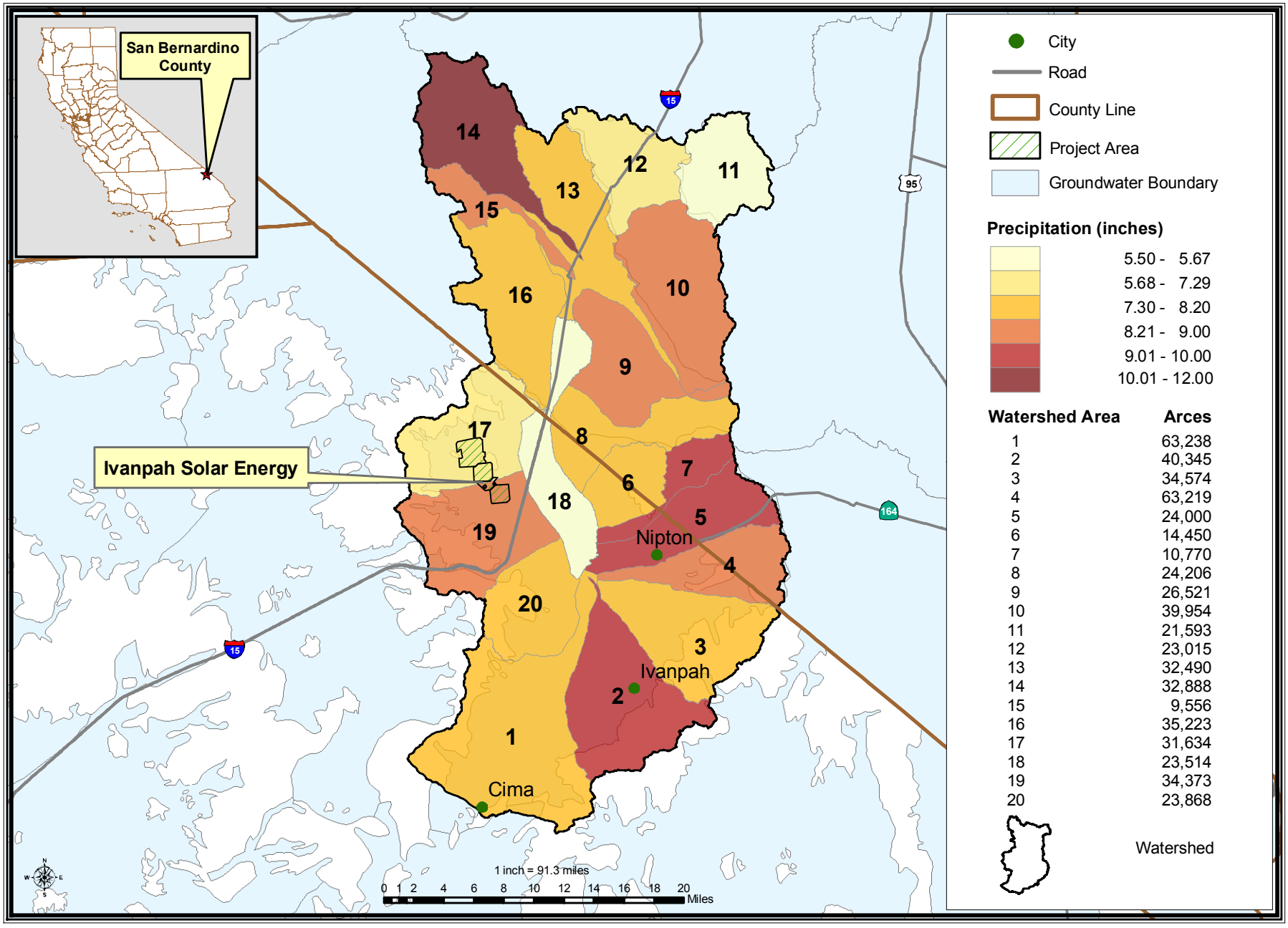
U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009

SOURCE: California Energy Commission - USGS 100K TOPO

SOIL AND WATER - FIGURE 2

Ivanpah Solar Power Project - 1971 to 2000 Annual Average Precipitation with PRISM

OCTOBER 2009



PRECIPITATION

CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009

SOURCE: Precipitation - USDA Geospatial Data Gateway, PRISM Group (Oregon State University). Watershed - AFC Volumne 1 (2007), DWR California, DWR Nevada.

TRAFFIC AND TRANSPORTATION

Prepared by Jason Ricks and James Jewell

SUMMARY OF CONCLUSIONS

U.S. Bureau of Land Management (BLM) and Energy Commission staff (hereafter jointly referred to as staff) have analyzed the traffic-related information provided in the Application for Certification and other sources to determine the potential for the Ivanpah Solar Electric Generating System Project (ISEGS) to have significant adverse traffic and transportation-related impacts. Staff has also assessed the availability of mitigation measures that could reduce or eliminate the significance of these impacts.

Neither construction nor operation of the project would have a significant adverse impact on the local or regional road network, except for northbound Interstate 15 (I-15) on Friday afternoons and evenings related primarily to motorists enroute to Las Vegas. Vehicle trips generated during construction and operation of the project would contribute to a significant adverse direct and cumulative impact on northbound I-15 on Fridays between the hours of 12 p.m. and 10 p.m. during construction and operation.

To reduce project impacts on area traffic and to facilitate safety during construction, the applicant has proposed to limit the amount of project-related traffic generated on area roadways on Friday afternoons. To mitigate the ISEGS impact on area traffic to the extent possible during construction and operation to a less-than-significant level, and in particular on northbound I-15 on Friday afternoons, staff has incorporated the applicant's proposal along with other mitigation into Condition of Certification **TRANS-1**. Staff has determined that, with the implementation of the Traffic Control Plan required by proposed Condition of Certification **TRANS-1**, construction and operation of the ISEGS would not cause a direct significant impact on northbound I-15 on Friday afternoons, but would contribute to a cumulatively considerable significant impact on northbound I-15 on Friday afternoons. Condition of Certification **TRANS-2** is recommended to ensure the repair of physical damage to area roadways caused during project construction.

Because the project has the potential to result in exposure of aircraft pilots, motorists, and hikers to solar radiation reflected from project heliostats and/or power tower receivers, Conditions of Certification **TRANS-3** and **TRANS-4** are recommended to ensure that potential glare from the project is minimized to the maximum extent possible and does not pose a health and safety risk. In addition, because the project would place structures greater than 200 feet in height in the vicinity of military flight training routes and air traffic from the proposed Southern Nevada Supplemental Airport, staff has proposed Condition of Certification **TRANS-5** to ensure the project complies with FAA recommendations for lighting of tall structures. Condition of Certification **TRANS-6**, which would require notifying the FAA of potential air hazards from turbulence at an altitude of 1,350 feet above the ground surface above the ISEGS site during daylight hours. Conditions of Certification referred to herein serve the purpose of both the Energy Commission's Conditions of Certification for purposes of the California Environmental Quality Act (CEQA) and BLM's Mitigation Measures for purposes of the National Environmental Policy Act (NEPA).

The Ivanpah Solar Electric Generating System Project, as proposed would be consistent with all applicable laws, ordinances, regulations, and standards, including the Circulation and Infrastructure Element of the County of San Bernardino General Plan.

INTRODUCTION

In the **Traffic and Transportation** analysis of this Final Staff Assessment/Draft Environmental Impact Statement (FSA/DEIS), staff addresses the extent to which the project may impact the transportation system in the local area. This analysis focuses on (1) whether construction and operation of the Ivanpah ISEGS Project would result in traffic and transportation impacts under the California Environmental Quality Act (CEQA) and (2) if the project would be in compliance with applicable laws, ordinances, regulations, and standards (LORS).

In this analysis staff identifies the (1) the roads and routings that are proposed for use for construction and operation; (2) potential traffic-related problems associated with the use of those routes by construction workers and truck drivers; (3) anticipated encroachments upon public rights-of-way during the construction of the proposed project and associated facilities; (4) frequency of trips and probable routes associated with the delivery of hazardous materials; (5) possible effect of project operations on local airport flight traffic; and (6) potential health and safety effects of project-related glare..

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Traffic and Transportation Table 1 provides a general description of adopted federal, state, and local LORS pertaining to traffic and transportation relevant to the proposed project.

Traffic and Transportation Table 1
Laws, Ordinances, Regulations, and Standards

Applicable Law	Description
Federal	
Code of Federal Regulations (CFR), Title 14 Aeronautics and Space, Part 77 Objects Affecting Navigable Airspace (14 CFR 77)	This regulation establishes standards for determining physical obstructions to navigable airspace; sets noticing and hearing requirements; and provides for aeronautical studies to determine the effect of physical obstructions to the safe and efficient use of airspace.
CFR, Title 49, Subtitle B	49 CFR Subtitle B includes procedures and regulations pertaining to interstate and intrastate transport (including hazardous materials program procedures) and provides safety measures for motor carriers and motor vehicles that operate on public highways.
State	
California Vehicle Code (CVC), Division 2, Chapter 2.5; Div. 6; Chap. 7; Div. 13; Chap. 5; Div. 14.1; Chap. 1 & 2; Div. 14.8; Div. 15	This code includes regulations pertaining to licensing, size, weight, and load of vehicles operated on highways; safe operation of vehicles; and the transportation of hazardous materials.
California Streets and Highway Code, Division 1, Chapter 3; Division 2 Chapter 5.5	This code includes regulations for the care and protection of state and county highways and provisions for the issuance of written permits.
Local	
SANBAG Regional Transportation Plan	Identifies public policies and strategies for the transportation system in the San Bernardino County region.
SANBAG Congestion Management Plan (CMP)	Requires maintenance of level of service (LOS) E or better on CMP segments.
San Bernardino County General Plan	Establishes regional transportation objectives, policies, and implementation measures for various modes of transportation.
San Bernardino County Code, Title 5, Division 1, Highway Permit	Addresses permitting requirements for oversize/overweight vehicles.

SETTING

The project site is located approximately one mile west of the Yates Well Road interchange on Interstate 15 (I-15) in San Bernardino County, approximately 3.1 miles west of the California-Nevada border. Access to the site is via the Yates Well Road interchange on I-15 and Colosseum Road (BSE 2007A, p. 2-3). The project site is

vacant with the exception of a 115 kV electrical transmission line (BSE 2007A p.2-4) and the two-lane Colosseum Road. The ISEGS would be comprised of three separate solar energy power plants: Ivanpah 1, Ivanpah 2, and Ivanpah 3. This FSA/DEIS addresses construction and operation of all three facilities.

The project site is surrounded by open space with the exception of a golf course located approximately one mile east of the site.

Parking for construction workers would be provided at the on-site laydown areas located on the outside edges of the heliostat fields (BSE 2007A, p. 2-17).

CRITICAL ROADS AND FREEWAYS

Traffic and Transportation Figure 1 and Figure 2 show the regional and local transportation features as described in the Application for Certification (AFC).

Information about critical roadways follows. This information is based on the Traffic and Transportation section of the AFC (BSE 2007A, p.5.12-9) as well as traffic data from the California Department of Transportation (Caltrans) and the County of San Bernardino.

Interstate 15 (I-15)

I-15 is a north-south divided freeway linking Los Angeles, California, to Las Vegas, Nevada. I-15 also extends from California through Nevada, Utah, Idaho, and Montana. Access from I-15 to the project site is provided via Yates Well Road. At this location I-15 consists of two lanes in each direction. Caltrans reports that I-15 carries approximately 59,690 daily vehicle trips near the ISEGS site (Caltrans 2007a).

Yates Well Road

Yates Well Road is a two-lane east-west local road providing direct access to I-15 (Caltrans 2007b). The ramp terminal intersections at the I-15/Yates Well Road Interchange are stop-controlled. No other controlled intersections exist on Yates Well Road in the vicinity of the project (BSE 2007A, p.5.12-9). San Bernardino County reports that Yates Well Road carries approximately 249 daily vehicle trips between I-15 and Colosseum Road (COSB 2007).

Colosseum Road

Colosseum Road, an east-west two-lane direct road, provides access to the site and the Primm Valley Golf Club. Colosseum Road is located both on and immediately to the east of the project site and connects to Yates Well Road. The County of San Bernardino does not have any traffic counts on record for Colosseum Road (COSB 2007).

LEVEL OF SERVICE

“Level of service” (LOS) is a qualitative measure used to describe operational conditions within a traffic stream. LOS is used to describe and quantify the congestion level on a particular roadway or intersection in terms *speed*, *travel time,* and *delay.* The 2000

Highway Capacity Manual[1] defines six levels of service for roadways or intersections ranging from LOS A-- the best operating conditions--to LOS F—the worst. See **Traffic and Transportation APPENDIX A** for additional information.

The County of San Bernardino uses the LOS criteria to assess the performance of its street and highway system and the capacity of roadway segments (COSB 2007). The County's Threshold Standards Policy requires that LOS C or better be maintained on roadway segments under the County's jurisdiction (COSB 2006).

The San Bernardino Associated Governments (SANBAG) has adopted a Congestion Management Program (CMP). The CMP defines a network of state highways and arterials, level of service standards, and related procedures. The CMP's level of service standard requires all CMP segments to operate at LOS E or better. I-15 is a CMP roadway.

Traffic and Transportation Table 2 includes information about the existing LOS for potentially affected intersections in the project area. LOS A represents free-flowing traffic; whereas, LOS F represents slow-moving or stalled traffic (overcapacity operation). All intersections currently operate at LOS A.

Traffic and Transportation Table 2
Existing Intersection Level of Service

Intersection	AM Peak Hour	PM Peak Hour
Colosseum Road at Yates Well Road Westbound left/through approach	A	A
Colosseum Road at Yates Well Road Northbound left/right approach	A	A
I-15 southbound ramps at Yates Well Road Westbound left/through approach	A	A
I-15 southbound ramps at Yates Well Road Southbound left/through/right approach	A	A
I-15 northbound ramps at Yates Well Road Eastbound left/through approach	A	A
I-15 northbound ramps at Yates Well Road Northbound left/through/right approach	A	A

Source: BSE 2007A, page 5.12-11

Traffic and Transportation Table 3 includes information about the existing volume-to-capacity (V/C) ratios and LOS for potentially affected roadway segments in the project vicinity.

[1] The *Highway Capacity Manual* is the most widely used resource for traffic analysis. The Highway Capacity Manual is prepared by the Transportation Research Board, Committee on Highway Capacity and Quality of Service. The current edition was published in 2000.

Traffic and Transportation Table 3
Average Daily Level of Service Summary for Existing Conditions

Name	Design Capacity	Volume[1]	V/C[2]	LOS[3]
Colosseum Road	3,000	NA	NA	A
Yates Well Road	6,000	249	0.04	A
I-15 NB & SB	72,000	59,690	0.83	C

1. Volume data for Colosseum Road a 2-lane dirt road is not maintained, however, based on field observation, this road is seldom used (BSE 2007A, p. 5.12-17). Sources of capacity and volume data for Yates Well Road and I-15 are, TRB 2000, COSB 2007, and Caltrans 2007a.
2. V/C = volume-to-capacity ratio;
3. LOS = level of service

Although I-15 operates at LOS C or better most days of the week (Monday through Thursday), northbound I-15 experiences increased traffic volumes on Friday afternoons because of commuter and tourist traffic from California to Las Vegas, Nevada. On most days, as presented in **Traffic and Transportation Table 3**, I-15 experiences an average daily traffic volume of approximately 60,000 trips—or an hourly average of approximately 1,200 trips. However, on Fridays from approximately 12 p.m. to 10 p.m., northbound I-15 experiences an hourly average that ranges between approximately 1,700 and 2,000 trips and operates at LOS F (BSE 2007A, p. 5.12-11 and Figure 5.12-5).

RAILWAYS

An active Union Pacific Railroad line exists approximately five miles east of the project site (BNSF 2005). Project construction traffic is not expected to cross this rail line (BSE 2007A, p. 5.12-11).

PUBLIC TRANSPORTATION

No public transit service exists in the vicinity of the project site. Amtrak serves the corridor via bus only, with service between Las Vegas and Los Angeles. Many private bus companies operate on demand for Primm Valley Golf Club customers; but no established regular schedule exists (BSE 2007A, p. 5.12-11).

BICYCLE ROUTES

No bicycle facilities exist in the project area (BSE 2007A, p. 5.12-11).

AIRPORTS

One existing public airport, Jean Airport, is located approximately 14 miles northeast of the project site and one mile south of Jean Nevada. In addition, the Southern Nevada Supplemental Airport is proposed for the same area. Jean Airport has two paved runways that serve less than 50 aircraft, most of which are single engine airplanes and gliders (AirNav.com 2008).

In addition, the Federal Aviation Administration (FAA) and the Bureau of Land Management (BLM) are currently preparing an Environmental Impact Statement for a proposed Southern Nevada Supplemental Airport to be constructed on approximately 6,000 acres of land just south of Jean, Nevada (VHB 2008). As currently planned, the proposed Southern Nevada Supplemental Airport would provide sufficient airport capacity to accommodate future aircraft operations and aviation passenger demand in

the Las Vegas Metropolitan Area (VHB 2008). The proposed ISEGS would be located approximately 40,000 feet (7.6 miles) southwest of the nearest runway at the proposed Southern Nevada Supplemental Airport.

ASSESSMENT OF IMPACTS AND MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

To determine whether a potentially significant impact would be generated by a project, staff reviewed the project using the criteria found in the CEQA Guidelines, Appendix G, Environmental Checklist Form, and applicable LORS used by other governmental agencies. Specifically, staff analyzed whether the proposed project would:

- Cause an increase in traffic, which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume-to-capacity ratio on roads, or congestion at intersections)
- Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways
- Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks
- Generate glare that could present a hazard to roadway vehicle traffic or aircraft
- Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)
- Result in inadequate emergency access
- Result in inadequate parking capacity
- Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks).

In addition staff analyzes two additional potential traffic and transportation impacts concerning (1) nearby school operations and (2) transportation of hazardous materials. However, no schools are located within at least 30 miles of ISEGS site. Consequently, this FSA/DEIS does not contain such an analysis. However, an analysis of the impacts of transporting hazardous materials may be found in the Operation Impacts and Mitigation Section.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Proposed Project - Construction Impacts and Mitigation

Total Construction Traffic

Facility construction is projected to take place over 48 months, beginning in first quarter 2009 and completed in last quarter 2012. Construction activities would generally occur from Monday through Saturday between the hours of 5 a.m. and 7 p.m. However, additional hours may be necessary to compensate for schedule deficiencies or to

complete critical construction activities. **Traffic and Transportation Table 4** contains peak construction traffic estimates for the ISEGS.

Traffic and Transportation Table 4
Daily and Peak Hour Estimated Construction Trip Generation

Trip Type	Average Daily Traffic	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Container trucks for heliostat fields	7	7	0	7	0	7	7
Delivery trucks for power block	2	2	0	2	0	2	2
Heavy vehicles for power block	3	3	0	3	0	3	3
Worker Busses	39	39	0	39	0	39	39
Private Vehicles	192	192	0	192	0	192	192
Total Construction Traffic	**243**	**243**	**0**	**243**	**0**	**243**	**243**

Source: BSE 2007A, p. 5.12-15

Assumptions on which the information in Table 4 is based follow.

1. Sixty percent of the 959 staff would arrive to the site by bus transport (15 people per bus) and 40 percent of staff would arrive by private vehicle typically with two persons per vehicle. During peak construction, workers would commute to the site in 39 busses and 192 private vehicles for a total of 231 trips. As included in **Traffic and Transportation Table 4,** delivery of construction materials during peak construction would require seven container trucks for heliostat fields; two delivery trucks for the power block; and three heavy vehicles for the power block, for a total of 12 truck trips per day (BSE 2007A, p 5.12-15). Therefore, a total of 243 construction vehicles are expected to drive to the site each day during peak construction.

2. Ninety-five percent of workers in private vehicles (183 vehicles) would originate in Las Vegas, Nevada. The remaining five percent of workers (9 private vehicles) as well as the trucks transporting the heliostats and power bloc would travel from California. Therefore, a total of 227 vehicles would travel from Nevada (39 busses; 183 private vehicles; 5 power block item deliveries) and 16 vehicles (9 private vehicles and 7 heliostat item deliveries) would travel from California (BSE 2007A, p 5.12-15). Although construction materials would likely arrive at the site throughout the day, all construction-related trips would arrive at the project site during the AM peak hour and would depart the site during the PM peak hour.

An HCM (Highway Capacity Manual) intersection analysis was conducted for the six approaches that would be directly affected by project construction traffic. Peak construction period intersection volumes were generated by adding the project peak intersection volumes to the existing peak intersection volumes. **Traffic and Transportation Table 5** includes information about the change in LOS with the addition of project peak construction traffic during the morning and afternoon peak hours.

Traffic and Transportation Table 5
Peak Hour Levels of Service During Project Peak Construction

Intersection	Existing				With Project			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Trips	LOS	Trips	LOS	Trips	LOS	Trips	LOS
Colosseum Road at Yates Well Road ; westbound left/through approach	7	A	26	A	7	A	269	A
Colosseum Road at Yates Well Road' northbound left/right approach	26	A	7	A	269	A	7	A
I-15 southbound ramps at Yates Well Road; westbound left/through approach	8	A	7	A	24	A	3	A
I-15 southbound ramps at Yates Well Road; southbound left/through/right approach	26	A	3	A	253	A	248	A
I-15 northbound ramps at Yates Well Road; eastbound left/through approach	5	A	3	A	5	A	3	A
I-15 northbound ramps at Yates Well Road; northbound left/through/right approach	8	A	19	A	24	A	246	B

Source: BSE 2007A, page 5.12-11, Figure 5.12-3, and Figure 5.12-4; and CH2ML 2008a.

As indicated in **Traffic and Transportation Table 5**, all intersections would continue to operate at an acceptable level of service (LOS C or better) in the morning and afternoon peak hours with the addition of peak construction traffic. Construction traffic would result in a change to the level of service at the intersection of the I-15 northbound ramps and Yates Well Road from LOS A to LOS B during the PM peak hour. However this change would not be significant because it would be above LOS C.

Traffic and Transportation Table 6 includes information about the predicted change to critical road segment LOS levels during construction of the ISEGS. As indicated in the table, project-related construction traffic would not cause the LOS on project area roadway segments to decline. All roadway segments would continue to operate at LOS C or better.

Traffic and Transportation Table 6
Intersection LOS Analysis with Project Construction Traffic

Roadway Segment on Main Street	Capacity (vehicle/ day)	Existing			Construction Traffic (vehicle/day)	With Project		
		Volume (vehicle/ day)	V/C	LOS		Volume (vehicle/ day)	V/C	LOS
Colosseum Road	3,000	NA	NA	A	243	0.08	NA	A
Yates Well Road	6,000	249	0.04	A	243	492	0.08	A
I-15 NB & SB	72,000	59,690	0.83	C	243	59,933	0.83	C

Volume data for Colosseum Road a 2-lane dirt road is not maintained, however, based on field observation, this road is seldom used and is therefore assumed to operate at LOS A (BSE 2007A, p. 5.12-17).
Sources of capacity and volume data for Yates Well Road and I-15 are: TRB 2000, COSB 2007, and Caltrans 2007a, respectively.
V/C = volume-to-capacity ratio;
LOS = level of service

As indicated previously, northbound I-15 currently operates at LOS F on Friday afternoons. The proposed project would add 227 vehicles during construction to northbound I-15 on Friday afternoons, a time at which traffic on this road is already highly congested. Because of the high volume of existing vehicle traffic on this roadway at this time, the addition of project traffic would exacerbate existing congestion on I-15, particularly in the area of Yates Well Road. Therefore, project traffic would cause an increase in traffic, which is substantial in relation to the existing traffic load and capacity of I-15.

Because northbound I-15 is already highly congested on Friday afternoons, and project-related construction traffic would exacerbate congestion in the area of Yates Well Road, project impacts on northbound I-15 on Fridays are considered significant (BSE 2007A, p. 5.12-16). To limit the proposed project's contribution to existing congestion on northbound I-15 on Friday afternoons, staff has proposed Condition of Certification **TRANS-1**, which would require development and Energy Commission staff approval of a traffic control plan that must include methods to substantially reduce the project's impact on I-15 traffic, such as staggering the departure of construction workers from the ISEGS site on Friday afternoons and/or establishing a carpool/vanpool incentive program. Staff believes that with proper implementation of the traffic control plan, project traffic accessing northbound I-15 from Yates Well Road would be distributed at sufficient intervals to reduce the congestive effect of project traffic along this segment of I-15 on Friday afternoons during construction to a less-than-significant level (i.e. fewer cars would be attempting to merge into congested I-15 traffic from the Yates Well Road on-ramp at any given time).

Regarding existing levels of service, the addition of 243 vehicle trips to Yates Well Road would not result in a significant impact. However, because this road is primarily traveled by recreationists--people traveling to the Primm Valley Golf Club and to desert recreation activities such as photography, off-highway vehicle riding, and so forth--proposed Condition of Certification **TRANS-1** also requires adequate signage along Yates Well Road as well as on the northbound and southbound I-15 off-ramps at Yates Well Road to alert travelers to the presence of construction vehicles.

Additionally, construction truck traffic could result in unexpected damage to Yates Well Road and I-15 freeway ramps. Therefore, staff is proposing Condition of Certification **TRANS-2** to require that any project construction-related damage to Yates Well Road or I-15 freeway ramps be repaired to their original condition, prior to the start of project construction.

Construction Workforce Parking and Laydown Area

The approximately 231 vehicles used to transport workers to the proposed project site during the peak construction period would park onsite. Private vehicles and busses would be parked at the approximately 377-acre laydown area at the project site (BSE 2007A, p.5.12-17; CH2ML 2008b, p.5-1). Although the precise number of available parking spaces is unknown, using a conservative assumption of 12 feet by 25 feet of area for one parking space, the applicant would need an approximate area of at least 69,300 square feet (1.5 acres) to accommodate 192 private vehicles and 39 busses. The 377-acre laydown are would be more than adequate to park 231 vehicles.

Hazards Due to a Street Design Feature

Primary access to the ISEGS site would be from Colosseum Road, which runs through the Ivanpah 2 site. However, prior to construction, this road would be realigned to run between Ivanpah 1 and Ivanpah 2 (BSE 2007A, p.5.12-17). The project site is comprised of mostly vacant desert land except for Colosseum Road and the electrical transmission line that traverses the site.

Most of the land surrounding the project site is unimproved with the exception of the two-lane unpaved Colosseum Road located adjacent to the site and the electrical transmission line (these features are located both on and adjacent to the project site). The entrance to the ISEGS site would be graded to dimensions to accommodate construction trucks; therefore, no impacts are expected to occur as a result of a street design feature.

Linear Facilities

The proposed project would use potable water from wells located at the northwest corner of the Ivanpah 1 site. Fire suppression water would be stored onsite in a raw water tank reserved for that purpose at each of the three power plants (CH2ML2009f).

All process wastewater is recycled in the system. Sanitary wastewater would be discharged into a septic system within the logistics area for the administration, operations and maintenance buildings. Portable toilets would be used at each of the three power plants. Therefore, because all water and wastewater pipelines would be constructed within the boundaries of the proposed ISEGS development, there would not be any traffic and transportation impacts resulting from these project linear facilities (CH2ML2009f).

Natural gas would be supplied to the site through a new six-mile long distribution pipeline that would run along the perimeter of the Ivanpah 3 and Ivanpah 2 sites. The line would cross Colosseum Road. Additionally, an approximately 1.6-mile segment of this roadway would be rerouted through the project site CH2ML2009f. Construction activities related to pipeline construction and rerouting would temporarily preclude public

use of Colosseum Road. The County of San Bernardino does not have any traffic counts (COSB 2007) for this unpaved rural portion of Colosseum Road, which connects Yates Well Road to other unpaved rural roads. Traffic on this road has been observed by staff to be extremely low to nonexistent; however, Colosseum Road can experience higher volume traffic for various recreation events and activities that occur in the vicinity. However, measures included in Condition of Certification **TRANS-1**, would require that traffic on this roadway be rerouted through the use of detours to ensure continuous access to the areas serviced by Colosseum Road.

Ivanpah 1, 2, and 3 would be interconnected to the grid through a new Ivanpah Substation utilizing 115-kV generation tie lines within the ISEGS development. The project would include a 220-kV upgrade to Southern California Edison's existing 115-kV line passing through the site on a northeast-southwest right-of-way over a 36-mile section from the new Ivanpah Substation to the existing Eldorado Substation in Nevada. Ivanpah 1 would be connected to the substation with a 5,800-foot-long line; Ivanpah 2, through the substation with a 3,900-foot-long line; and Ivanpah 3 would be connected through the substation with a 14,100-foot-long line. Construction of the new Ivanpah Substation and the generation tie lines would all be within the ISEGS development and the upgrade to SCE's transmission line would be within the existing transmission right-of-way. Therefore, transmission line interconnection and upgrades would not require public road closure and would not affect traffic (CH2ML2009f).

The proposed Ivanpah Substation would also require that new telecommunication infrastructure be installed to provide protective relay circuit and a supervisory control and data acquisition (SCADA) circuit, together with data and telephone services. The telecommunication path from Ivanpah Substation to the local carrier facility interface at Mountain Pass area consists of approximately eight miles of fiber optic cable to be installed overhead on existing poles and through new underground conduits to be constructed in the substation and telecom carrier interface point. This fiber optic route consists of two segments. The first segment is from Ivanpah Substation to Mountain Pass Substation using the existing Nipton 33-kV distribution line poles built along the transmission line corridor that crosses between Ivanpah 1 and 2. The second segment is from Mountain Pass Substation to the telecommunications facility approximately 1.5 miles away at an interface point to be designated by the local telecommunication carrier. The fiber cable would be installed on the existing 12-kV distribution line poles. The construction of the telecommunication facilities within existing right-of-way of the distribution lines would not affect traffic (CH2ML2009f).

Proposed Project - Operation Impacts and Mitigation

Operation Workforce Traffic

The operational phase of the proposed project would require 90 employee commutes, or 180 daily trips. Thirty employees are required for the daytime shift. The remaining 60 employees work on the night time shift and would not travel during the peak hours (BSE 2007A, p.5.12-17). However, it is assumed that the daytime workforce of 30 would travel from the Las Vegas area during the AM peak hours and to the Las Vegas area during the PM peak hours.

Thirty operational trips added to I-15 during peak hours would not represent a substantial increase in traffic volume and would not result in a significant impact Monday through Thursday. However, as indicated previously, northbound I-15 operates at LOS F on Friday afternoons and into the late evening. The number of project-related vehicles added to northbound I-15 on Friday afternoons would be minor compared to the number of vehicles traveling on northbound I-15 during the same time. However, because the project would exacerbate existing congestion on I-15 in the area of Yates Well Road, project impacts on northbound I-15 on Friday afternoons are considered significant. To limit the proposed project's contribution to existing congestion on northbound I-15 on Friday afternoons, staff has proposed Condition of Certification **TRANS-1**, which would require development and Energy Commission staff approval of a traffic control plan that must include methods to substantially reduce the project's impact on traffic on I-15, such as staggering the departure of operational employees from the ISEGS site on Friday afternoons and/or establishing a carpool/vanpool incentive program.

Condition of Certification **TRANS-1** would reduce the impact from project operation-related traffic on northbound I-15 to a less-than-significant level. Staff consulted with Dan Kopulsky of Caltrans District 8 on the content of staff's proposed Condition of Certification **TRANS-1**, and Mr. Kopulsky indicated that although the addition of any project-related trips would be considered adverse, with the expected vehicle reductions from implementation of Condition of Certification **TRANS-1**, these impacts would be less than significant (Kopulsky 2008).

Operational employees would park in a parking lot provided at Ivanpah 1. The onsite parking is expected to be large enough to accommodate at least 60 vehicles, therefore, operation of the ISEGS is not expected to result in an inadequate parking capacity.

Proposed Project - Glare

Glare is defined as difficulty seeing in the presence of bright light such as direct or reflected sunlight or other light. Glare is caused by a substantial ratio of luminance (brightness) between a field of view and the glare source. Because the proposed project involves the use of mirrors to direct reflected sunlight at power tower receivers, the potential exists for glare to be observed by motorists on adjacent roadways and aircraft pilots. The analysis below addresses two different aspects of glare from sunlight:

1. energy in consideration of human safety from the energy intensity that could be potentially absorbed by the retina, or in other words, the potential for light to result in damage to the retina as evaluated in units of kilowatts per square meter (kw/m^2); and

2. luminance or brightness perceived by observers as evaluated in units of candelas per square meter (cd/m^2).

Energy and Safety

There are currently no regulations specific to light reflected from solar plants, however, potential safety effects of solar radiation from the proposed project have been analyzed within the context of principles and procedures developed for beam safety in the Solar 1 experimental plant at Daggett, California, as conducted by the Sandia National

Laboratories (Sandia Report SAND83-8035 by T.D. Brumleve), which identified the following maximum permissible exposure (MPE) limits for reflected sunlight:

- MPE for momentary exposure (for a period of 0.25 second or less) is 10 kw/m^2
- MPE for continuous exposure (for a period greater than 0.25 second) is 1 kw/m^2 (LIA 2009)

Heliostat Energy and Safety

With regard to heliostat safety, the highest intensity of solar radiation that could be directly reflected from a single heliostat would occur at its focal distance of 500 meters and would be 3.125 kw/m^2 (CH2ML 2008a). Because this level of solar radiation is well below the MPE for momentary exposure of 10 kw/m^2, an observer, such as a motorist or pilot, would not experience retinal injury in the event of sunlight being directed away from the power tower receiver and reflected towards an observer as a momentary exposure. However, this solar radiation would exceed the MPE for continuous exposure of 1 kw/m^2, and the potential would exist for a person to experience injury if he or she stared directly into the reflected solar radiation without blinking or looking away.

It is important to note that the intensity of reflected light and solar radiation substantially diminishes as distance from the source increases. For example, at 1,000 meters from the heliostat, the highest intensity of solar radiation would be less than 1 kw/m^2 (CH2ML 2008a). Locations where an observer could potentially be exposed to solar radiation above the 1 kw/m^2 MPE for continuous exposure (should the heliostat(s) be directed to cause such an effect) would be from low-altitude aircraft passing over the project or when an observer is on foot or in a vehicle, in both cases within 1,000 meters of one or more heliostats.

During daylight hours, the heliostats would normally pivot within the range of the stowed position (mirrors facing vertically upwards) to the track position (various angles ranging from facing horizontally to nearly vertical). At night, the heliostats would normally be maintained in the stowed position. Approximately every 2 weeks, the heliostat would pivot from the stowed position to the wash position for night-time mirror washing (mirrors facing horizontally). Daily positioning of the heliostats would occur as follows:

1. At dawn, when likely all heliostats would be moved from stowed to track position to begin reflecting solar energy to the receiver/boiler;

2. During mid-day, when some heliostats would be returned to the stowed position to not exceed solar energy capacity limits of the receiver/boiler;

3. During late-afternoon or evening, when the stowed heliostats would be returned to track position to increase solar energy directed to the receiver/boiler as the sun's position begins to lower in the western horizon and be less optimal for energy production;

4. At nightfall, when all heliostats would be returned to the stowed position or to the wash position for mirror washing at a frequency of about once every two weeks.

The aiming control system of the heliostats uses optimization software to instruct the solar field controller where each heliostat should aim to maximize solar energy collection and output. The software accounts for the light flux intensity and distribution required for the four faces of the receiver/boiler and various other conditions such as sun radiation, wind, air pressure, and the number of heliostats available for tracking. When computing the optimal aiming policy, the control system factors in the differences between heliostats with respect to their tracking accuracy, the intensity of the beam they reflect, the shape of the beam and other relevant aspects. The applicant has indicated that the optimization software would also prevent the mirrors from being aimed toward the freeway or the Primm Valley Golf Course at an angle that would reflect sunlight near the ground surface (CH2ML 2009f).

Assuming all mirrors are returned to the stowed position (facing vertically upwards) before dawn, staff has identified three circumstances under which an observer could potentially be exposed to reflected solar radiation from one or more heliostats, including:

1. **Energy Capacity Regulation**. During mid-day, when some heliostats would be returned to the stowed position to avoid exceeding the solar energy capacity limits of the receiver/boiler, which would result in the potential for sunlight to be reflected upward at angles that could be observed by pilots of aircraft flying over or past the site. Depending on the time of day at which a mirror is in the stow position and the orientation of the mirror, solar radiation could be reflected toward offsite site observers on roadways, in the airspace above the site, or at elevated positions on the ground (such as in foothills near the site);

2. **Technical Malfunction**. Solar radiation could be reflected offsite as a result of a technical malfunction if the mirror position was such that it would reflect sunlight toward an observer;

3. **Maintenance**. During day-time maintenance if the heliostat was moved from the stowed to the wash position and passed momentarily through a position that would reflect sunlight to an observer;

Staff expects that for all of the scenarios described above, in most cases, exposure to solar radiation reflected from heliostats would be momentary because the observers would most likely be in motion—traveling either by vehicle or aircraft. The applicant has indicated that in the event that a heliostat was not aimed at the receiver/boiler, never would more than one heliostat be aimed at a single location or angle in the sky (CH2ML2009w). Circumstances when an observer at ground level may not be in motion and could be exposed to longer than momentary (continuous) reflection could occur when hikers are in the Clark Mountains, motorists on I-15 are stationary or moving slowly in congested traffic such as during Friday afternoons and evenings, or if an observer is hiking or on a local road in the vicinity of the project and within 1,000 meters. Should any of these potential exposure conditions occur at ground level, this reflected solar radiation would not be expected to exceed the MPE for continuous exposure of 1 kw/m^2, for hikers in the Clark Mountains and motorists on I-15, because they would be beyond 1,000 meters from the heliostat. If observers were on-foot or in a vehicle within 1,000 meters of heliostats that were misdirected, then they could be exposed to reflected solar radiation exceeding the MPE for continuous exposure. While

the brightness of light reflected from heliostats would likely cause observers to avoid looking directly into the light for longer than a fraction of a second, it is not conclusive to staff that personal reaction to bright light would adequately mitigate this risk of exposure that could cause retinal injury to one's eyes.

Circumstances when a viewer from an aircraft could be exposed to continuous reflected solar radiation at a level exceeding the continuous MPE threshold could occur when an aircraft is within 1,000 meters altitude above the heliostats and the solar radiation from a number of heliostats created a continuum of reflection in the sky, such as could occur with adjacent rows of heliostats all turned to the stowed position. Aircraft could fly as low as 1,350' (411 meters) above the ground surface, and thus there is potential for exceeding the threshold for continuous exposure. While the brightness of light reflected from heliostats would likely cause observers to avoid looking directly into the light for longer than a fraction of a second, like the potential exposure to observers on the ground, it is not conclusive to staff for observers in aircraft that personal reaction to bright light would adequately mitigate this risk of exposure that could cause retinal injury to one's eyes. In consideration of potential harmful and/or distractive exposure to observers on the ground and airborne and existing military flight paths and those planned with the development of the Southern Nevada Supplemental Airport near Jean, Nevada which would have flight paths over and near the ISEGS site, staff recommends mitigation to reduce the risk of exposure to light reflected from heliostats. Recommended Condition of Certification **TRANS-3** would require the applicant to prepare a Heliostat Positioning Plan that would accomplish the following:

1. Recognize potential sensitive receptors including observers in aircraft, motorists on I-15, hikers in the Clark Mountains and other hikers and motorists who could access locations closer to the project;

2. Identify the heliostat movements and positions that could result in reflected solar radiation from heliostats to be observed by these receptors;

3. Propose a Heliostat Operating Plan that would avoid potential for human health and safety hazards at locations of sensitive receptors including the potential for momentary and continuous solar radiation exposure to occur greater than the thresholds of significance of:

   a. MPE for momentary exposure (for a period of 0.25 second or less) is 10 kw/m^2

   b. MPE for continuous exposure (for a period greater than 0.25 second) is 1 kw/m^2

4. Develop a monitoring plan to verify any ISEGS operational impacts are less than significant, and if impacts are found or reported, that they are investigated and appropriate mitigation proposed and implemented. The monitoring plan should log, investigate and respond to complaints regarding glare.

5. The monitoring plan should be coordinated with the FAA, U.S. Department of the Navy, CalTrans, and Clark County Department of Aviation in relation to the proposed Southern Nevada Supplemental Airport and be updated on an annual basis for the first 5 years, and at 2-year intervals thereafter for the life of the project.

Power Tower Receiver

With regard to power tower receiver safety, the highest intensity of solar radiation expected to be reflected from a single power tower receiver at its surface would be as high as 688 kw/m^2. However, as noted above, the intensity of reflected light and solar radiation diminishes as distance from the source increases. Each tower on which each power tower receiver would be installed would be approximately 140 meters tall (459 feet). Each power tower receiver would be approximately 20 meters high, therefore the bottom of each power tower receiver would be located approximately 120 meters (394 feet) from the ground surface. As shown below in **Traffic and Transportation Table 7**, the intensity of energy reflected from the power tower receiver as experienced at the ground surface (120 meters below) would be approximately 0.048, which is well below the 10 kw/m^2 and 1 kw/m^2 MPEs for momentary and continuous exposure, respectively. Therefore, solar radiation reflected from project power tower receivers is not expected to pose a health and safety hazard to motorists on adjacent roadways, as they would be located even farther from the light source and would experience even lower levels of solar radiation. Additionally, with implementation of condition of certification **TRANS-6**, as described below under hazards to Hazards to Air Navigation, aircraft flying over the project site would be required to fly at least 1,350 feet (411 meters) above the ground surface, which would be approximately 900 feet (274 meters) above the power tower receiver. Therefore, as shown in **Traffic and Transportation Table 7**, the intensity of solar radiation expected to be experienced by pilots flying over the project site attributable to the power tower receivers would be approximately 0.009 kw/m^2, which is well below the MPEs for momentary and continuous exposure. Therefore, solar radiation reflected from project power tower receivers is not expected to pose a health and safety hazard to pilots or passengers in aircraft flying over the site.

Traffic and Transportation Table 7
Energy Reflected from ISEGS Power Tower Receivers

Distance from Receiver		Intensity of Reflected Light	
Meters	**Feet**	**w/m^2**	**kw/m^2**
1	3.3	687,550	687.5
5	16.4	27,502	27.5
10	32.8	6,875	6.88
50	164	275	0.28
100	328	68.8	0.069
120	393	47.8	0.048
140	459	35.1	0.035
150	492	30.6	0.031
200	656	17.2	0.017
250	820	11.0	0.011
274	900	9.2	0.009
500	1,640	2.8	0.003
1,000	3,280	0.69	0.0007

Calculations based on information presented in CH2ML 2009a, CH2ML 2009b.

Luminance and Brightness

There are currently no regulations that are directly applicable to brightness from facilities such as solar plants, however, the Illuminating Engineering Society of North America Recommended Practice for Roadway Sign Lighting includes standards for

lighting of roadway signs. The recommended maintained level of lighted roadway signs is 44 to 89 cd/m^2 (IESNA, 2001). With regard to aircraft pilots, the FAA does not evaluate the potential for glare from proposed projects to affect aircraft (FAA, 2009).

The luminance of several common objects is provided in **Traffic and Transportation Table 8** for reference.

Traffic and Transportation Table 8
Luminance of Common Objects

Object	Luminance (cd/m^2)
Sun	1.6 billion
100-watt lamp	47,000
Compact fluorescent lamp	30,000
Candle flame	10,000
Daylight sky	8,000
Moonlight	2,500

The brightness of reflected light at the surface of a single heliostat would be approximately 1.34 billion cd/m^2 (CH2ML 2009c). Under operating conditions most heliostats would be positioned such that the light reflected from them would be concentrated directly at the power tower receivers. However, as discussed above, staff has identified three circumstances under which an observer could potentially be exposed to light reflected from one or more heliostats. These observers include pilots and passengers of aircraft flying over or near the site, motorists on I-15, hikers in the Clark Mountains and other hikers and motorists who could access locations closer to the project.

The highest intensity of luminance expected to be reflected from a single heliostat, at its surface, would be 1.34 billion cd/m^2 (CH2ML 2009b). In the event of heliostat repositioning or malfunction that resulted in sunlight being directed away from the power tower receiver and into the sky, the luminance of light reflected from a single heliostat as seen by an aircraft flying over the site at a distance of at least 370 meters would be as high as 35 million cd/m^2, or approximately 2% of the brightness of the sun. This level of brightness would be extremely bright and would be temporarily blinding when viewed directly. On one hand, staff could rationalize that the potential for glare from heliostats to pose a significant hazard to navigation of vehicles on adjacent roadways or air traffic flying above or adjacent to the site would not be significant, because:

- viewers of such glare would instinctively divert their eyes from the source;
- the duration of exposure may be very short because light would be reflected at a constant stationary angle and the viewer (motorist or pilot) would be traveling at a high rate of speed (the changing altitude of departing or arriving aircraft at the Southern Nevada Supplemental Airport would also severely limit the potential for any potential exposure to pilots); and

- glare that is bright enough to temporarily impair vision and cause viewers to look away is a common occurrence from other objects in the built and natural environment (such as lakes, building windows, and reflective surfaces such as mirrors and windows on other roadway vehicles).

However, it is not conclusive to staff that personal reaction to bright light would adequately mitigate this risk of exposure that could cause temporary blindness and compromise safety of an observer who may be responsible to navigate an aircraft or vehicle. Therefore, staff is recommending Condition of Certification **TRANS-3** that would require the applicant to prepare a Heliostat Positioning Plan in order to avoid the potential risk to human health and safety.

Brightness of light reflected at the surface of each power tower receiver would be approximately 555,000 cd/m^2 (CH2ML 2009b). As described above, the intensity of solar energy and brightness diminishes as distance from the source increases. As shown below in **Traffic and Transportation Table 9**, the intensity of brightness of light reflected from the power tower receivers at different distances from a power tower receiver. To provide a frame of reference, this table also includes the intensity of brightness of light produced by a 100-watt light bulb as viewed from different distances.

Traffic and Transportation Table 9
Brightness of Light Reflected from ISEGS Power Tower Receivers

Distance		Luminance (cd/m^2)	
Meters	**Feet**	**Receivers**	**100-watt Bulb**
1	3.3	555,000	47,000
5	16.4	22,200	1,880
10	32.8	5,550	470
35	115	453	38.4
50	164	222	18.8
100	328	55.5	4.70
120	394	38.54	3.26
140	459	28.32	2.40
150	492	24.67	2.09
200	656	13.88	1.18
250	820	8.88	0.75
274	899	7.39	0.63
500	1,640	2.22	0.19
1,000	3,281	0.56	0.047
1,448	4,751	0.26	0.02

Calculations based on information presented in CH2ML 2009a, CH2ML 2009b.

Roadway Traffic. As shown above and shown in **Traffic and Transportation Table 9**, the intensity of reflected light diminishes as distance from the source increases. Because the power tower receiver would be located approximately 120 meters (394 feet) from the ground surface, the intensity of brightness that would be experienced by receptors on the ground at the base of the tower would be approximately 38 cd/m^2. This level of brightness is below the standard range of 44 to 89 cd/m^2 for externally lighted roadway signs (as recommended in the Recommended Practice for Roadway Sign Lighting by the IESNA Sign Lighting Subcommittee) and is equivalent to the brightness of a 100-watt light bulb as viewed from a distance of 35 meters (115 feet). Therefore,

the brightness of reflected light from project power tower receivers is not expected to cause temporary blindness or cause retinal damage to motorists on adjacent roadways, as they would be located even farther from the light source and would experience even lower levels of reflected brightness. Specifically, the highest intensity luminance expected to be experienced by drivers on adjacent roadways, including Colosseum Road, Yates Well Road, and I-15 would be less than 38 cd/m^2, which is the same brightness experienced from viewing a 100-watt light bulb from a distance of 35 meters (115 feet).

While the brightness associated with the power tower receivers, and brightness associated with the heliostats if recommended mitigation Condition of Certification **TRANS-3** is implemented, would not cause temporary blindness or retinal damage to motorists or observers from aircraft, specular reflections from the heliostats and diffuse reflections associated with the receivers would certainly be bright enough, and in an unexpected location, so that some observers could be distracted in trying to identify their source. This is not likely to be a safety issue on Colosseum Road, where drivers could slow and stop, but may create a hazard on I-15 due to the high speed of vehicles on that roadway. Because the light reflected from seven 459-foot power towers and the potential reflections from heliostats would be a feature that is out of context in this mostly natural desert setting (with the exception of nearby casinos, commercial businesses, amusement facilities, and billboards), the potential level of distraction to motorists on I-15 is expected to be higher than that of other man-made features in the vicinity. Drivers would expect to see the sun setting or rising on the horizon, but they would not expect to see bright glare off tall towers or mirrors in the desert. Staff has recommended Condition of Certification **TRANS-4** to require verification after commercial operation that power tower receiver luminance does not exceed 89 cd/m^2 at the nearest receptor, to require monitoring over the life of the project to verify that the power tower receiver materials are maintained so as to not exceed this threshold, and to establish a process for complaint processing and resolution.

Air Traffic. With regard to air traffic, with implementation of condition of certification **TRANS-6** (as described below under hazards to Hazards to Air Navigation), aircraft flying over the project site would be required to fly at least 1,350 feet (411 meters) above the ground surface, which would be approximately 900 feet (274 meters) above the power tower receiver. Therefore, as shown in **Traffic and Transportation Table 9**, the brightness of light reflected from the power tower receivers expected to be experienced by pilots flying over the project site would be approximately 7.39 cd /m^2. This level of brightness is equivalent to that of a 100-watt light bulb as viewed from a distance of 80 meters (262 feet). Therefore, brightness of reflected light from project power tower receivers is not expected to pose a safety hazard to pilots of aircraft flying over the site.

The Applicant has provided data and analysis with respect to the expected intensity of energy and luminance of reflected light from the ISEGS project and staff has independently verified the accuracy of the calculations provided and does not disagree with the assumptions provided. However, because of the technology proposed at the ISEGS site is relatively new and has never been implemented at this scale, staff has proposed Condition of Certification **TRANS-4** to ensure that upon operation of the ISEGS, that brightness would not result in a safety hazard to motorists on nearby

roadways and pilots of aircraft flying over the site. **TRANS-4** would require measurements to verify luminance does not exceed 89 cd/m^2 at any of the nearest roads and power plant boundaries to each north, south, east and west face of each power tower for Ivanpah 1, 2 and 3 power plants. Measurements at these locations would verify that public exposure to brightness of light reflected from the power towers does not exceed the established limit as applicable to motorists.

Proposed Project Hazards to Air Navigation

Obstruction Hazards. FAA Regulations, Part 77, Section 77.13(a)(1), require that objects greater than 200 feet tall from the ground surface constructed within three miles of an airport with a runway of more than 3,200 feet in length may present an obstruction hazard to aircraft. Furthermore, obstruction standards presented in 14 CFR 77.25 affecting navigable air space state that an object may present a hazard to air navigation if it penetrates the horizontal departure surface from a distance of 10,000 feet at a slope of 50 to 1 with an additional 40,000 feet at a slope of 40 to 1. The ISEGS would require construction of seven power towers to a height of 469 feet above the ground surface.

No existing airports are located within three miles of the proposed project site. However, one runway of the proposed Southern Nevada Supplemental Airport, that if constructed would be located northeast of ISEGS, is proposed to be located approximately 40,000 feet from the ISEGS site. Therefore, in May 2008, the applicant submitted FAA Form 7460-1 (Notice of Proposed Construction or Alteration) to the FAA. **Traffic and Transportation Table 11** includes information about FAA's review of project towers.

Traffic and Transportation Table 10
Status of FAA Review of Form 7460-1

Tower Number	Location	Aeronautical Study No.[1]	FAA Determination
Power Tower 1	Ivanpah 1	2008-AWP-3209-OE	No Hazard to Navigation
Power Tower 2	Ivanpah 2	2008-AWP-3210-OE	No Hazard to Navigation
Power Tower 3	Ivanpah 3	2008-AWP-3211-OE	No Hazard to Navigation
Power Tower 4	Ivanpah 3	2008-AWP-3212-OE	No Hazard to Navigation
Power Tower 5	Ivanpah 3	2008-AWP-3213-OE	No Hazard to Navigation
Power Tower 6	Ivanpah 3	2008-AWP-3214-OE	No Hazard to Navigation
Power Tower 7	Ivanpah 3	2008-AWP-3215-OE	No Hazard to Navigation

1 Source: Determinations downloaded from https://www.oeaaa.faa.gov/oeaaa/external/portal.jsp, accessed September 9, 2008.
2 Determination is based upon standardized, non-project specific analysis. Applicant has requested that the FAA initiate project specific analysis (CH2ML 2008a).

As included in **Traffic and Transportation Table 10,** the FAA has determined that none of the seven towers would present a hazard to navigation to aircraft from the proposed Southern Nevada Supplemental Airport. Although Power Tower 1 received a determination of no hazard to navigation, it was identified to be within the flight path of Instrument Route 213 (IR-213), a U.S. Navy training flight route (FAA 2008a). However, the U.S. Navy has confirmed that construction of Power Tower 1 would not impose a significant impact to IR-213, and that the Department of the Navy has no objection to the construction (Thompson 2008).

The FAA Determination for each tower includes a recommendation that each tower be marked and/or lighted in accordance with FAA Advisory circular 70/7460-1 K. To ensure that each tower is marked with appropriate lighting, staff has proposed Condition of Certification **TRANS-5.** Condition of Certification **TRANS-5** requires the applicant to implement all FAA recommendations regarding structure lighting for Power Towers 1 through 7. .

Thermal Plumes

When the ISEGS is operating, heat exhaust from the air cooled condensers (ACCs) would have the potential to cause turbulence to low flying aircraft. The intensity of turbulence produced by an ACC is a function of wind speed, solar radiation, and ambient temperature and would therefore vary depending on these conditions. Turbulence intensity would peak during calm or low wind conditions and would not occur at night when the ACC is not in operation. The thermal radiation from the collector tower would be a small fraction of the magnitude of the thermal exhaust from the ACC and it is not considered to provide a thermal source of enough intensity to cause noticeable thermal turbulence impacts to low flying aircraft.

A small aircraft would be subject to potential disruption (i.e. turbulence) from a thermal plume with an average plume velocity of 4.3 m/s or higher (CASA 2004), where the peak velocity is twice the calculated plume average velocity. The velocity of thermal plumes generated by the air cooled condensers at the ISEGS site was calculated based on equations presented in a technical paper (Best 2003) to estimate the worst-case plume vertical velocities. The worst-case ACC operating conditions for the three ACCs were derived from heat balance data available in the AFC (BSE 2007a) and other operating variables (exhaust velocity/temperature increase) are based on staff's experience from other projects. The peak height for thermal plume average velocities of 4.3 m/s for the 200 MW generating area ACC at Ivanpah 3 and the 100 MW generating area ACCs at Ivanpah 1 and 2 would be approximately 1,350 feet and 900 feet, respectively. Therefore, aircraft flying directly over the Ivanpah 3 ACC would have the potential to experience turbulence at an altitude of 1,350 feet or less and aircraft flying directly over either of the Ivanpah 1 or 2 ACCs would have the potential to experience turbulence at an altitude of 900 feet or less.

To ensure that thermal plumes associated with ISEGS operation do not impact aviation activities within the navigable airspace above the site, staff proposes Condition of Certification **TRANS-6** be implemented. This condition would require the applicant to coordinate with the FAA to: 1) notify all pilots using the airspace above ISEGS of potential turbulence from thermal plumes, 2) update all applicable airspace charts to indicate that plume hazards could exist up to an altitude of 1,350 feet above the ground surface, and 3) require pilots to avoid direct overflight of the ISEGS site at or below this altitude during daylight hours.

Therefore, because implementation of this measure would ensure pilots using the airspace above the ISEGS site would be notified to avoid direct overflight of the ISEGS site at or below 1,350 feet during daylight hours this impact would be less than significant.

Proposed Project - Emergency Services Vehicle Access

The San Bernardino County Fire Department (SBCFD) Station No. 53 in Baker, CA would provide service to the proposed project site. Station No. 53 is located approximately 45 miles from the project site and is staffed by three personnel including a full-time Captain and two paid-call firefighters (PCFs), who are supported as needed by other PCFs who live in the local area (SBCFD 2008).

In the event of an emergency at the proposed project site, emergency vehicles would enter the project site via Colosseum Road. Based on the proposed site plan, staff believes emergency services vehicle access is adequate.

Proposed Project - Transportation of Hazardous Materials

Operation of the ISEGS would result in transportation of hazardous materials. Staff has addressed this issue in the **Hazardous Materials Management** section of this FSA/DEIS. As presented in that section, staff believes that during construction and operation of ISEGS, minimal amounts and types of hazardous materials (paint, cleaners, solvents, gasoline, diesel fuel, motor oil, lubricants, 20 percent sulfuric acid, 30% sodium hydroxide, and welding gases in standard-sized cylinders) do not pose a significant risk of either spills or public impacts along any transportation route. Staff therefore does not recommend a specific route.

Although the transportation and handling of hazardous materials can increase roadway hazard potential, impacts associated with the hazardous materials can be mitigated to a level of insignificance by compliance with existing federal and state standards established to regulate the transportation of hazardous substances. These standards constitute a comprehensive regulatory program whose purpose is to ensure the safety of hazardous materials transportation. Staff has assessed the efficacy of these standards and finds that they are successful in minimizing the risks associated with hazardous materials transportation. The applicant stated that delivery of hazardous materials will comply with Caltrans, California Highway Patrol (CHP), and California Vehicle Code (CVC) (BSE 2007A, p. 5.12-18).

Specific sections of the CVC and the California Streets and Highways Code ensure that the transportation and handling of hazardous materials is done in a manner that protects public safety. Enforcement of these statutes is under the jurisdiction of the CHP.

The California Department of Motor Vehicles specifically licenses all drivers who carry hazardous materials. Drivers are required to check weight limits and conduct periodic brake inspections. Commercial truck operators handling hazardous materials are required to take instruction in first aid and procedures on handling hazardous waste spills. Drivers transporting hazardous waste are required to carry a manifest, which is available for review by the CHP at inspection stations along major highways and interstates.

The applicant would be required to comply with all LORS governing the transport, storage, and use of hazardous materials. For a more detailed discussion on the

handling and disposal of hazardous substances, see the **Hazardous Materials Management** section of this FSA/DEIS.

Proposed Project - Closure and Decommissioning Impacts and Mitigation

Following the operational life of 50 years, the project owner would close and decommission the project. Closure of the ISEGS would require a number of worker vehicle trips and truck haul trips to dismantle and haul project infrastructure from the ISEGS site. While the number of workers is unknown at this point, the number of haul trips would likely be similar to that of construction of the project. It is also likely that due to expected growth and development in the project area and in Las Vegas, that the level of service on I-15 would be lower than current conditions. As such, it is reasonable to expect that impacts to the local and regional and transportation system as a result of decommissioning of the ISEGS would be similar to those related to construction of the ISEGS. Specifically, vehicle and truck traffic related to decommissioning would like exacerbate existing congestion in I-15 on Friday afternoons, would substantially increase the volume of traffic on roadways and intersections in the vicinity of recreation resources, and would have the potential to result in unexpected damage to Yates Well Road and I-15 freeway ramps. However with implementation of measures similar to those identified in Conditions of Certification **TRANS-1** through **TRANS-5**, impacts would be expected to be less than significant.

NO PROJECT / NO ACTION ALTERNATIVE

In the No Project / No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan.

The results of the No Project / No Action Alternative would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project.
- The benefits of the proposed project in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

If this project is not approved, renewable projects would likely be developed on other sites in the Mojave Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are three large solar projects proposed on BLM land in Nevada within a few miles of the Ivanpah site. In addition, as of August 2009 there were 66 applications for solar projects covering 611,692 acres pending with BLM in the California Desert District. The No Project/No Action Alternative would not cause any significant impacts to Traffic and Transportation.

CUMULATIVE IMPACTS AND MITIGATION

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (California Code Regulation, Title 14, section 15130). NEPA states that cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR §1508.7).

There is the potential for substantial future development in the Ivanpah Valley area and throughout the southern California desert region. Analysis of cumulative impacts is based on data provided in the following maps and tables which are contained in the **Cumulative Scenario** section of this document.

- Cumulative Impacts Figure 1, Regional Renewable Applications
- Cumulative Impacts Figure 2, Regional Renewable Applications (Detail)
- Cumulative Impacts Figure 3, Ivanpah Valley Existing and Future/Foreseeable Projects
- Cumulative Impacts Table 1, Regional Renewable Energy Projects
- Cumulative Impacts Table 2, Existing Development in the Ivanpah Valley
- Cumulative Impacts Table 3, Future Foreseeable Projects in the Ivanpah Valley Area.

The analysis in this section first defines the geographic area over which cumulative impacts to traffic and transportation could occur. The cumulative impact analysis itself describes the potential for cumulative impacts to occur as a result of implementation of the ISEGS project along with the listed local and regional projects.

Geographic Extent

Cumulative impacts can occur if implementation of the ISEGS project could combine with those of other local or regional projects. Cumulative impacts would occur locally if ISEGS project impacts combined with impacts of projects located within the Ivanpah Valley. Cumulative impacts could also occur as a result of development of some of the many proposed solar and wind development projects that have been or are expected to be under consideration by the BLM and the Energy Commission in the near future. Many of these projects are located within the California Desert Conservation Area, as well as on BLM land in Nevada and Arizona.

Cumulative impacts could occur to both the local roadway network and the regional roadway network. Local impacts are impacts that would occur to the transportation system in the immediate vicinity of the project site, such as damage to local roadways, traffic delays due to road closures, and increased congestion from project-related traffic. Cumulative impacts to the local roadway network would occur if project impacts combined with impacts of projects located within the same general vicinity of the ISEGS

site. Therefore, the analysis of cumulative traffic and transportation impacts is evaluated for the local roadway network, defined as the area up to two miles from the ISEGS project site.

Cumulative impacts could also affect the regional roadway network, based on potential impacts that would occur to I-15. Primary access to the project site would be provided via I-15, which is an interstate highway that connects Los Angeles, California to Las Vegas, Nevada, as well as California to Nevada, Utah, Idaho, and Montana. Existing traffic on I-15 is mostly attributable to commuter, commercial, and tourist traffic that originates from well beyond the project area, such as Las Vegas, Nevada; Barstow, California; Victorville, California; and Los Angeles, California. However, a comprehensive analysis of traffic generated by projects in such distant locations is beyond the scope of this analysis. Therefore, the geographic extent for the analysis of cumulative traffic and transportation impacts to the regional roadway network is defined as the area up to 30 miles from the project.

It should be noted that the geographic extent of regional cumulative impacts would not include currently proposed solar and wind projects located more than 30 miles from the ISEGS project site because the vast area over which these projects are spread and the different construction schedules would preclude the potential for traffic from these projects to combine to result in significant cumulative impacts.

Potential Environmental Impacts

Local Impacts

Construction related commuter traffic and equipment deliveries for the ISEGS project would generate up to 243 additional daily trips to roadways in the immediate vicinity of the site (Yates Well Road, Coliseum Road, and the I-15 (regional impacts to I-15 are discussed below) on- and off-ramps located at Yates Well Road) throughout the 48-month construction period. The addition of these trips to local roadways would result in less-than-significant impacts with respect to delays to local traffic, congestion, roadway hazards, and damage to roadways. Only one of the foreseeable projects presented on Cumulative Impacts Figure 3 and Table 3, the FirstSolar photovoltaic project, has the potential to add traffic to the same local roadways as the ISEGS project. Although the environmental review process has not yet begun for the FirstSolar photovoltaic project and there is currently no publicly available information regarding the potential construction schedule of this project, because construction of the ISEGS project would be ongoing for approximately four years, it is likely that there would be at least some overlap between the construction schedules of the two projects.

There is currently no available data regarding construction traffic of the proposed FirstSolar project, however, it is reasonable to assume that this project would require a level of workforce and equipment deliveries roughly equal to that of the ISEGS project. Due to the extremely low volume of traffic on Yates Well and Colosseum Roads, the combined effect of traffic from the ISEGS and FirstSolar projects would be unlikely to result in significant impacts related to congestion and level of service of these roadways. The combined effect of traffic from both projects would likely increase the potential for damage to these roadways; however, similar to Condition of Certification

TRANS-4, it is assumed that the FirstSolar project would be required to repair any damaged roadways attributable to the FirstSolar project. Therefore, impacts of the ISEGS project are not expected to combine with impacts from the FirstSolar photovoltaic project to result in significant cumulative impacts to local roadways.

Regional Impacts

Several projects presented on Cumulative Impacts Figure 3 and Table 3 with the potential to result in increased congestion on I-15 are located within 15 miles of the ISEGS project. Projects that have the potential to be under construction at the same time as the ISEGS are the Southern Nevada Supplemental Airport, the Desert Xpress Train, the I-15 Mountain Pass Truck Lane, the FirstSolar photovoltaic project, and the Caltrans Joint Port of Entry projects. Construction of each of these projects would result in increased vehicle trips on I-15. It is highly likely that some, if not all of these projects would result in additional vehicle trips on northbound I-15 on Friday afternoons. Additionally, because it is proposed to facilitate tourist travel to Las Vegas, operation of the Southern Nevada Supplemental Airport would likely result in a substantial increase in vehicle traffic on northbound I-15 on Friday afternoons.

I-15 currently operates at a congested level of service (LOS F) on Friday afternoons due to the high volume of commuter and tourist traffic traveling from California to Las Vegas, Nevada. Although implementation of **TRANS-1** would reduce the congestive effects of ISEGS-related traffic on I-15 at the Yates Well Road on-ramp, implementation of the project would still add an additional 227 vehicles to I-15 on Friday afternoons. The above referenced cumulative projects would also result in the addition of vehicles to northbound I-15 on Friday afternoons. While some projects would contribute a higher number of additional trips to I-15 than others, the combined effect of additional traffic from all of the identified cumulative projects would cause an increase in traffic, which is substantial in relation to the existing traffic load and capacity of I-15. The existing congestion on northbound I-15 on Friday afternoons would be exacerbated, and is therefore considered to be a significant cumulative impact. No additional mitigation measures are available to reduce the ISEGS project's contribution to this impact to less than considerable.

It should be emphasized that the significant cumulative impact identified above is the result of the *combined effects* of existing conditions, ISEGS traffic, and traffic from the cumulative projects listed above (Southern Nevada Supplemental Airport, the Desert Xpress Train, the I-15 Mountain Pass Truck Lane, the FirstSolar photovoltaic project) throughout the 30-mile geographic extent of cumulative impacts; whereas the direct ISEGS project impact identified in the Direct/Indirect Impacts section of this Staff Assessment only considers the effect of ISEGS traffic on existing conditions in the immediate vicinity of the proposed project. This cumulative effect is related to increased traffic and public safety concerns resulting from the combined congestive effect to northbound traffic on Friday afternoons.

The Applicant indicated that "other published reports" indicate that traffic on I-15 peaks at midnight on Friday and again noon on Saturday and suggested that if this is true, then dayshift traffic leaving project site would not contribute adversely to the most congested peak period. The Applicant also noted that it is important to consider that the peak

condition is seasonal, with the greatest impact in August and much less in January. The Applicant concluded that "when the LOS condition is accurately described, the LOS condition on eastbound I-15 at 5:00 p.m. on Friday may not be "F" for most, if not all of the year".

It should be noted that the "other published report" cited by the Applicant's is dated 1999. Per industry standards, impact analysis is conducted in consideration of the most recently available data. Traffic volumes cited in this FSA/DEIS were collected in 2006 and 2007 and are considered to be more representative of current conditions than data from 1999. Furthermore, the applicant has acknowledged in its AFC that I-15 operates at LOS F on Friday afternoons, at which time proposed construction activities would conclude and when construction workers would begin commuting from the project site. Therefore, according to data prepared by the Applicant and verified by Caltrans, proposed project construction would result in the addition of traffic trips to a roadway at a time that the roadway operates at LOS F.

With regard to seasonal traffic flows, the analysis presented in the FSA/DEIS represents a "worst-case" scenario to ensure that impacts are not understated. For example, although the number of construction workers traveling to the project site would fluctuate throughout the overall construction period, the analysis addressed the number of workers that would travel to the site during peak construction. Similarly, while I-15 may not operate at LOS F every Friday of the year, according to the 2007 Annual Traffic Report prepared by the Nevada Department of Transportation (NDOT, 2007), traffic volumes on I-15 in the vicinity of the California / Nevada state line exceeded the annual average daily traffic from April through August, and exceeded 94% of the annual average daily traffic volume in February, March, September, November and December. Therefore, although northbound I-15 may not operate at LOS F every Friday of the year, it is reasonable to assume that it operates at LOS F on most Fridays.

Cumulative Impacts Conclusion

Traffic and transportation impacts of the ISEGS project would not combine with impacts of any past, present, or reasonably foreseeable projects to result in cumulatively considerable impacts to local streets in the immediate vicinity of the ISEGS project site. However, traffic and transportation impacts of the ISEGS project would combine with impacts of past, present, or reasonably foreseeable projects to result in cumulatively considerable local and regional impact to northbound I-15.

COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Traffic and Transportation Table 8 provides a general description of applicable statutes, regulations, and standards adopted by the federal government, the State of California, and San Bernardino County pertaining to traffic and transportation with which the project is required to comply. Conditions of certification have been proposed to ensure project consistency with a law, ordinance, regulation, or standard where it was not already mandated by federal or state regulations.

Traffic and Transportation Table 8
Project Compliance with Adopted Traffic and Transportation LORS

Applicable Law	LORS Description and Project Compliance Assessment
Federal	
Code of Federal Regulations (CFR), Title 14, section 77 (14 CFR 77)	Includes standards for determining physical obstructions to navigable airspace. Sets forth requirements for notice to the Federal Aviation Administration of certain proposed construction or alteration. Also provides for aeronautical studies of obstructions to air navigation to determine their effect on the safe and efficient use of airspace (including temporary flight restrictions).
	The FAA has conducted aeronautical studies for all project structures which exceed 200 feet in height and has determined that construction of these structures, if properly lighted, would not present a hazard to aircraft. Implementation of Condition of Certification **TRANS-5** would ensure that that each power tower is marked and lighted according to the recommendations included in the FAA aeronautical study. Therefore the proposed project would comply with FAA regulations.
CFR, Title 49, Subtitle B	Includes procedures and regulations pertaining to interstate and intrastate transport (includes hazardous materials program procedures) and specifies safety measures for motor carriers and motor vehicles that operate on public highways.
	Enforcement is conducted by state and local law enforcement agencies and through state agency licensing and ministerial permitting (e.g., California Department of Motor Vehicles licensing, Caltrans permits), and/or local agency permitting.
State	
California Vehicle Code, Division 2, Chapter. 2.5; Div. 6, Chap. 7; Div. 13, Chap. 5; Div. 14.1, Chap. 1 & 2; Div. 14.8; Div. 15	Includes regulations pertaining to licensing, size, weight, and load of vehicles operated on highways; safe operation of vehicles; and the transportation of hazardous materials.
	Enforcement is provided by state and local law enforcement agencies and through ministerial state agency licensing and permitting and/or local agency permitting.
California Streets and Highway Code, Division 1 & 2, Chapter 3 & Chapter 5.5	Includes regulations for the care and protection of state and county highways and provisions for the issuance of written permits.
	Enforcement is provided by state and local law enforcement and through ministerial state agency licensing and permitting and/or local agency permitting.
Local	
SANBAG Regional Transportation Plan	Identifies public policies and strategies for the transportation system in the San Bernardino County region.
	Enforcement is provided by CHP, local law enforcement, and through ministerial state agency licensing and permitting and/or local agency permitting.
SANBAG Congestion Management Plan (CMP)	Requires maintenance of level of service (LOS) E or better on CMP segments.
	Although it would contribute to an existing LOS F condition on I-15 on Friday afternoons, the ISEGS project would not cause any CMP segment to exceed minimum LOS E standards.

San Bernardino General Plan	Establishes regional transportation objectives, policies, and implementation measures for various modes of transportation.
	Project construction and operation traffic would comply with the general plan because the project would not cause LOS to drop below the County of San Bernardino's minimum criteria of LOS C.
San Bernardino County Code Title 5 Division 1 Highway Permit	Addresses permitting issues for oversize/overweight vehicles.
	Enforcement is provided by CHP, local law enforcement, and through ministerial state agency licensing and permitting and/or local agency permitting.

NOTEWORTHY PUBLIC BENEFITS

Neither the applicant nor staff has identified any traffic-related benefits associated with the ISEGS.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Comments were provided verbally and in writing regarding the proposed ISEGS from agencies, organizations, and members of the public prior to and following the publication of the Preliminary Staff Assessment (PSA). The Clark County Department of Aviation provided comments on the **Traffic and Transportation** section of the PSA in their letter dated January 23, 2009. The comments and responses are presented in this section.

Clark County Comment 1: Department of Aviation (CCDOA 2009). Glare Impacts. The PSA states that the project could adversely affect aviation operations at the proposed Southern Nevada Supplemental Airport) due to glare from the solar thermal arrays. The potential for adverse impacts from glare could also adversely affect operations at the existing Jean Airport. CCDOA Strongly urges the Commission to study this issue in more detail with respect to both airports.

Response: As discussed in detail above under the heading Proposed Project Glare, staff has identified three circumstances under which observers could potentially be exposed to reflected solar radiation project heliostats. These observers include pilots of aircraft flying over or near the site, motorists on I-15, hikers in the Clark Mountains and other hikers and motorists who could access locations closer to the project. Additionally, nearby observers may also experience glare from light reflected from the power tower receivers.

With regard to heliostat safety, the highest intensity of solar radiation that could be directly reflected from a single heliostat would occur at its focal distance of 500 meters and would be 3.125 kw/m^2 (CH2ML 2008a). Because this level of solar radiation is well below the MPE for momentary exposure of 10 kw/m^2, there is still potential for an observer, such as a motorist or pilot, to experience retinal injury in the event of sunlight being directed away from the power tower receiver and reflected towards an observer as a continuous exposure. Staff expects that for all of the scenarios described above, in most cases, exposure to solar radiation reflected from heliostats could be momentary because the observers would most likely be in motion—traveling either by vehicle or

aircraft. While the brightness of light reflected from heliostats would likely cause observers to avoid looking directly into the light for longer than a fraction of a second, it is not conclusive to staff that personal reaction to bright light would adequately mitigate this risk of exposure that could cause retinal injury to one's eyes.

Therefore, to minimize the potential for such reflections to occur, Condition of Certification **TRANS-3** has been recommended to require the applicant to prepare a Heliostat Positioning Plan. This measure requires the project owner to identify the most likely scenarios under which heliostat movement would result in offsite glare and to develop a heliostat positioning plan that avoids or minimizes the potential for observers to be exposed to glare from heliostats that could cause temporary blindness or retinal damage to one's eyes.

The project also has the potential to result in glare from project power tower receivers. However, due to the distance that observers, such as pilots, motorists, and hikers, would be located from the receivers, the brightness of reflected light from project power tower receivers is not expected to pose a safety hazard to these observers. However, because the technology proposed at the ISEGS site is relatively new and has never been implemented at this scale, staff has proposed Condition of Certification **TRANS-4** to ensure that upon operation of the ISEGS, that brightness would not result in a safety hazard to motorists on nearby roadways and pilots of aircraft flying over the site.

Clark County Comment 2: Department of Aviation (CCDOA 2009). Thermal Effects. Thermal plumes from the ISEGS could create hazards to air navigation. The concentrated heat from the project may produce enough rising hot air to cause turbulence to overflying aircraft. This effect would impact the planned flight tracks to the Southern Nevada Supplemental Airport and would likely impact Visual Flight Rules (VFR) traffic in the area that currently tracks along the I-15 corridor en route to Jean Airport.

Response: As discussed above under Operation Impacts and Mitigation, aircraft would be subject to potential disruption (i.e. turbulence) from a thermal plume with an average plume velocity of 4.3 m/s or higher (CASA 2004), where the peak velocity is twice the calculated velocity. The peak height for thermal plume average velocities of 4.3 m/s for the Ivanpah 3 and Ivanpah 1 and 2 generating area ACCs would be approximately 1,350 feet and 900 feet, respectively. Therefore, aircraft flying directly over the Ivanpah 3 ACC would have the potential to experience turbulence at an altitude of 1,350 feet or less and aircraft flying directly over either the Ivanpah 1 or 2 ACCs would have the potential to experience turbulence at an altitude of 900 feet or less. As such, staff has recommend Condition of Certification **TRANS-6**, which would require the applicant to coordinate with the FAA to: 1) notify all pilots using the airspace above ISEGS of potential turbulence from thermal plumes, 2) update all applicable airspace charts to indicate that plume hazards could exist up to an altitude of 1,350 feet above the ground surface, and 3) require pilots to avoid direct overflight of the ISEGS site at or below this altitude during daylight hours.

Clark County Comment 3: Department of Aviation (CCDOA 2009). Military Training Routes. There are several military training routes in the vicinity. The ISEGS will clearly have an impact to these routes and any development must therefore be coordinated with the military.

Response: As discussed above under Operation Impacts and Mitigation, the FAA has determined that none of the seven towers would present a hazard to navigation to aircraft from the proposed Southern Nevada Supplemental Airport. Power Tower 1 was identified to be within the flight path of Instrument Route 213 (IR-213), a U.S. Navy training flight route (FAA 2008a). However, the U.S. Navy has confirmed that construction of Power Tower 1 would not impose a significant impact to IR-213, and that the Department of the Navy has no objection to the construction (Thompson 2008).

Clark County Comment 4: Department of Aviation (CCDOA 2009). Ivanpah Lands Act. The PSA omits mention of a critical federal law that contains several relevant obligations, specifically, the Ivanpah Valley Airport Public Lands Transfer Act (Public Law 1106-362, hereafter referred as the Ivanpah Lands Act). In accordance with this law, CCDOA prepared an Airspace Feasibility Study that was certified by the FAA Administrator. The Commission should examine the degree to which the proposed ISEGS facility conflicts or does not conflict with the Airspace Feasibility Study and with the FAA's statutory obligations to ensure VFR access to the Las Vegas Basin at a level that is equal to or better than existing access and to minimize impacts to the Mojave.

Response: The Ivanpah Lands Act is not directly applicable to the proposed ISEGS project. The Ivanpah Lands Act identifies several requirements that must be met by Clark County and the FAA prior to conveyance of certain Federal public lands in the Ivanpah Valley, Nevada, to Clark County, Nevada, for the development of an airport facility. Although the ISEGS project is proposed to be constructed on Federal lands, none of the lands involved in the project would be used for air traffic and are not subject to the Ivanpah Lands Act.

The Ivanpah Lands Act requires Clark County to identify any potential adverse effects on access to the Las Vegas Basin under visual flight rules that would result from the construction and operation of a commercial or primary airport, or both, on the land to be conveyed and that the FAA must certify that the assessment made by Clark County is thorough and that alternatives have been developed to address each adverse effect identified in the assessment, including alternatives that ensure access to the Las Vegas Basin under visual flight rules at a level that is equal to or better than existing access.

As the commentor notes, the Airspace Feasibility Study prepared by Clark County, which was certified by the FAA, indicated that the introduction of new traffic patterns would not adversely affect the flow of VFR traffic. As discussed above, under the discussion of hazards to navigation, the FAA evaluated the potential for the ISEGS project to result in obstruction hazards to air traffic from the proposed Southern Nevada Supplemental Airport.

CONCLUSIONS

Staff has analyzed the project's potential construction and operational impacts related to the regional and local traffic and transportation system and concludes the following:

1. During construction, because project-related construction traffic would not result in an unacceptable level of service along study area roadway segments or intersections, potential impacts created by workforce traffic and truck traffic would be

less than significant. The project would exacerbate existing congestion on I-15 on Friday afternoons in the area of Yates Well Road, and impacts are considered significant. To reduce the proposed project's construction- and operation-related contribution to congestion on northbound I-15 on Friday afternoons, staff has proposed Condition of Certification **TRANS-1** to reduce direct impacts to less than significant.

2. During construction, the project would substantially increase the volume of traffic on roadways and intersections in the vicinity of recreation resources. Therefore, staff's proposed Condition of Certification **TRANS-1** requires adequate signage along local roads and intersections to alert travelers to the presence of construction vehicles.

3. Because proposed project construction traffic has the potential to result in unexpected damage to Yates Well Road and I-15 freeway ramps, staff has proposed Condition of Certification **TRANS-2** to ensure that any damage to local roadways would be repaired to pre-project levels to not present a safety hazard to motorists.

4. Saturday through Thursday during operation, workforce and truck traffic to and from the facility would not result in a substantial increase in congestion, deterioration of the existing level of service, or creation of a traffic hazard during any time in the daily traffic cycle and would have a less-than-significant impact along the routes or roadway intersections that would be used to access the ISEGS site.

5. Solar radiation and light reflected from proposed project heliostats could cause a significant human health and safety hazard to observers in vehicles on adjacent roadways or air traffic flying above the site, and could cause a distraction of drivers on I-15 that would lead to road hazards and to pilots of aircraft flying over the site. Staff has proposed Condition of Certification **TRANS-3** to ensure solar radiation and light from the heliostats does not impair the vision of motorists or pilots traveling near the site and that the potential for exposure of observers does not cause a human health and safety hazard.

6. Solar radiation and light reflected from proposed project power tower receivers is not expected to pose a significant human safety or hazard to navigation of vehicles on adjacent roadways or air traffic flying above the site, but could potentially cause a distraction of drivers on I-15 that would lead to road hazards. Staff has proposed Condition of Certification **TRANS-4** to ensure glare from power tower receivers does not impair the view of motorists or pilots traveling near the site and that the potential for exposure of observers to light reflected from heliostats is minimized to the maximum extent possible.

7. .Because the proposed project would result in construction of structures greater than 200 feet tall in the vicinity of a proposed airport and existing military training flight route, staff has proposed Condition of Certification **TRANS-5** to ensure that onsite power towers are lighted in accordance with FAA recommendations. The project would not adversely affect aircraft operations associated with any aircraft flight traffic.

8. The construction and operation of the ISEGS as proposed, with the effective implementation of staff's recommended conditions of certification below, would ensure that the project's direct adverse traffic and transportation impacts would be less than significant.

9. Vehic**le trip**s generated by construction and operation of the ISEGS would combine with vehicle trips generated by past, present and reasonably foreseeable projects to contribute to the existing significant cumulative impact of congestion on northbound I-15 on Friday afternoons.

10. Staff has determined that, with the implementation of the traffic control plan required by proposed Condition of Certification **TRANS-1**, construction and operation of the ISEGS would not cause a direct significant impact on northbound I-15 on Friday afternoons, but would contribute to a cumulatively considerable significant impact on northbound I-15 on Friday afternoons. All other direct and cumulative project impacts would be less than significant or would be mitigated to a level of less than significant.

11. During project operation, heat exhaust from the Ivanpah 3 air cooled condenser would result in thermal plumes that would result in the potential for aircraft to experience turbulence at an altitude of 1,350 feet or less. Therefore staff has proposed Condition of Certification **TRANS-6** to ensure that thermal plumes associated with ISEGS operation do not impact aviation activities within the navigable airspace above the site.

If the Energy Commission elects to grant certification for this project, staff is proposing three conditions of certification.

PROPOSED CONDITIONS OF CERTIFICATION

TRAFFIC CONTROL PLAN

TRANS-1 Prior to start of construction of the ISEGS, the project owner shall prepare and implement a Traffic Control Plan for ISEGS construction and operation traffic, containing a Traffic Management Plan addressing the movement of workers, vehicles, and materials, including arrival and departure schedules, and designated workforce and delivery routes. The plan shall include:

- requiring at least 60% of construction workers to arrive to the site by bus transport (15 people per bus);
- limiting truck deliveries to the project site to no more than 12 truck trips per day;
- redirection of construction traffic with a flag person as necessary to ensure traffic safety and minimize interruptions to non-construction related traffic flow;
- signage, lighting, and traffic control device placement at the project construction site and laydown areas;

- signage along eastbound and westbound Yates Well Road and at the entrance of each of the I-15 northbound and southbound off-ramps at Yates Well Road notifying drivers of construction traffic throughout the duration of the construction period;
- signage and detours to redirect traffic from Colosseum Road during construction activities related to roadway realignment and pipeline installation in and across the Colosseum Road right of way;
- a Heavy Haul Plan addressing the transport and delivery of heavy and oversized loads requiring permits from Caltrans or other state and federal agencies;
- a work schedule and end-of-shift departure plan, and/or a carpool/vanpool incentive program to substantially reduce the number of project-related vehicles traveling from the project site to Las Vegas during Friday afternoon peak traffic hours, including limiting departures from the site to 12 or fewer vehicles every three minutes between 12:00 PM and 10:00 PM every Friday.

The project owner shall consult with the County of San Bernardino and the Caltrans District 8 office in the preparation and implementation of the Traffic Control Plan and shall submit the proposed Traffic Control Plan to the County of San Bernardino and the Caltrans District 8 office in sufficient time for review and comment and to BLM's Authorized Officer and the Energy Commission Compliance Project Manager (CPM) for review and approval prior to the proposed start of construction and implementation of the plan. The project owner shall provide a copy of any written comments from the County of San Bernardino and the Caltrans District 8 office and any changes to the Traffic Control Plan to BLM's Authorized Officer and the CPM prior to the proposed start of construction.

Verification: At least 90 calendar days prior to the start of construction, including any grading or site remediation on the power plant site or its associated easements, the project owner shall submit the proposed traffic control plan to the County of San Bernardino and the Caltrans District 8 office for review and comment and to BLM's Authorized Officer and the CPM for review and approval. The project owner shall also provide BLM's Authorized Officer and the CPM with a copy of the transmittal letter to the County of San Bernardino and the Caltrans District 8 office requesting review and comment.

At least 30 calendar days prior to the start of construction, the project owner shall provide copies of any comment letters received from either the County of San Bernardino and the Caltrans District 8 office, along with any changes to the proposed traffic control plan to BLM's Authorized Officer and the CPM for review and approval.

REPAIR OF PUBLIC RIGHT-OF-WAY

TRANS-2 The project owner shall restore all public roads, easements, and rights-of-way that have been damaged due to project-related construction activities to original or near-original condition in a timely manner.

Prior to the start of site mobilization, the project owner shall consult with the County of San Bernardino and Caltrans District 8 and notify them of the proposed schedule for project construction. The purpose of this notification is to request that the County of San Bernardino and Caltrans consider postponement of public right-of-way repair or improvement activities in areas affected by project construction until construction is completed and to coordinate with the project owner regarding any concurrent construction-related activities that are planned or in progress and cannot be postponed.

Verification: At least 30 days prior to the start of mobilization, the project owner shall photograph or videotape all affected public roads, easements, and right-of-way segment(s) and/or intersections and shall provide BLM's Authorized Officer, the CPM, the affected local jurisdiction(s) and Caltrans (if applicable) with a copy of these images.

Within 60 calendar days after completion of construction, the project owner shall meet with BLM's Authorized Officer and the CPM, the County of San Bernardino and Caltrans District 8 to identify sections of public right-of-way to be repaired. At that time, the project owner shall establish a schedule to complete the repairs and to receive approval for the action(s). Following completion of any public right-of-way repairs, the project owner shall provide a letter signed by the County of San Bernardino and Caltrans District 8 stating their satisfaction with the repairs to BLM's Authorized Officer and the CPM.

HELIOSTAT POSITIONING PLAN AND MONITORING

TRANS-3 The project owner shall prepare a Heliostat Positioning Plan that would accomplish the following:

1. Identify potential sensitive receptors including observers in aircraft, motorists on I-15, hikers in the Clark Mountains and other hikers and motorists who could access locations closer to the project;

2. Identify the heliostat movements and positions that could result in exposure of these observers to reflected solar radiation from heliostats;

3. Prepare a Heliostat Operating Plan that would avoid potential for human health and safety hazards at locations of sensitive receptors including the potential for momentary and continuous solar radiation exposure to occur greater than the thresholds of significance of :

   a. MPE for momentary exposure (for a period of 0.25 second or less) is 10 kw/m^2

   b. MPE for continuous exposure (for a period greater than 0.25 second) is 1 kw/m^2

4. Prepare a monitoring plan that would: a) verify that the Heliostat Operating Plan would avoid potential for human health and safety hazards at locations of sensitive receptors, and b) provide requirements and procedures to document, investigate and resolve complaints regarding glare.

5. The monitoring plan should be coordinated with the FAA, U.S. Department of the Navy, CalTrans, and Clark County Department of Aviation in relation to the proposed Southern Nevada Supplemental Airport and be updated on an annual basis for the first 5 years, and at 2-year intervals thereafter for the life of the project.

Verification: Within 90 days before commercial operation of any of the three ISEGS power plants, the project owner shall submit the Heliostat Positioning Plan to the CPM for review and approval. The project owner shall also submit the plan to CalTrans, FAA, and the Clark County Department of Aviation for review and comment and forward any comments received to the CPM.

VERIFICATION OF POWER TOWER RECEIVER LUMINANCE AND MONITORING

TRANS-4 Upon commercial operation of each of the three ISEGS power plants (Ivanpah 1, 2 and 3) and at intervals of every 5 years thereafter, the project owner shall evaluate the intensity of luminance of light reflected from all four sides (north, south, east and west) of the power tower receivers, as measured from the power plant boundary, nearest road and at distances of 200, 500, 1,000 and 1,500 meters from the power tower receivers for each power tower. The measurements are to ensure that luminance does not exceed the standard of 89 cd/m^2 at the nearest road or power plant boundary.

The project owner shall measure solar radiation and luminance with an illuminance meter, photometer, or similar device.

If luminance is identified to be above 89 cd/m^2 at any power plant boundary or nearest road location, the project owner shall propose mitigation measures for review by BLM's Authorized Officer and the CPM, and upon receiving both approvals, shall implement project modifications to maintain luminance within the threshold of 89 cd/m^2 at the nearest road and power plant boundary. The modifications may include surface treatment or material changes to increase absorption and reduce reflectivity of the power tower receivers or operational controls, such as reducing the number of heliostats reflecting toward the power tower receiver that is identified as the source of that light. The project owner shall also prepare a monitoring plan that provides requirements and procedures to document, investigate and resolve complaints regarding glare.

Verification: Within 30 days following commercial operation of each of the three ISEGS power plants (Ivanpah 1, 2 and 3) during peak load conditions (95% or greater

of the power plant rated capacity) and at intervals of every 5 years thereafter, the project owner shall conduct luminance measurements as follows:

1. The luminance measurement shall be conducted for all four sides (north, south, east and west) of the power tower receivers, as measured from the power plant boundary, nearest road and at distances of 200, 500, 1,000 and 1,500 meters from the power tower receivers for each power tower.

2. Within 15 days after completing each of the surveys, the project owner shall submit a summary report of the survey to FAA, U.S. Department of the Navy, CalTrans, and Clark County Department of Aviation for review and comment, and to BLM's Authorized Officer and the CPM for review and approval.

3. If the measurements reveal that luminance exceeds 89 cd/m^2 at any of the nearest roads and power plant boundaries to each north, south, east and west face of each power tower, the survey report shall include a description of proposed mitigation measures necessary to achieve compliance, and the project owner shall also propose a schedule, subject to BLM Authorized Office and CPM approval, for implementing those measures.

4. Within 30 days following the implementation of the mitigation measures, the project owner shall repeat the luminance measurements and prepare a supplemental survey report for review and comment to FAA, U.S. Department of the Navy, CalTrans, and Clark County Department of Aviation, and for review and approval by BLM's Authorized Officer and the CPM.

5. This process would be repeated as necessary until the project complies with the luminance limit of not exceeding 89 cd/m^2 at any of the nearest roads and power plant boundaries to each north, south, east and west face of each power tower.

The field measurements and verification process are to be repeated at five-year intervals following commercial operation for the life of the project as applicable to each of the three ISEGS power plants.

The five-year field measurement and verification process and investigation of any complaints related to glare shall be coordinated with the FAA, U.S. Department of the Navy, CalTrans, and Clark County Department of Aviation as applicable, and shall document, address and satisfactorily resolve any complaints as determined by BLM's Authorized Officer and the CPM.

The project owner shall prepare a monitoring plan that provides requirements and procedures to document, investigate and resolve complaints regarding glare, and report these to BLM's Authorized Officer and the CPM within 10 days of receiving a complaint, as part of the Annual Compliance Report, and as part of the Five-Year Field Measurement and Verification Report.

POWER TOWER LIGHTING

TRANS-5 The project owner shall ensure that each power tower is marked and lighted according to the recommendations included in the FAA aeronautical study performed for each tower. Additionally, the project owner shall submit FAA Form 7460-2 Part II, Notice of Actual Construction or Alteration, to the FAA within 5 days of completion of construction of the tower to its greatest height.

The project owner shall provide evidence of compliance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting by submitting a copy of Form 7460-2 to BLM's Authorized Officer and the CPM for review and approval upon completion of construction or each power tower.

Verification: Within 5 days of completion of construction of each of the seven power towers, the project owner shall submit the above referenced evidence to BLM's Authorized Officer and the CPM for review and approval.

FAA NOTIFICATION

TRANS-6 Prior to start-up and testing activities of the plant and all related facilities, the project owner shall coordinate with the FAA to notify all pilots using the airspace in the vicinity of the ISEGS of potential air hazards from turbulence. These activities would include, but not be limited to: 1) issuing a notice to airmen (NOTAM of the identified air hazard, 2) updating all applicable FAA-approved airspace charts to indicate that plume hazards could exist up to an altitude of 1,350 feet above the ground surface, and 3) requesting FAA to require pilots to avoid direct overflight of the ISEGS site at or below this altitude during daylight hours.

Verification: At least 60 days prior to start of project operation, the project owner shall submit to BLM's Authorized Officer and the CPM for review a letter from the FAA showing compliance with these measures.

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HIGHWAY CAPACITY MANUAL

The *Highway Capacity Manual* is prepared by the Transportation Research Board, Committee on Highway Capacity and Quality of Service. It represents a concentrated, multi-agency effort by the Transportation Research Board, the Federal Highway Administration, the American Association of Highway and Transportation Officials, and other traffic/transportation related agencies. It is the most widely used resource for traffic analysis. Several versions of the Highway Capacity Manual have been published. The current edition was published in 2000. It contains concepts, guidelines, and computational procedures for computing the capacity and quality of service of various highway facilities, including freeways, signalized and unsignalized intersections, rural highways, and the effects of transit, pedestrians, and bicycles on the performance of these systems.

LEVEL OF SERVICE

The description and procedures for calculating capacity and level of service are found in the *Highway Capacity Manual 2000*. The *Highway Capacity Manual 2000* represents the latest research on capacity and quality of service for transportation facilities.

Quality of service requires quantitative measures to characterize operational conditions within a traffic stream. Level of service is a quality measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience.

Six levels of service are defined for each type of facility that has analysis procedures available. Letters designate each level, from A to F, with level of service A representing the best operating conditions and level of service F the worst. Each level of service represents a range of operating conditions and the driver's perception of these conditions. Safety is not included in the measures that establish service levels. A general description of service levels for various types of facilities is shown in **Table A-1**.

Traffic and Transportation Table A-1
Level of Service Description

Facility Type	Uninterrupted Flow	Interrupted Flow
	Freeways Multi-Lane Highways Two-Lane Highways Urban Streets	Signalized Intersections Unsignalized Intersections - Two-Way Stop Control - All-Way Stop Control
Level of Service		
A	Free-flow	Very low delay
B	Stable flow. Presence of other users noticeable.	Low delay
C	Stable flow. Comfort and convenience starts to decline.	Acceptable delay
D	High density stable flow	Tolerable delay
E	Unstable flow	Limit of acceptable delay
F	Forced or breakdown flow	Unacceptable delay

Source: *Highway Capacity Manual 2000*

Interrupted Flow

One of the more important elements limiting, and often interrupting, the flow of traffic on a highway is the intersection. Flow on an interrupted facility is usually dominated by points of fixed operation such as traffic signals and stop and yield signs. These all operate quite differently and have differing impacts on overall flow.

Signalized Intersections

The capacity of a highway is related primarily to the geometric characteristics of the facility, as well as to the composition of the traffic stream on the facility. Geometrics are a fixed, or non-varying, characteristic of a facility.

At the signalized intersection, an additional element is introduced into the concept of capacity: time allocation. A traffic signal essentially allocates time among conflicting traffic movements seeking use of the same physical space. The way in which time is allocated has a significant impact on the operation of the intersection and on the capacity of the intersection and its approaches.

Level of service for signalized intersections is defined in terms of control delay, which is a measure of driver discomfort, frustration, fuel consumption, and increased travel time. The delay experienced by a motorist is made up of a number of factors that relate to control, traffic, and incidents. Total delay is the difference between the travel time actually experienced and the reference travel time that would result during base conditions (i.e., in the absence of traffic control, geometric delay, any incidents, and any other vehicles). Specifically, level of service criteria for traffic signals is stated in terms of average control delay per vehicle, typically for a 15-minute analysis period. Delay is a complex measure and depends on a number of variables, including the quality of progression, the cycle length, the ratio of green time to cycle length and the volume-to-capacity ratio for the lane group.

For each intersection analyzed, the average control delay per vehicle per approach is determined for the peak hour. A weighted average of control delay per vehicle is then determined for the intersection. A level of service designation is given to the control delay to better describe the level of operation. Descriptions of levels of service for signalized intersections can be found in **Table A-2**.

Traffic and Transportation Table A-2
Description of Level of Service for Signalized Intersections

Level of Service	Description
A	Very low control delay, up to 10 seconds per vehicle. Movement forward (progression) is extremely favorable, and most vehicles arrive during the green phase. Many vehicles do not stop at all. Short cycle lengths may tend to contribute to low delay values.
B	Control delay greater than 10 and up to 20 seconds per vehicle. There is good progression or short cycle lengths or both. More vehicles stop causing higher levels of delay.
C	Control delay greater than 20 and up to 35 seconds per vehicle. Higher delays are caused by fair progression or longer cycle lengths or both. Individual cycle failures may begin to appear. Cycle failure occurs when a given green phase does not serve a waiting line of vehicles, and overflow occurs. The number of vehicles stopping is significant, though many still pass through the intersection without stopping.
D	Control delay greater than 35 and up to 55 seconds per vehicle. The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high volumes. Many vehicles stop, the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.
E	Control delay greater than 55 and up to 80 seconds per vehicle. The limit of acceptable delay. High delays usually indicate poor progression, long cycle lengths, and high volumes. Individual cycle failures are frequent.
F	Control delay in excess of 80 seconds per vehicle. Unacceptable to most drivers. Oversaturation and arrival flow rates exceed the capacity of the intersection. Many individual cycle failures. Poor progression and long cycle lengths may also be contributing factors to higher delay.

Source: *Highway Capacity Manual 2000*

The use of control delay, often referred to as signal delay, was introduced in the 1997 update to the *Highway Capacity Manual*. It represents a departure from previous updates. In the third edition of the *Highway Capacity Manual*, published in 1985 and the 1994 update to the third edition, delay only included stop delay. Thus, the level of service criteria listed in Table B differs from earlier criteria.

Unsignalized Intersections

The current procedures on unsignalized intersections were first introduced in the 1997 update to the *Highway Capacity Manual* and represent a revision of the methodology published in the 1994 update to the 1985 *Highway Capacity Manual*. The revised procedures use control delay as a measure of effectiveness to determine level of service. Delay is a measure of driver discomfort, frustration, fuel consumption, and

increased travel time. The delay experienced by a motorist is made up of a number of factors that relate to control, traffic, and incidents. Total delay is the difference between the travel time actually experienced and the reference travel time that would result during base conditions (i.e., in the absence of traffic control, geometric delay, any incidents, and any other vehicles). Control delay is the increased time of travel for a vehicle approaching and passing through an unsignalized intersection, compared with a free-flow vehicle if it were not required to slow or stop at the intersection.

Two-Way Stop Controlled Intersections

Two-way stop controlled intersections in which stop signs are used to assign the right-of-way, are the most prevalent type of intersection in the United States. At two-way stop-controlled intersections, the stop-controlled approaches are referred as the minor street approaches and can be either public streets or private driveways. The approaches that are not controlled by stop signs are referred to as the major street approaches.

The capacity of movements subject to delay is determined using the "critical gap" method of capacity analysis. Expected average control delay based on movement volume and movement capacity is calculated. A level of service designation is given to the expected control delay for each minor movement. Level of service is not defined for the intersection as a whole. Control delay is the increased time of travel for a vehicle approaching and passing through an all-way, stop-controlled intersection, compared with a free-flow vehicle if it were not required to slow or stop at the intersection. A description of levels of service for two-way stop-controlled intersections is found in **Table A-3**.

Traffic and Transportation Table A-3
Description of Level of Service for Two-Way Stop Controlled Intersections

Level of Service	Description
A	Very low control delay less than 10 seconds per vehicle for each movement subject to delay.
B	Low control delay greater than 10 and up to 15 seconds per vehicle for each movement subject to delay.
C	Acceptable control delay greater than 15 and up to 25 seconds per vehicle for each movement subject to delay.
D	Tolerable control delay greater than 25 and up to 35 seconds per vehicle for each movement subject to delay.
E	Limit of acceptable control delay greater than 35 and up to 50 seconds per vehicle for each movement subject to delay.
F	Unacceptable control delay in excess of 50 seconds per vehicle for each movement subject to delay.
Source: *Highway Capacity Manual 2000*	

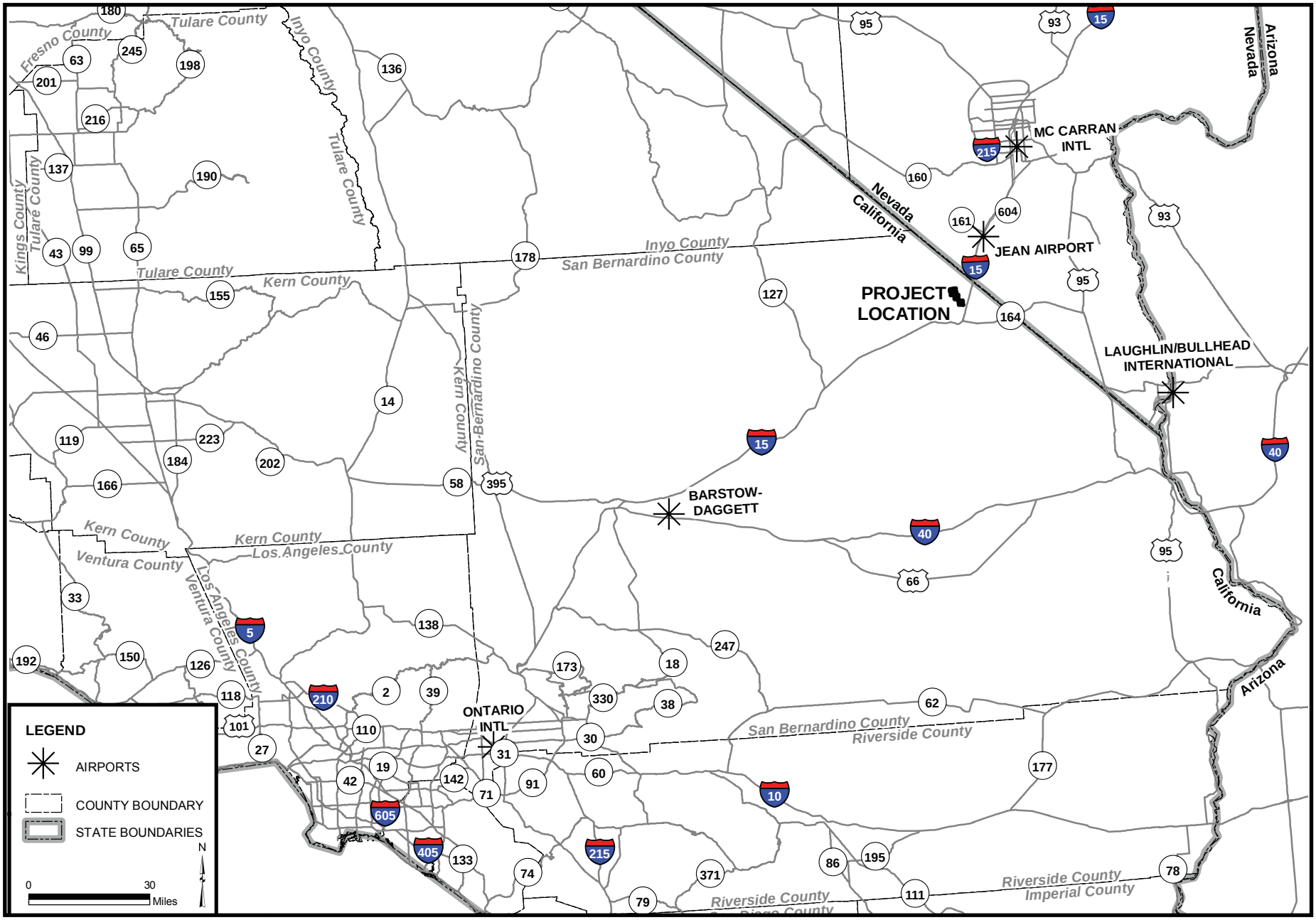
REFERENCE

Transportation Research Board. Highway Capacity Manual 2000. Washington, D.C.

OCTOBER 2009

TRAFFIC & TRANSPORTATION - FIGURE 1

Ivanpah Solar Electric Generating System - Regional Transportation Network



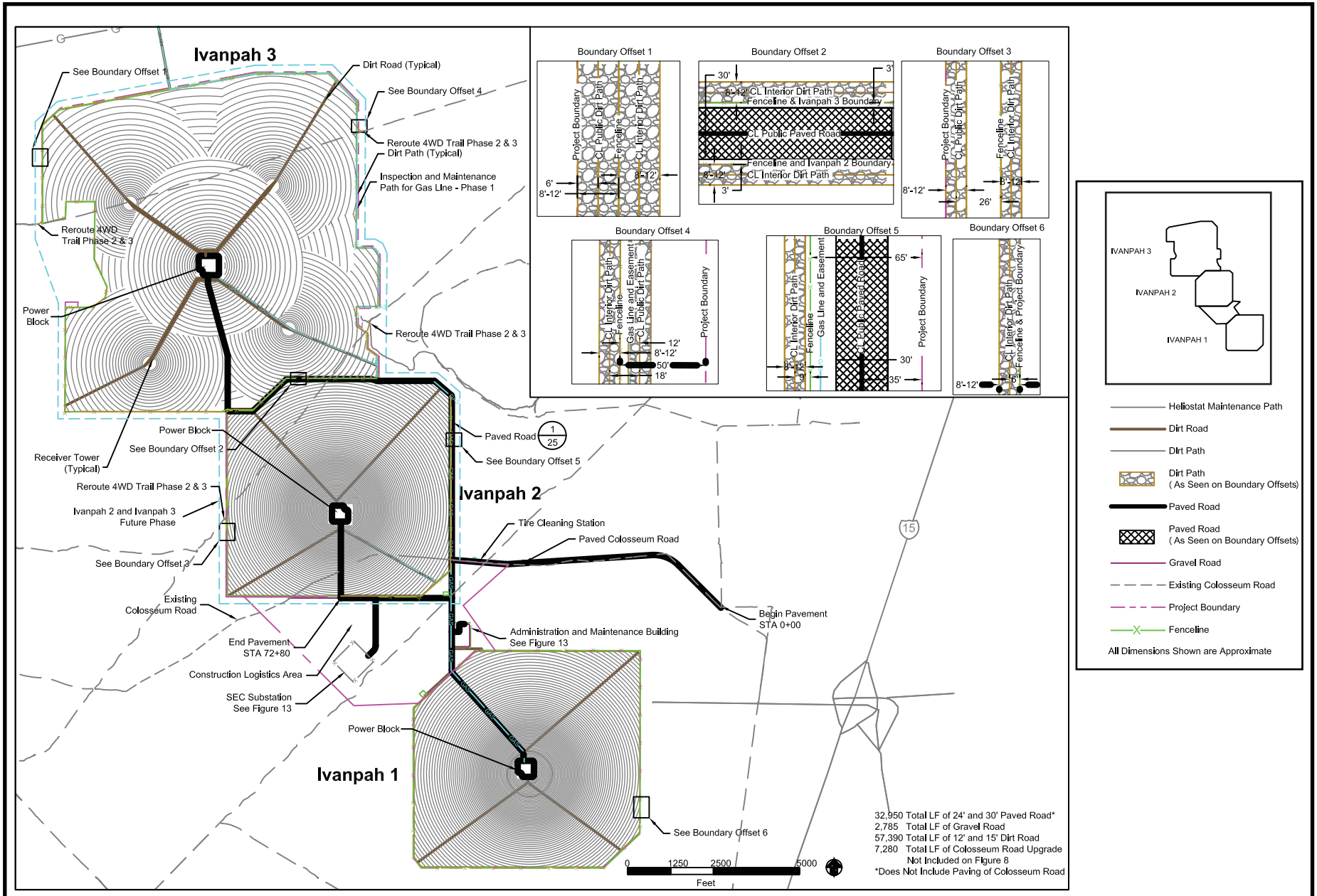
TRAFFIC & TRANSPORTATION

U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009

SOURCE: AFC Fig. 5.12-1

TRAFFIC AND TRANSPORTATION - FIGURE 2

Ivanpah Solar Electric Generating System - Local Roadways



SOURCE: Attachment DR130-2B Figure 15

TRANSMISSION LINE SAFETY AND NUISANCE

Prepared by Obed Odoemelam, Ph.D.

SUMMARY OF CONCLUSIONS

Since U.S. Bureau of Land Management (BLM) and California Energy Commission staff (hereafter jointly referred to as staff) do not expect the proposed transmission lines to pose an aviation hazard according to current FAA criteria, staff does not consider it necessary to recommend location changes on the basis of a potential hazard to area aviation.

The potential for nuisance shocks would be minimized through grounding and other field-reducing measures that would be implemented in keeping with current SCE guidelines (reflecting standard industry practices). These field-reducing measures would maintain the generated fields within levels not associated with radio-frequency interference or audible noise.

The potential for hazardous shocks would be minimized through compliance with the height and clearance requirements of CPUC's General Order 95. Compliance with Title 14, California Code of Regulations, section 1250, would minimize fire hazards while the use of low-corona line design, together with appropriate corona-minimizing construction practices, would minimize the potential for corona noise and its related interference with radio-frequency communication in the area around the route.

Since electric or magnetic field health effects have neither been established nor ruled out for the proposed ISEGS and similar transmission lines, the public health significance of any related field exposures cannot be characterized with certainty. The only conclusion to be reached with certainty is that the proposed lines' design and operational plan would be adequate to ensure that the generated electric and magnetic fields are managed to an extent the CPUC considers appropriate in light of the available health effects information. The long-term, mostly residential magnetic exposure of health concern in recent years would be insignificant for the proposed line given the absence of residences along the proposed route. On-site worker or public exposure would be short term and at levels expected for SCE lines of similar design and current-carrying capacity. Such exposure is well understood and has not been established as posing a substantial human health hazard.

Since the proposed project line would be operated to minimize the health, safety, and nuisance impacts of concern to staff and would remain in its present route without nearby residences, staff considers the proposed design, maintenance, and construction plan as complying with the applicable laws. With implementation of the conditions of certification proposed below, any such impacts would be less than significant with respect to CEQA and NEPA. Conditions of Certification referred to herein serve the purpose of both the Energy Commission's Conditions of Certification for purposes of the California Environmental Quality Act (CEQA) and BLM's Mitigation Measures for purposes of the National Environmental Policy Act (NEPA).

INTRODUCTION

The purpose of this Final Staff Assessment/Draft Environmental Impact Statement (FSA/DEIS) is to assess the proposed Ivanpah Solar Electric Generating System (ISEGS) Units 1 through 3 (Ivanpah 1 through 3) transmission lines' design and operational plan to determine whether their related field and non-field impacts would constitute a significant environmental hazard in the areas around the proposed routes. All related health and safety laws, ordinances, regulations, and standards (LORS) are currently aimed at minimizing such hazards. Staff's analysis focuses on the following issues taking into account both the physical presence of the lines and the physical interactions of their electric and magnetic fields:

- aviation safety;
- interference with radio-frequency communication;
- audible noise;
- fire hazards;
- hazardous shocks;
- nuisance shocks; and
- electric and magnetic field (EMF) exposure.

The following federal, state, and local laws and policies apply to the control of the field and non-field impacts of electric power lines. Staff's analysis examines the project's compliance with these requirements.

TRANSMISSION LINE SAFETY AND NUISANCE (TLSN) TABLE 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable LORS	Description
Aviation Safety	
Federal	
Title 14, Part 77 of the Code of Federal Regulations (CFR),"Objects Affecting the Navigable Air Space"	Describes the criteria used to determine the need for a Federal Aviation Administration (FAA) "Notice of Proposed Construction or Alteration" in cases of potential obstruction hazards.
FAA Advisory Circular No. 70/7460-1G, "Proposed Construction and/or Alteration of Objects that May Affect the Navigation Space"	Addresses the need to file the "Notice of Proposed Construction or Alteration" (Form 7640) with the FAA in cases of potential for an obstruction hazard.
FAA Advisory Circular 70/460-1G, "Obstruction Marking and Lighting"	Describes the FAA standards for marking and lighting objects that may pose a navigation hazard as established using the criteria in Title 14, Part 77 of the CFR.
Interference with Radio Frequency Communication	
Federal	
Title 47, CFR, section 15.2524, Federal Communications Commission (FCC)	Prohibits operation of devices that can interfere with radio-frequency communication.
State	
California Public Utilities Commission (CPUC) General Order 52 (GO-52)	Governs the construction and operation of power and communications lines to prevent or mitigate interference.
Audible Noise	
Local	
San Bernardino County General Plan, Noise Element	**References the county's Ordinance Code for noise limits.**
San Bernardino County Development Code	**Establishes performance standards for planned residential or other noise-sensitive land uses.**
Hazardous and Nuisance Shocks	
State	
CPUC GO-95, "Rules for Overhead Electric Line Construction"	Governs clearance requirements to prevent hazardous shocks, grounding techniques to minimize nuisance shocks, and maintenance and inspection requirements.
Title 8, California Code of Regulations (CCR) section 2700 et seq. "High Voltage Safety Orders"	Specifies requirements and minimum standards for safely installing, operating, working around, and maintaining electrical installations and equipment.
National Electrical Safety Code	Specifies grounding procedures to limit nuisance shocks. Also specifies minimum conductor ground clearances.
Industry Standards	

Applicable LORS	Description
Institute of Electrical and Electronics Engineers (IEEE) 1119, "IEEE Guide for Fence Safety Clearances in Electric-Supply Stations"	Specifies the guidelines for grounding-related practices within the right-of-way and substations.
Electric and Magnetic Fields	
State	
GO-131-D, CPUC "Rules for Planning and Construction of Electric Generation Line and Substation Facilities in California"	Specifies application and noticing requirements for new line construction including EMF reduction.
CPUC Decision 93-11-013	Specifies CPUC requirements for reducing power frequency electric and magnetic fields.
Industry Standards	
American National Standards Institute (ANSI/IEEE) 644-1944 Standard Procedures for Measurement of Power Frequency Electric and Magnetic Fields from AC Power Lines	Specifies standard procedures for measuring electric and magnetic fields from an operating electric line.
Fire Hazards	
State	
14 CCR sections 1250-1258, "Fire Prevention Standards for Electric Utilities"	Provides specific exemptions from electric pole and tower firebreak and conductor clearance standards and specifies when and where standards apply.

SETTING

As discussed by the applicant, Bright Source Energy/Solar Partners I, LLC/J. Woolard, (BSE2007a pp. 3-1 through 3-5, 5.6-1, 5.6-2, and 5.6-7 through 5.6-12), the total area required for the three facilities (Ivanpah 1–3) that would constitute the proposed Ivanpah Solar Electric Generating System (ISEGS) would be 4,073 acres of federal land currently managed by the BLM. Each of these facilities would consist of a solar field and related electric power generating equipment from which the generated power would be interconnected to Southern California Edison's (SCE's) power grid via a new 220/115-kilovolt (kV) SCE substation (Ivanpah Substation) to be located between Ivanpah 1 and Ivanpah 2. The connection to the SCE grid would be through SCE's existing 115-kV line that will be upgraded to 220 kV for 36 miles between the new Ivanpah Substation and the existing Eldorado Substation in Nevada. This transmission line passes through the site on a northeast-southwest right-of-way. The site is in an uninhabited open space with transmission line corridors. The nearest community is Primm, Nevada, with a population of 436, 4.5 miles to the northeast. The city of San Bernardino is approximately 145 miles to the southwest while the Edwards Air Force Base is approximately 145 miles west-southwest.

PROJECT DESCRIPTION

The proposed project generator tie-in line system would consist of the following individual segments:

- one new, single-circuit 115-kV overhead transmission line extending 5,800 feet from the Ivanpah 1 switchyard to the Ivanpah Substation;
- two new single-circuit 115-kV overhead transmission lines extending from the Ivanpah 2 and Ivanpah 3 switchyards and merging into a double-circuit overhead transmission line at a point 1,400 feet from the Ivanpah Substation before entering it;
- each generating unit's own 115-kV on-site switchyard through which its line would extend towards the Ivanpah Substation;
- project-related reliability upgrades of the area's SCE 115-kV line system; and
- SCE's new 220/115-kV Ivanpah Substation.

The generator tie-in line for Ivanpah 3 would be 14,000 feet long while the one for Ivanpah 2 would be 3,900 feet. All three lines and related facilities would be designed, operated, and maintained in keeping with SCE guidelines that ensure line safety and efficiency together with reliability and maintainability. The applicant provided the details of the proposed support structures as related to line safety, maintainability, and field reduction efficiency (BSE2007a, Figures 3.2-1 and 3.2-30) (CH2ML2008g).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHODS AND THRESHOLDS FOR DETERMINING SIGNIFICANCE

The potential magnitude of the line impacts of concern in this staff analysis depends on compliance with the listed design-related LORS and industry practices. These LORS and practices have been established to maintain impacts below levels of potential significance. Thus, if staff determines that the project would comply with applicable LORS, staff would conclude that any transmission line-related safety and nuisance impacts would be less than significant. The nature of these individual impacts is discussed below together with the potential for compliance with the LORS that apply.

DIRECT IMPACTS AND MITIGATION

Proposed Project

Aviation Safety

Any potential hazard to area aircraft would relate to the potential for collision in the navigable airspace. The requirements listed on **TLSN Table 1** establish the standards for assessing the potential for obstruction hazards within the navigable space and establish the criteria for determining when to notify the FAA about such hazards. As noted by the applicant (BSE 2007a, pp. 3-13 and 3-14), these regulations require FAA notification in cases of structures over 200 feet from the ground. Notification is also required if the structure is to be below 200 feet in height but would be located within the restricted airspace in the approaches to public or military airports. For airports with

runways longer than 3,200 feet, the restricted space is defined by the FAA as an area extending 20,000 feet from the runway. For airports with runways of 3,200 feet or less, the restricted airspace would be an area that extends 10,000 feet from this runway. For heliports, the restricted space is an area that extends 5,000 feet.

One existing public airport, Jean Airport, is located approximately 14 miles northeast of the project site and one mile south of Jean Nevada. In addition, one additional airport is proposed for the same area, the Southern Nevada Supplemental Airport. Jean Airport has two paved runways that serve less than 50 aircraft, most of which are single engine airplanes and gliders (AirNav.com 2008).

In addition, the Federal Aviation Administration (FAA) and the Bureau of Land Management (BLM) are currently preparing an Environmental Impact Statement for a proposed Southern Nevada Supplemental Airport to be constructed on approximately 6,000 acres of land just south of Jean, Nevada (VHB 2008). As currently planned, the proposed Southern Nevada Supplemental Airport would provide sufficient airport capacity to accommodate future aircraft operations and aviation passenger demand in the Las Vegas Metropolitan Area (VHB 2008). The proposed ISEGS would be located approximately 40,000 feet (7.6 miles) southwest of the nearest runway at the proposed Southern Nevada Supplemental Airport.

The maximum height of 85 feet for the proposed transmission line support structures (BSE2007a Figure 3.2-2) would be much less than the 200 feet that triggers the concern over aviation hazard according to FAA requirements. As noted in the **Traffic and Transportation** section of this document, the FAA has determined that even the tallest structures of the proposed ISEGS, the 459-foot high solar power towers, would not pose a hazard to aviation.

Interference with Radio-Frequency Communication

Transmission line-related radio-frequency interference is one of the indirect effects of line operation and is produced by the physical interactions of line electric fields. Such interference is due to the radio noise produced by the action of the electric fields on the surface of the energized conductor. The process involved is known as *corona discharge*, but is referred to as *spark gap electric discharge* when it occurs within gaps between the conductor and insulators or metal fittings. When generated, such noise manifests itself as perceivable interference with radio or television signal reception or interference with other forms of radio communication. Since the level of interference depends on factors such as line voltage, distance from the line to the receiving device, orientation of the antenna, signal level, line configuration and weather conditions, maximum interference levels are not specified as design criteria for modern transmission lines. The level of any such interference usually depends on the magnitude of the electric fields involved and the distance from the line. The potential for such impacts is therefore minimized by reducing the line electric fields and locating the line away from inhabited areas.

The proposed project lines would be built and maintained in keeping with standard SCE practices that minimize surface irregularities and discontinuities. Moreover, the potential for such corona-related interference is usually of concern for lines of 345 kV and above,

and not for 115-kV lines such as the proposed lines. The lines' proposed low-corona designs are used for all SCE lines of similar voltage rating to reduce surface-field strengths and the related potential for corona effects. Since the proposed lines would traverse an uninhabited open space, staff does not expect any corona-related radio-frequency interference or related complaints and does not recommend any related condition of certification.

Audible Noise

The noise-reducing designs related to electric field intensity are not specifically mandated by federal or state regulations in terms of specific noise limits. As with radio noise, such noise is limited instead through design, construction, or maintenance practices established from industry research and experience as effective without substantial impacts on line safety, efficiency, maintainability, and reliability. Audible noise usually results from the action of the electric field at the surface of the line conductor and could be perceived as a characteristic crackling, frying, or hissing sound or hum, especially in wet weather. Since the noise level depends on the strength of the line electric field, the potential for perception can be assessed from estimates of the field strengths expected during operation. Such noise is usually generated during rainfall, but mainly from overhead lines of 345 kV or higher. It is, therefore, not generally expected at substantial levels from lines of less than 345 kV as proposed for ISEGS. Research by the Electric Power Research Institute (EPRI 1982) has validated this by showing the fair-weather audible noise from modern transmission lines to be generally indistinguishable from background noise at the edge of a right-of-way of 100 feet or more. Since the low-corona designs are also aimed at minimizing field strengths, staff does not expect the proposed line operation to add substantially to current background noise levels in the project area. For an assessment of the noise from the proposed line and related facilities, please refer to staff's analysis in the **Noise and Vibration** section.

Fire Hazards

The fire hazards addressed through the related LORS in **TLSN Table 1** are those that could be caused by sparks from conductors of overhead lines, or that could result from direct contact between the line and nearby trees and other combustible objects.

Standard fire prevention and suppression measures for similar SCE lines would be implemented for the proposed project lines (BSE 2007a, p. 3-14). The applicant's intention to ensure compliance with the clearance-related aspects of GO-95 would be an important part of this mitigation approach. Condition of Certification **TLSN-3** is recommended to ensure compliance with important aspects of the fire prevention measures.

Hazardous Shocks

Hazardous shocks are those that could result from direct or indirect contact between an individual and the energized line, whether overhead or underground. Such shocks are capable of serious physiological harm or death and remain a driving force in the design and operation of transmission and other high-voltage lines.

No design-specific federal regulations have been established to prevent hazardous shocks from overhead power lines. Safety is assured within the industry from

compliance with the requirements specifying the minimum national safe operating clearances applicable in areas where the line might be accessible to the public.

The applicant's stated intention to implement the GO-95-related measures against direct contact with the energized line (BSE 2007a, p. 3-14) would serve to minimize the risk of hazardous shocks. Staff's recommended Condition of Certification **TLSN-1** would be adequate to ensure implementation of the necessary mitigation measures.

Nuisance Shocks

Nuisance shocks are caused by current flow at levels generally incapable of causing substantial physiological harm. They result mostly from direct contact with metal objects electrically charged by fields from the energized line. Such electric charges are induced in different ways by the line's electric and magnetic fields.

There are no design-specific federal or state regulations to limit nuisance shocks in the transmission line environment. For modern overhead high-voltage lines, such shocks are effectively minimized through grounding procedures specified in the National Electrical Safety Code (NESC) and the joint guidelines of the American National Standards Institute (ANSI) and the Institute of Electrical and Electronics Engineers (IEEE). For the proposed project line, the project owner will be responsible in all cases for ensuring compliance with these grounding-related practices within the right-of-way.

The potential for nuisance shocks around the proposed line would be minimized through standard industry grounding practices (BSE 2007a, p.3-13). Staff recommends Condition of Certification **TLSN-4** to ensure such grounding for ISEGS.

Electric and Magnetic Field Exposure

The possibility of deleterious health effects from EMF exposure has increased public concern in recent years about living near high-voltage lines. Both electric and magnetic fields occur together whenever electricity flows, and exposure to them together is generally referred to as *EMF exposure*. The available evidence as evaluated by the CPUC, other regulatory agencies, and staff has not established that such fields pose a significant health hazard to exposed humans. There are no health-based federal regulations or industry codes specifying environmental limits on the strengths of fields from power lines. Most regulatory agencies believe, as staff does, that health-based limits are inappropriate at this time. They also believe that the present knowledge of the issue does not justify any retrofit of existing lines.

Staff considers it important, as does the CPUC, to note that while such a hazard has not been established from the available evidence, the same evidence does not serve as proof of a definite lack of a hazard. Staff therefore considers it appropriate, in light of present uncertainty, to recommend feasible reduction of such fields without affecting safety, efficiency, reliability, and maintainability.

While there is considerable uncertainty about EMF health effects, the following facts have been established from the available information and have been used to establish existing policies:

- Any exposure-related health risk to the exposed individual will likely be small.
- The most biologically significant types of exposures have not been established.
- Most health concerns are about the magnetic field.
- There are measures that can be employed for field reduction, but they can affect line safety, reliability, efficiency, and maintainability, depending on the type and extent of such measures.

State Requirements

In California, the CPUC (which regulates the installation and operation of many high-voltage lines owned and operated by investor-owned utilities) has determined that only no-cost or low-cost measures are presently justified in any effort to reduce power line fields beyond levels existing before the present health concern arose. The CPUC has further determined that such reduction should be made only in connection with new or modified lines. It requires each utility within its jurisdiction to establish EMF-reducing measures and incorporate such measures into the designs for all new or upgraded power lines and related facilities within their respective service areas. The CPUC further established specific limits on the resources to be used in each case for field reduction. Such limitations were intended by the CPUC to apply to the cost of any redesign to reduce field strength or relocation to reduce exposure. Publicly owned utilities, which are not within the jurisdiction of the CPUC, voluntarily comply with these CPUC requirements. This CPUC policy resulted from assessments made to implement CPUC Decision 93-11-013.

In keeping with this CPUC policy, staff requires a showing that each proposed overhead line would be designed according to the EMF-reducing design guidelines applicable to the utility service area involved. These field-reducing measures can impact line operation if applied without appropriate regard for environmental and other local factors bearing on safety, reliability, efficiency, and maintainability. Therefore, it is up to each applicant to ensure that such measures are applied in ways that prevent impacts on line operation and safety. The extent of such applications would be reflected by ground-level field strengths as measured during operation. When estimated or measured for lines of similar voltage and current-carrying capacity, such field strength values can be used by staff and other regulatory agencies to assess the effectiveness of the applied reduction measures. These field strengths can be estimated for any given design using established procedures. Estimates are specified for a height of one meter above the ground, in units of kilovolts per meter (kV/m), for the electric field, and milligauss (mG) for the companion magnetic field. Their magnitude depends on line voltage (in the case of electric fields), the geometry of the support structures, degree of cancellation from nearby conductors, distance between conductors, and, in the case of magnetic fields, amount of current in the line.

Since the CPUC currently requires that most new lines in California be designed according to the EMF-reducing guidelines of the electric utility in the service area involved, their fields are required under this CPUC policy to be similar to fields from similar lines in that service area. Designing the proposed project line according to existing SCE field strength-reducing guidelines would constitute compliance with the CPUC requirements for line field management.

The CPUC has recently revisited the EMF management issue to assess the need for policy changes to reflect the available information on possible health impacts. The findings did not point to a need for substantial changes to existing field management policies. Since there are no residences in the immediate vicinity of the proposed project line, there would not be the long-term residential EMF exposures mostly responsible for the health concern of recent years. The only project-related EMF exposures of potential significance would be the short-term exposures of plant workers, regulatory inspectors, maintenance personnel, visitors, or individuals in the vicinity of the line. These types of exposures are short term and well understood as not significantly related to the health concern.

Industry's Approach to Reducing Field Exposures

The present focus is on the magnetic field because unlike electric fields, it can penetrate the soil, buildings, and other materials to produce the types of human exposures at the root of the health concern of recent years. The industry seeks to reduce exposure, not by setting specific exposure limits, but through design guidelines that minimize exposure in each given case. As one focuses on the strong magnetic fields from the more visible high-voltage power lines, staff considers it important, for perspective, to note that an individual in a home could be exposed to much stronger fields while using some common household appliances than from high-voltage lines (National Institute of Environmental Health Services and the U.S. Department of Energy, 1998). The difference between these types of field exposures is that the higher-level, appliance-related exposures are short term, while the exposures from power lines are lower level, but long term. Scientists have not established which of these types of exposures would be more biologically meaningful in the individual. Staff notes such exposure differences only to show that high-level magnetic field exposures regularly occur in areas other than around high-voltage power lines.

As with similar SCE lines, specific field strength-reducing measures would be incorporated into the proposed line upgrade to ensure the field strength minimization currently required by the CPUC in light of the concern over EMF exposure and health.

The field reduction measures to be applied include the following:

1. increasing the distance between the conductors and the ground to an optimal level;

2. reducing the spacing between the conductors to an optimal level;

3. minimizing the current in the line; and

4. arranging current flow to maximize the cancellation effects from interacting of conductor fields.

Since the routes of the proposed project lines would have no nearby residences, the residential field exposures at the root of the health concern of recent years would not be a consideration. The strengths of the lines' fields along the routes would depend on the effectiveness of the applied field-reducing measures. The applicant (BSE 2007a, pp. 3-9 through 3-12 and Figures 3-31 through 3-39) calculated the maximum electric and

magnetic field intensities expected along all the proposed routes. The maximum electric field strength was calculated as 1.04 kV/m, which is similar to those of SCE lines of the same voltage rating. The maximum magnetic field intensity of 117.14 mG is similar to that of similar SCE lines (as required under current CPUC regulations) but is much less than the 200 mG currently specified by the few states with regulatory limits. The requirements in Condition of Certification **TLSN-2** for field strength measurements are intended to validate the applicant's assumed reduction efficiency.

Closure and Decommissioning Impacts and Mitigation

If the proposed ISEGS were to be closed, decommissioned and all related structures are removed as described in the **Project Description** section, the minimal aviation risk and electric shocks and fire hazards from the physical presence of the tie-in lines would be eliminated. Decommissioning and removal would also eliminate the lines' field impacts assessed in this analysis in terms of nuisance shocks, radio-frequency impacts, audible noise, and electric and magnetic field exposure. Since the lines would be designed and operated according existing SCE guidelines, these impacts would be as expected for SCE lines of the same voltage and current-carrying capacity.

No Project/No Action Alternative.

Failure to build ISEGS and its related tie-in transmission lines would eliminate the potential field and non-field impacts of specific concern in this analysis. Since the lines would be designed and operated according to existing SCE guidelines, these avoided impacts would be as expected for similar area SCE lines.

CUMULATIVE IMPACTS AND MITIGATION

Staff considered the potential for impacts due to field and non-field impacts from the proposed ISEGS with other existing or foreseeable nearby facilities as listed in the **Cumulative Scenario** section. When field intensities are measured or calculated for a specific location, they reflect the interactive, and therefore, cumulative effects of fields from all contributing conductors. This interaction could be additive or subtractive depending on prevailing conditions. Since the proposed project transmission lines would be designed, built, and operated according to applicable field-reducing SCE guidelines (as currently required by the CPUC for effective field management), any contribution to cumulative area exposures should be at levels expected for SCE lines of similar voltage and current-carrying capacity. It is this similarity in intensity that constitutes compliance with current CPUC requirements on EMF management. The actual field strengths and contribution levels for the proposed line design would be assessed from the results of the field strength measurements specified in Condition of Certification **TLSN-2**. Therefore, staff concludes there would not be any cumulatively considerable contribution by ISEGS to a field or non-field impact of electric power lines.

COMPLIANCE WITH LORS

As previously noted, current CPUC policy on safe EMF management requires that any high-voltage line within a given area be designed to incorporate the field strength-reducing guidelines of the main area utility lines to be interconnected. The utility in this case is SCE. Since the proposed project lines and related switchyards would be

designed according to the respective requirements of the LORS listed in **Table 1**, and operated and maintained according to current SCE guidelines on line safety and field strength management, staff considers the proposed design and operational plan to be in compliance with the health and safety requirements of concern in this analysis. The actual contribution to the area's field exposure levels would be assessed from results of the field strength measurements required in Condition of Certification **TLSN-2**.

NOTEWORTHY PUBLIC BENEFITS

Since the proposed ISEGS tie-in lines would pose specific, although insignificant risks of the field and non-field effects of concern in this analysis, their building and operation would not yield any public benefits regarding the effort to minimize any human risks from these impacts.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Staff received no public or agency comments on the preliminary staff assessment of the transmission line nuisance and safety aspects of the proposed ISEGS.

CONCLUSIONS

Since staff does not expect the proposed transmission lines to pose an aviation hazard according to current FAA criteria, staff does not consider it necessary to recommend location changes on the basis of a potential hazard to area aviation.

The potential for nuisance shocks would be minimized through grounding and other field-reducing measures that would be implemented in keeping with current SCE guidelines (reflecting standard industry practices). These field-reducing measures would maintain the generated fields within levels not associated with radio-frequency interference or audible noise.

The potential for hazardous shocks would be minimized through compliance with the height and clearance requirements of CPUC's General Order 95. Compliance with Title 14, California Code of Regulations, section 1250, would minimize fire hazards while the use of low-corona line design, together with appropriate corona-minimizing construction practices, would minimize the potential for corona noise and its related interference with radio-frequency communication in the area around the route.

Since electric or magnetic field health effects have neither been established nor ruled out for the proposed ISEGS and similar transmission lines, the public health significance of any related field exposures cannot be characterized with certainty. The only conclusion to be reached with certainty is that the proposed lines' design and operational plan would be adequate to ensure that the generated electric and magnetic fields are managed to an extent the CPUC considers appropriate in light of the available health effects information. The long-term, mostly residential magnetic exposure of health concern in recent years would be insignificant for the proposed line given the absence of residences along the proposed route. On-site worker or public exposure would be short term and at levels expected for SCE lines of similar design and current-

carrying capacity. Such exposure is well understood and has not been established as posing a substantial human health hazard.

Since the proposed project line would be operated to minimize the health, safety, and nuisance impacts of concern to staff and would remain in its present route without nearby residences, staff considers the proposed design, maintenance, and construction plan as complying with the applicable laws. With implementation of the conditions of certification proposed below, any such impacts would be less than significant with respect to both CEQA and NEPA.

MITIGATION MEASURES/PROPOSED CONDITIONS OF CERTIFICATION

TLSN-1 The project owner shall construct the proposed transmission lines according to the requirements of California Public Utility Commission's GO-95, GO-52, GO-131-D, Title 8, and Group 2. High Voltage Electrical Safety Orders, sections 2700 through 2974 of the California Code of Regulations, and Southern California Edison's EMF-reduction guidelines.

Verification: At least 30 days before starting the transmission line or related structures and facilities, the project owner shall submit to BLM's Authorized Officer and the Compliance Project Manager (CPM) a letter signed by a California registered electrical engineer affirming that the lines will be constructed according to the requirements stated in the condition.

TLSN-2 The project owner shall use a qualified individual to measure the strengths of the electric and magnetic fields from the line at the points of maximum intensity along the route for which the applicant provided specific estimates. The measurements shall be made before and after energization according to the American National Standard Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE) standard procedures. These measurements shall be completed no later than 6 months after the start of operations.

Verification: The project owner shall file copies of the pre-and post-energization measurements with BLM's Authorized Officer and the CPM within 60 days after completion of the measurements.

TLSN-3 The project owner shall ensure that the rights-of-way of the proposed transmission line are kept free of combustible material, as required under the provisions of section 4292 of the Public Resources Code and section 1250 of Title 14 of the California Code of Regulations.

Verification: During the first 5 years of plant operation, the project owner shall provide a summary of inspection results and any fire prevention activities carried out along the right-of-way and provide such summaries in the Annual Compliance Report to be provided to BLM's Authorized Officer and the CPM.

TLSN-4 The project owner shall ensure that all permanent metallic objects within the right-of-way of the project-related lines are grounded according to industry standards regardless of ownership.

Verification: At least 30 days before the lines are energized, the project owner shall transmit to BLM's Authorized Officer and the CPM a letter confirming compliance with this condition.

REFERENCES

BSE 2007a — Bright Source Energy/Solar Partners, LLC/ J. Woolard. Application for certification of the Ivanpah Solar Electric Generating System Volumes I and II. Submitted to the California Energy Commission on August 31, 2007.

CH2ML2008g – CH2M HILL/ J. Carrier (tn: 46239). Data Responses Set 1D. Dated on 5/09/2008. Submitted to CEC / Docket Unit on 5/09/2008.

EPRI — Electric Power Research Institute. 1982. Transmission Line Reference Book: 345 kV and Above.

National Institute of Environmental Health Services. 1998. *An Assessment of the Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields*. A Working Group Report, August 1998.

VISUAL RESOURCES

Prepared by William Kanemoto

SUMMARY OF CONCLUSIONS

BLM and Energy Commission staff (hereafter jointly referred to as staff) have analyzed visual resource-related information pertaining to the proposed Ivanpah Solar Electric Generating System (ISEGS) and conclude that the proposed project would result in a substantial adverse impact to existing scenic resource values as seen from several Key Observation Points in the Ivanpah Valley and Clark Mountains, including:

- The Primm Valley Golf Course;
- Middle-ground-distance viewpoints on Highway I-15;
- Viewpoints in the Mojave National Preserve on the east face of Clark Mountain; and
- Viewpoints in the Stateline Wilderness Area, including the Umberci Mine and vicinity.

Staff also concludes that the visual analysis and resulting findings, obtained using the CEC staff methods typically used in Staff Assessment visual analysis, were essentially consistent with findings that would be obtained under the BLM visual impact assessment methods.

Staff concludes that these visual impacts would be significant in terms of the four criteria of CEQA Appendix G, and in terms of the context and intensity of the effects in general. Regarding the latter, the context of the project is one directly adjoining a national park and two designated wilderness areas, and a land-sailing site of regional or greater importance. Intensity of potential effects involve the unique scenic characteristics of the local landscape as indicated by the national park and wilderness designations of portions of the project viewshed; concerns expressed by public commentors to date; a degree of uncertainty as to the level of discomfort or disability glare from the solar tower receivers; and concern over cumulative visual effects of renewable projects on the CDCA and Mojave Desert as a whole.

Staff found that with recommended conditions of certification, potentially significant visual impacts at the Primm Valley Golf Course (KOPs 1 and 2) could be mitigated to less than significant levels in the long term. However, staff has concluded that potentially significant visual impacts at the other locations cited above could not be mitigated to less than significant levels and would thus result in significant and unavoidable impacts.

Because the project has the potential to result in exposure of aircraft pilots, motorists, and hikers to solar radiation reflected from project heliostats and/or power tower receivers, **Traffic and Transportation** Conditions of Certification **TRANS-3** and **TRANS-4** are recommended to ensure that potential glare from the project is minimized to the maximum extent possible and does not pose a health and safety risk. Staff also concludes that the solar receiver units atop the solar power towers would generate conspicuously bright levels of glare for foreground viewers. Staff, however, concludes that with these measures, remaining glare, while not representing a hazard, could

represent a visually dominant feature as seen from the viewpoints named above. Remaining glare could alter the character of views of Clark Mountain from the valley floor, affecting the public's ability to enjoy those views, though not preventing them.
.
In addition, staff concludes that the project would not conform with applicable goals and policies of the San Bernardino County General Plan Conservation and Open Space Elements as follows:

- Conservation Element Goal D/CO 1, calling for preservation of scenic vistas in the County.
- Open Space Element Goal OS 5, and Policy OS 5.2, which require projects to be visually compatible with the scenic qualities of designated County scenic routes. Highway I-15 in the project vicinity is a County-designated scenic route.

Finally, staff concludes that the project in combination with foreseeable future projects could have significant unavoidable cumulative visual impacts of two kinds:

1. Cumulative impacts within the immediate project viewshed, essentially comprising foreseeable future projects in the Ivanpah Valley; and

2. Cumulative impacts of foreseeable future solar and other renewable energy projects within the southern California Mojave Desert.

As stated, staff concludes that the project would have significant unavoidable adverse impacts in both a direct and cumulative context. However, if the Energy Commission approves the project, staff recommends that all of staff's proposed conditions of certification be adopted in order to minimize impacts to the greatest feasible extent. Conditions of Certification referred to herein serve the purpose of both the Energy Commission's Conditions of Certification for purposes of CEQA and BLM's Mitigation Measures for purposes of NEPA.

INTRODUCTION

The following analysis evaluates potential visual impacts of the Ivanpah Solar Electric Generating System (ISEGS); its consistency with applicable Laws, Ordinances, Regulations and Standards (LORS); and conformance with applicable guidelines of the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA).

In order to provide a consistent framework for the analysis, a standard visual assessment methodology developed by CEC staff and applied to numerous siting cases in the past was employed in this study. A description of this methodology is provided in **Appendix VR-1.**

As noted above, the project is evaluated for conformance with applicable LORS. Adopted expressions of local public policy pertaining to visual resources are also given great weight in determining levels of viewer concern. In accordance with staff's procedure, conditions of certification are proposed as needed to reduce potentially

significant impacts to less than significant levels, and to ensure LORS conformance, if feasible.

VISUAL RESOURCES Table 2
Laws, Ordinances, Regulations, and Standards

Applicable LORS	Description
Federal	
National Environmental Policy Act (NEPA)	Under the National Environmental Policy Act (NEPA), it is the responsibility of the federal government to "use all practicable means to ensure all Americans safe, healthful, productive and aesthetically and culturally pleasing surroundings (42 USC 4331(b)2). "
Federal Land Policy and Management Act of 1976 (FLPMA)	FLPMA is the enabling legislation establishing the Bureau of Land Management's responsibilities for lands under its jurisdiction. Section 102 (a) of the FLPMA states that " . . . . the public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values …. " Section 103 (c) identifies "scenic values" as one of the resources for which public land should be managed. Section 201 (a) states that "The Secretary shall prepare and maintain on a continuing basis an inventory of all public lands and their resources and other values (including ... scenic values) ...." Section 505 (a) requires that "Each right-of-way shall contain terms and conditions which will... minimize damage to the scenic and esthetic (sic) values...."
California Desert Conservation Area (CDCA) Plan	The ISEGS project is located within the California Desert Conservation Area Plan, which is the BLM Resource Management Plan applicable to the project site (USDOI, 1980, as amended). The CDCA Plan did not include Visual Resource Management (VRM) inventory or management classes. However, BLM developed updated Visual Resource Inventory (VRI) mapping in 2008 (USDOI, 2008). The ISEGS site is classified in the CDCA Plan

	as Multiple-Use Class (MUC) L (Limited Use). Multiple-Use Class L, the most restrictive under the plan, "protects sensitive, natural, scenic, ecological, and cultural resource values. Public lands designated as Class L are managed to provide for generally lower-intensity, carefully controlled multiple use of resources, while ensuring that sensitive values are not significantly diminished." The CDCA Plan includes a table (Table 1) which illustrates the types of allowable land uses by MUC Class. The table specifically includes Electrical Power Generation Facilities including Wind/Solar facilities. Guidance provided under this section allows for the authorization of such facilities within MUC Class L lands in compliance with NEPA requirements.
Northern and Eastern Mojave CDCA Plan Amendments (NEMO), 2002	The NEMO plan amendments to the CDCA Plan did not directly affect visual resource management. Among the elements of the NEMO plan amendments was designation of approved motorized vehicle trails, including several such trails within the ISEGS site. According to the NEMO Routes Designation EA, "the off-road vehicle experience of traveling historic routes provides an educational and scenic experience of the natural wonders of a harsh desert region and the elements that the pioneers and founders of the historical route had to endure." (USDOI, 2004). The East Mojave Heritage Trail, a 650-mile trail identified in the NEMO Proposed Route Designation Plan Amendment as a major historical trail of scenic, historic, and Native American values, is one such designated trail within the Ivanpah Valley. However, it does not cross the ISEGS site and would not be affected by the project (Murray, Tel. Con. 9/23/08).).
National Historic Preservation Act (NHPA)	Under regulations of the NHPA, visual impacts to a listed or eligible National Register property that may diminish the integrity of the property's "

	. . . setting . . .(or) feeling . . . " in a way that affects the property's eligibility for listing, may result in a substantial adverse effect. "Examples of adverse effects . . . include . . . Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features . . . . " (36 CFR Part 800.5)
State	
State Scenic Highway Program	The California State Department of Transportation (Caltrans) identifies a state system of eligible and designated scenic highways which, if designated, are subject to various controls intended to preserve their scenic quality (Ca. Streets and Highways Code, Sections 260 through 263). Highway I-15 within the project viewshed is not listed as an eligible State Scenic Highway.
Local	
County of San Bernardino General Plan	Various policies of the Conservation and Open Space Elements of the San Bernardino County General Plan refer to the protection of scenic resources in the project area, as described in detail in Visual Resources Table 3. In particular, Open Space Policies 5.1 through 5.3 provide protection to designated County scenic routes. Highway I-15 in the Ivanpah Valley is a designated County scenic route.
Night Sky Protection Ordinance Ord. 3900 (San Bernardino County Code 87.0921)	Ordinance intended "to encourage effective, non-detrimental lighting; to maintain night-time safety, utility, security and productivity; and to encourage lighting practices and systems which will minimize light pollution, glare and light trespass, conserve energy and resources and curtail the degradation of the night time visual environment . . . . "

SETTING

REGIONAL LANDSCAPE SETTING

The proposed project landscape is part of the Great Basin section of Fenneman's Basin and Range physiographic province, a vast desert area of the western U.S. extending from eastern Oregon to western Texas, characterized by periodic mountain ranges separated by desert plain (Fenneman, 1931). It is also located within the Mojave Desert, and is immediately north and east of the northernmost portions of the Mojave National Preserve. Locally, the site is situated within the Ivanpah Valley, notable for the level playa or dry lakebed of Ivanpah Lake. Steeply rising, barren slopes and ridges of the Clark, Spring, and Ivanpah Mountains to the south, west, and north, and the Lucy Gray, McCullough, and New York Mountains to the east, define the Ivanpah Valley in the project vicinity, creating an enclosed viewshed. While the project portion of the Ivanpah Valley is visually relatively intact, it is located roughly 30 miles south of the City of Las Vegas, within a visual corridor along Highway I-15 that becomes increasingly urbanized and less scenically intact as one progresses northward. Thus, in a regional context, the site is located at the outer edge of urban influence of the City of Las Vegas metropolitan area. I-15 adjacent to the project site is the principal travel route for visitors to Las Vegas from southern California.

PROJECT SITE

VISUAL RESOURCES Figure 1, Views of the Project Site, depicts views of the Ivanpah Valley from the vicinity of the proposed project site.

The ISEGS site comprises approximately four square miles west of Highway I-15 and the northern half of the Ivanpah Lake dry lakebed. The site occupies a moderately sloping alluvial fan or bajada that descends eastward from the foot of the Clark Mountains and Mojave National Preserve (MNP) immediately to the west. Visual exposure to viewers on I-15, due both to proximity and slope orientation, is thus high. This portion of the Ivanpah Valley, defined at the north by a pass between the Clark and Lucy Gray Mountains at Primm, Nevada, is scenically relatively intact, as depicted in **VISUAL RESOURCES Figure 1**. The Bighorn Electric Generating Station, the town of Primm at the north end of the valley, the Primm Golf Course, existing high-voltage power lines, several unpaved vehicular trails and Highway I-15 intrude on the valley's scenic intactness but overall these features are very subordinate visually, and the landscape appears predominantly undisturbed. The proposed site is located immediately to the west of the Primm Golf Course, a slightly elevated site who's irrigated landscaping and perimeter berm-slopes contrast conspicuously with the surrounding natural landscape for viewers in its vicinity. The project site also surrounds an isolated, 416 -foot tall rock formation that serves as a prominent landmark within a radius of several miles and represents a striking scenic feature of the valley.

Land cover on the site consists primarily of Mojave Creosote Bush Scrub, including areas of small, young Joshua Trees. Surface disturbance is relatively minimal and inconspicuous overall, including unpaved vehicular trails and access roads. The ground surface is largely a medium tan color, further darkened in appearance by the relatively uniform scrub groundcover. With the exception of the vivid rock formation at the center

of the site, its bajada/scrub landscape is relatively common throughout the Mojave Desert landscape. The prominent and highly scenic adjacent scenery of slopes, ridges and peak of Clark Mountain, however, lend the project viewshed as a whole a higher degree of scenic interest and value. Similarly, the contrast between perfectly flat dry lakebed and steep, tall, nearby mountain slopes within a narrow enclosed valley lend the landscape a distinctive character with strong visual unity.

PROJECT AREA VISUAL SETTING

Project Viewshed

The *viewshed* or area of potential visual effect (the area within which the project could potentially be seen) is indicated by the reddish-colored area in **VISUAL RESOURCES Figure 2**. The computer-generated viewshed mapping was projected from the top of the proposed solar collectors. The mapping is accurate within the limits of error of the USGS digital elevation model (DEM) topographic map surveys from which it is created. In this landscape, because of the general absence of tall land-cover that could alter the actual viewshed, the topographically-generated viewshed mapping is considered generally accurate. A feature of this desert landscape is the potential for large projects to be seen over great distances where elevated viewpoints exist, due to the large open areas of level topography and absence of intervening landscape features.

Landscape Units and KOPs:

Visual Quality, Viewer Concern, and Viewer Exposure

VISUAL RESOURCES Figure 2, Existing Landscape Setting and Key Observation Points (KOPs), subdivides the project viewshed into broad landscape units and their associated overall visual sensitivity levels, and depicts KOPs used as the basis of the impact analysis. (All figures referred to in the text may be found at the end of this section). These units represent contiguous areas with broadly consistent visual character, quality, viewer sensitivity and visibility. Those attributes are reflected in their overall visual sensitivity ratings, which represent a summary of the existing visual quality, viewer concern, and viewer exposure (site visibility) of each unit. These ratings serve as the environmental baseline against which potential project impacts are evaluated. This figure is generally consistent with a Visual Resource Inventory conducted by BLM in 2008 (BLM inventory classifications are provided in parentheses for informational purposes)(USDOI, 2008a).

In the discussion below, distance zone terminology is used as follows: ‘foreground’ is used generically to refer to viewing distances under ½-mile; ‘middle-ground’ to distances between ½ and 4 miles; ‘near middle-ground’ refers to that portion of middle-ground under roughly one mile; and ‘background’ to distances over 4 miles.

The three major landscape units depicted are the Ivanpah Valley floor, including the Ivanpah dry lakebed; and the adjoining mountain ranges that define the valley: the Clark Mountains to the north, west, and south; and the Lucy Gray Mountains to the east. The Clark Mountains are divided into two major categories: portions of the Mojave National Preserve under National Park Service (NPS) jurisdiction; and the Stateline and Mesquite Wilderness Areas (WAs), under BLM jurisdiction.

VISUAL RESOURCES Figure 2 also depicts Key Observation Points (KOPs) used as the basis for this analysis. KOPs are used in the Energy Commission visual analysis method to evaluate potential project impacts. These viewpoints represent key sensitive viewer groups and viewing locations likely to be affected by the project. Existing views and simulated views with the proposed project from each KOP may be seen in **VISUAL RESOURCES Figures 6 to 15** at the end of this section. The KOPs below are presented according to landscape unit and key viewer group.

KOPs 1 and 2, representing Primm Golf Course, were presented in the AFC. KOPs 3 and 4, representing worst-case Highway I-15 views, were requested by Energy Commission staff. KOPs 5 through 10, representing sensitive outdoor recreation viewer groups, were identified by BLM staff and requested by BLM and Energy Commission staff.

Ivanpah Valley Viewpoints (KOPs 1 through 8)

The Ivanpah Valley floor has moderate overall visual sensitivity, with moderate existing visual quality, moderately high viewer concern, and high viewer exposure. (This sensitivity rating was generally consistent with BLM's visual inventory rating).

Primm Valley Golf Course: KOPs 1 – 2

The two KOPs from the AFC are both taken from the Primm Valley Golf Course, located on I-15 south of Ivanpah Lake and east of the proposed project site. Viewing distances are 1.5 miles to Ivanpah 2, and under 1.0 mile to Ivanpah 1, respectively. These KOPs represent a developed, outdoor recreational viewpoint with moderate to high use, at middle-ground distance.

I-15 Motorists: KOPs 3 –5

I-15 views are all within the valley and thus considered to have moderate overall sensitivity. Viewer numbers on this segment of highway are extremely high, particularly on Friday evenings and other peak periods, although the recreational destination for the majority of such motorists is Las Vegas rather than the Mojave Desert and the level of concern with scenic quality thus likely to be moderate or low. Viewing distance ranges from background (over four miles) to near- middle-ground (approximately one mile).

KOP 3: I-15 near Yates Well Road. KOP 3 depicts views of the Ivanpah 2 and 3 portions of the project site from I-15 at middle-ground distance (roughly 2 miles).

KOP 4: I-15 near Yates Well Road. KOP 4 depicts views of the Ivanpah 1 portion of the project site from I-15 at middle-ground distance (roughly 1 mile).

KOPs 3 and 4 correspond to two segments of the overall panorama seen from viewpoints in the portion of I-15 nearest to the project. The project, which occupies too wide an angle of view to be captured in a single photograph at this distance, is depicted in these two views to represent the entire angle of view encompassed by Ivanpah 2 and 3 (KOP 3, to the right), and Ivanpah 1 (KOP 4, to the left). These KOPs are approximately one mile from the proposed project at its nearest point (Ivanpah 1).

KOP 5: I-15 at Nipton Road. KOP 5 depicts views of I-15 motorists as they enter the Ivanpah Valley from the south at background distance (roughly 4 miles). This viewpoint demonstrates the high level of visual exposure toward I-15 created by the site's eastward sloping bajada topography, and represents I-15 views at their farthest point from the project site.

Ivanpah Lake: KOPs 6 –7

KOP 6 is taken from the most heavily used access point for wind sailors, on the eastern side of the dry lakebed. KOP 7 is taken from a second, also heavily used wind sailing access point on the west side of the lakebed, west of I-15.

These KOPs represent a natural, outdoor recreational viewpoint with very high use at far middle-ground/background distances of 4 and 3 miles respectively.

Primm: KOP 8

View from parking lot at southern boundary of Primm (roughly 4 miles). Primm is a high-volume visitor destination within middle-ground distance of the project. Although it is included within the larger landscape unit of the valley, viewer exposure and sensitivity from this indoor activity-oriented KOP is considered relatively low, and existing visual quality, dominated by large parking areas and commercial development, is also relatively low. Nevertheless, open and scenic views toward the project site exist from various locations in the southern area of Primm.

Clark Mountains Viewpoints: (KOPs 9 – 10)

Portions of the project viewshed in the Clark Mountain Range, which encloses the valley to the north, west, and south are comprised almost entirely of either the Mojave National Preserve or Stateline and Mesquite BLM Wilderness Areas, as indicated in **VISUAL RESOURCES Figure 2**. The fact that these areas were designated for special status under the Desert Protection Act (DPA) reflects their unusually high scenic and recreational value.

Both the Mojave National Preserve (MNP) and BLM Wilderness Areas (WAs) are regarded as high viewer concern locations due to their special designated status. This fact is amplified by the high visitor numbers reported by the National Park Service in surveys of visitors to the Clark Mountains cited below. This, in combination with the exceptional scenic quality of the mountains in both the MNP and WAs, and the high project visibility from these elevated viewpoints, would result in a high overall sensitivity rating.

KOP 9: Umberci Mine. KOP 9 is a popular hiking destination from Primm and the northern part of the valley, located on the trail to Umberci Mine within the Stateline Wilderness Area.

This KOP represents a sensitive recreational viewpoint at middle-ground distance.

KOP 10: Benson Mine. KOP 10, located in the vicinity of the Benson Mine, is representative of visitors to the MNP using or passing through the east face of Clark Mountain. According to the most recent statistical survey of MNP visitors conducted in

2003 for the National Park Service, an estimated 9% of visitors to the MNP visit the Clark Mountains, 7% use the Clark Mountains as their entry point to the MNP, and 10% use them as their departure point from the Preserve (USDOI, 2004b). The estimated overall number of visitors to the MNP in 2007 was 576,840 (USDOI, 2008b). Based on the visitor survey estimates, the number of annual visitors represented by this KOP (i.e., those visiting Clark Mountain) would thus be approximately 51,915 (9%). Since 10% of visitors to the Preserve were estimated to depart the park from Clark Mountain, and the principal access roads such as Yates Well and Colosseum Road are located in the vicinity of KOP 10 on the east face of Clark Mountain, staff assumes the KOP is reasonably representative of some substantial proportion of these visitors. According to the survey, these visitors include rock climbers, hikers, hunters, and OHV drivers traveling on Yates Well, Colosseum, or other open access roads in the vicinity of the KOP.

This KOP represents an elevated, high sensitivity recreational viewpoint at background distance.

Lucy Gray Mountains

No high-sensitivity recreational destinations or other KOPs were identified in the mountains to the east of the valley. This portion of the viewshed was assigned a moderate level of overall visual sensitivity.

IMPACTS

Ratings of existing visual sensitivity and proposed project contrast, dominance, and view blockage were made on the basis of field observation, photo documentation, and study of applicant-prepared visual simulations and other project information. KOP photos were taken with a 35mm camera and fixed 50mm lens, with a resulting horizontal field of view of approximately 40 degrees. This field of view, sometimes referred to as ‘normal’, approximates the actual field of view experienced in the field if viewed as a 9.5 inch wide image at a reading distance of about 1 foot.

SIGNIFICANCE CRITERIA

The following regulatory criteria were considered in determining whether a visual impact would be significant.

Federal

Significance under NEPA is defined in terms of a) context and b) intensity. Context means that the significance of an action must be analyzed in several contexts, such as society, the affected region, affected interests, and locale. Intensity refers to the severity of impact, and includes a variety factors to be considered (40 CFR 1508.27).
Some of the intensity factors potentially relevant to visual impacts include ‘unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands . . . ,’ degree of controversy, degree of uncertainty about possible effects, degree to which an action may establish a precedent for future actions, and potential for cumulatively significant impacts.

State

The CEQA *Guidelines* define a "significant effect" on the environment to mean a "substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including . . . objects of historic or aesthetic significance." (Cal. Code Regs., tit.14, § 15382.) Appendix G of the *Guidelines*, under Aesthetics, lists the following four questions to be addressed regarding whether the potential impacts of a project are significant:

1. Would the project have a substantial adverse effect on a scenic vista?

2. Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

3. Would the project substantially degrade the existing visual character or quality of the site and its surroundings?
4. Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

Local

Energy Commission staff considers any local goals, policies, or designations regarding visual resources. Conflicts with such laws, ordinances, regulations, and standards can constitute significant visual impacts. See the section on Applicable **Laws, Ordinances, Regulations, and Standards (LORS)**.

VISUAL PROJECT DESCRIPTION

Power Plant

VISUAL RESOURCES Figure 3 depicts the layout of the three proposed units. **VISUAL RESOURCES Figure 4** depicts architectural elevations of the Ivanpah 3 power block, based upon the original AFC plan. Components of the other two units would be essentially similar in appearance and heights. **VISUAL RESOURCES Figure 5** depicts elevations of the proposed mirror units.

Solar Power Towers, Receivers, and Mirror Arrays (Heliostats)

The overall area of the three proposed project phases would be approximately 6.4 square miles or 4,073 acres, most of which would be occupied by mirror fields. Under the modified project plan, there would be one power tower each at Ivanpah 1 and 2, and five towers at Ivanpah 3. All proposed towers would have an overall height of approximately 459 feet (140 meters), with an additional 5 to 10 feet of FAA-required lighting. Mirror array units would be approximately 12 feet (4 meters) tall (Data Response Set 1D, #4, CH2ML2008g). Power towers would require day and night FAA strobe lighting.

Other visually prominent structures would include steam turbine generators, air-cooled condensers, water storage tanks, a 16-acre substation, administrative and maintenance facilities, and new transmission lines and towers (described below). Of these the most prominent would be the Ivanpah 1 air-cooled condenser (approximately 92 feet in height) (AFC Figure 2.2-1c); and new transmission towers. (BSE2007a).

Site Grading

Site grading would potentially represent a significant visual component of the proposed project during construction. Surface disturbance of the proposed site, as in most desert landscapes of the region, can result in high contrast between the disturbed area and surroundings, due to high contrast between the disturbed soil color and albedo, and the color and albedo of the existing undisturbed, vegetated surface (Data Response Set 2, # 150, CH2ML2008i). Alterations in landform from construction of berms, ponds, and channels could also be visually prominent features of the project.

Plant Night Lighting

Lighting to support plant operation would be required but is not described in detail in the AFC. FAA strobe and other aircraft warning lighting is assumed to be required atop the tall solar receiver towers due to proximity to existing and possible future flight paths.

Linear Facilities

Transmission Lines

Approximately 22,400 feet of new 115-kV generation tie lines and single-pole towers would be introduced within the project boundaries (please refer to **Project Description** of this FSA/DEIS). In addition, approximately 36 miles of existing transmission line within California and Nevada would be upgraded from 115 kV to 220 kV lines to accommodate the additional load of ISEGS and other foreseeable energy projects.

Water Lines

Water would be provided from two wells located adjacent to the northwest corner of Ivanpah 1. Each of the three power blocks would be connected to the groundwater wells by underground water pipelines. (Data Response Set 1D, #4, CH2ML2008g). Potential visual effects would result primarily from color contrast of soil disturbance and vegetation removal for pipeline construction .

Gas Lines

Natural gas would be supplied to the site through a new, proposed six-mile long distribution pipeline ranging from 4 to 6 inches in diameter. From the Kern River Gas Transmission pipeline, the pipeline would extend 0.5 miles south to the northern edge of Ivanpah 3. The ROW area required for this section of the pipeline would be 75 feet wide and 0.5 miles long. The line would then run east along the northern edge, and then south along the eastern edge, of Ivanpah 3 to a metering station near the southeast corner of Ivanpah 3. From there, a supply line would extend northwest into the Ivanpah 3 power block. The main pipeline would continue along the eastern edge of Ivanpah 2 to another metering station at its southeastern corner. Again, a branch supply line will extend northwestwards into the center of the Ivanpah 2 power block. From that station, the pipeline would follow the paved access road from Colosseum Road past the administration/warehouse building to the Ivanpah 1 power block. (Data Response Set 1D, #4, CH2ML2008g). Typical visual effects of new pipeline consist primarily of color contrast between adjoining undisturbed land and pipeline right-of-way due to soil disturbance and vegetation removal, an effect that usually persists for the long term in arid environments

Construction Staging Area

Construction parking and laydown would occur within the units under construction. A 377.5-acre construction logistics area would be located between Ivanpah 1 and 2. After Ivanpah 3 construction is complete, associated fabrication buildings would be removed and the area restored. Upon completion of construction, a 16.1-acre site would be utilized by the new Ivanpah substation and a 8.9 acres for the administration buildings, warehouse and parking facilities (DR Set 1D, # 4, CH2ML2008g .

VISUAL IMPACT ASSESSMENT

Staff Discussion of AFC Analysis

In both the AFC and subsequent data responses, the applicant applied the the BLM Visual Resource Management (VRM) system as the basis of its analysis. However, in both the AFC and subsequent analyses, the applicant incorrectly attributed a Class IV VRM baseline rating to the study area and the two Primm Valley Golf Course KOPs.. In addition, the AFC and subsequent Data Response 1D identified the golf course as having a low (visual) sensitivity level.

There is no basis for identifying the site and surroundings as a VRM Class IV area. VRM Classes are formally assigned by BLM as part of a land use plan or plan amendment. Previously, however, no VRM mapping or assignment had been adopted for the area by BLM. The AFC analysis thus refers to Visual Resource Inventory (VRI) classes. As discussed previously, however, BLM subsequently identified the site as VR Inventory Class III in a formal inventory of the study area. Energy Commission staff's independently-conducted visual inventory also resulted in an evaluation that is consistent with a VRI Class III rating of the area. In general, recreational destinations with high use levels within relatively scenic natural settings such as KOP 1 would not be considered VR Inventory Class IV, the lowest possible rating and one that implies either low viewer sensitivity or low scenic quality, neither of which apply to this site. Viewer sensitivity would generally be considered high due to the recreational activity types and high use numbers present. Similarly, staff disagrees with the applicant's project contrast ratings as described in Data Response 1A # 97-2, as indicated in the analysis of KOPs 3 and 4, below (CH2ML2008a).

A principal disagreement with the AFC analysis by both Energy Commission and BLM staff is the omission of sensitive outdoor recreational KOPs outside of the Primm Valley Golf Course. This omission was addressed in Data Response 2A, # 147 with visual simulations developed by the applicant from KOPs selected by BLM and Energy Commission staff (CH2ML2008i). These KOPs were not analyzed by the applicant in the Data Responses, but are analyzed by staff below.

Direct Impacts

Potential direct impacts of the proposed project are discussed below under the four significance criteria of the CEQA Guidelines Appendix G.

A. Would the project have a substantial adverse effect on a scenic vista?

Although no designated scenic vistas were identified in the study area, various viewpoints, particularly those in the Clark Mountains within the Mojave Preserve and Stateline Wilderness Area would qualify as such due both to their very high scenic quality and high levels of recreational use. Both representative KOPs within the Clark Mountains, KOPs 9 and 10, would experience substantial adverse visual effects as a result of the proposed project. Panoramic elevated views of the valley would change from a relatively undisturbed desert floor landscape dominated by striking views of the Ivanpah dry lake bed, to an industrial, highly man-altered one dominated by roughly four square miles of mirror-arrays and 459-foot tall solar collector towers topped with brightly lit receiver units, a large graded area, as well as light rays reflected off of ambient atmospheric dust. The mirror fields would display a high degree of visual unity due to their orientation in large-scale circular patterns of high regularity around the collector towers, lending the view a higher level of visual quality than that of many other forms of intensive development. Reflected light rays, when present, would create striking, tent-like patterns, also with high visual unity, which some viewers might consider attractive or interesting. Nevertheless, since the existing intact natural landscape is considered one of the primary attractions for visitors to these mountains, the resulting dramatic alteration of landscape character, particularly as seen from high sensitivity recreational viewpoints in the Clark Mountains, is considered to represent a substantial adverse visual effect. These effects are discussed in further detail below, in the discussion of individual KOPs 9 and 10 under CEQA Criterion C.

View corridors to Clark Mountain from Highway I-15 could be considered to be a scenic vista in light of the County scenic designation of Highway I-15 within the Ivanpah Valley. The project would not substantially obstruct these scenic views due to the low height of the mirror fields, and the relatively large distances between the vertical solar towers. However, very bright levels of glare from the receiver units atop the solar power towers, though not anticipated to be hazardous, would appear in the foreground of views of Clark Mountain, resulting in very strong levels of contrast that could strongly alter the character of these views or make viewing difficult.

B. Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway?

The project is adjacent to Highway I-15, which is not listed as an eligible State Scenic Highway. The proposed project would be located in immediate proximity to a large rock-outcropping that is a prominent landmark for viewers throughout the viewshed to background distances. The project would not damage or intrude into views of this rock outcropping but would dramatically alter its visual setting. No other notable scenic features are present on-site. The project would not directly damage any specific scenic resources located within the project site. Potential effects on scenic resources in general are discussed under CEQA Criterion C, below.

C. Would the project substantially degrade the existing visual character or quality of the site and its surroundings?

Project Operation Impacts

Impacts of Structures on Key Observation Points

Ivanpah Valley – Primm Valley Golf Course

As described above, views from within the valley are considered to have moderate overall visual sensitivity, with moderate existing visual quality, moderately high viewer concern, and high viewer exposure. As noted above, this rating is generally consistent with BLM's characterization of the valley as VRI Class III.

KOP 1 – Looking Southwest from Primm Valley Golf Course toward Ivanpah 1, (roughly 1.5 miles). **VISUAL RESOURCES Figures 6 A** and **6B.**

Staff Comments on Applicant's Simulation

Staff notes that the simulation of KOP 1 does not clearly depict the portion of the mirror fields nearest the viewer, which appear in the images as an indistinct area with the same color and texture as the background soils. In fact these would appear as a large field of angular, 12-foot-tall metallic structures with an industrial texture and complex patterns of light and shadow that would accentuate their contrast with the surrounding landscape, lending the facility a distinctly man-made character. Staff understands that this may reflect technical limitations in the visual simulation process. Staff's observation is only made to inform the reader that the simulation may (unavoidably) understate the actual level of contrast that would be experienced by viewers. Color contrast with the surroundings could be strong depending upon the paint color used, but could be minimized for the arrays facing away from the viewer. The far portion of the mirror fields, in which the mirror surfaces themselves are visible, would appear as distinct, angular structures with highly variable surface color and brightness and a dense, industrial texture. **VISUAL RESOURCES Figure 7a**, depicting the Solucar solar thermal project in Seville Spain, illustrates the appearance of these features, including the high color and form contrast of unpainted mirror arrays.

Visible mirror surfaces would not be expected to display visible specular reflection of the sun to the public absent mirror system malfunction. Visible mirror surfaces would display areas of diffuse reflection of sunlight under some conditions. While strongly contrasting with the existing setting, these diffuse reflections have been compared to the sun's reflection on the surface of a lake, and are considered to be a moderate and acceptable level of contrast.

The heated solar receiver units at the top of the power towers would appear brightly lit in daylight. That brightness cannot be accurately depicted in graphic simulations.

VISUAL RESOURCES Figure 7b, c and d, photographs of the Solar One project in Dagget, CA, illustrate the variable appearance of the mirror surfaces, including areas of bright specular or spread glare that occur under certain conditions; the potential for soil color contrast beneath the heliostats due to visibility of the soil surface from elevated

viewpoints, and the role of heliostat shadow in creating visual contrast. Staff was unable to obtain data from the applicant about likely frequency, duration or intensity of the reflected 'light-ray' effect depicted in the simulations. However, **VISUAL RESOURCES Figure 7a** also presents some anecdotal documentary evidence on the appearance of this phenomenon, though not on its frequency or duration. Staff also notes that in the absence of light rays, the project would appear less vivid, both less dominant and more purely utilitarian in character, than depicted in the simulations.

As depicted in **VISUAL RESOURCES Figure 6B**, the project would appear very prominently from this near-middle-ground viewpoint. The 495-foot solar collector towers would introduce strong vertical line and form contrast. This form contrast would be strongly accentuated by the bright illumination of the heated solar collector at the top of each tower, as well as by rays of reflected sunlight when ambient dust particles are present in the surrounding air. The solar collector towers and adjacent air-cooled condenser, as well as the substation and related facilities south of Ivanpah 2, would present a utilitarian, industrial character. The panoramic expanse of mirror arrays would present strong textural contrast with the intact, natural character of the desert floor. Portions of the desert floor below the mirror arrays, where visible, would contrast in hue, brightness and value with surrounding undisturbed soil surfaces, and with the mirror structures themselves. When present, reflected light rays would create a luminous, transparent surface of tent-like form that would to some degree repeat that of the mountain ridgeline, would have a legible form with high unity, and to some observers could be perceived as an interesting and vivid, albeit man-made, sight. At other times in the absence of the light rays, the view of the solar tower and mirror fields would be more purely utilitarian in character, both less dominant and less picturesque. Under sunny conditions, the bright lighting of the solar receiver units would be very conspicuous, and may tend to visually dominate views due to their brightness.

In addition to this strong level of contrast, the project would exhibit strong spatial and scale dominance. The vast scale of the project would be such that it could not be taken in in a single view.

The project would not physically block existing scenic views of Clark Mountain but as noted previously would strongly alter their character due to the brightness of the solar receivers, and would interfere with the ability of viewers to look toward the mountain due to strong levels of discomfort glare. This would represent a moderately strong to strong level of view blockage in the direction of Clark Mountain.

These factors together would result in a strong level of overall visual change. The project would demand attention, could not be overlooked, and would be dominant in the landscape.

Impact Significance - In the context of moderate overall visual sensitivity, this strong level of visual change would represent a potentially significant impact.

Mitigation – Views of the proposed project from the golf course could be partially or substantially screened by perimeter tree plantings. Substantial tall screening would also tend to block the panoramic natural views of the Clark Mountains that are the location's scenic attraction. Partial screening of the project with low-growing trees or tall shrubs

could screen views of the mirror fields from within the golf course while leaving views of the Clark Mountains intact. In that case the tower and light rays would also remain visible. Screening only quadrants containing views of the project (northwest to southwest) could leave scenic views eastward over Ivanpah Lake and mountains to the east intact. These measures are described in Condition of Certification **VIS- 2.**

Staff recommends that if the project is approved, this measure be required if desired by the golf course owner, with input by the owner as described in **VIS-2**. Potential contrast of the mirror arrays could be reduced considerably by painting the non-mirror surfaces in a non-reflective tan or brown color to blend with the visual background of the surrounding terrain and the slopes of the Clark Mountains, as described in Condition of Certification **VIS-1**.

Residual Impact Significance After Mitigation with Staff-Recommended Measures – With Conditions of Certification **VIS-1** and **VIS- 2**, impacts to viewers at Primm Valley Golf Course could be reduced to a less-than-significant level in the long term. If Condition **VIS-2** is not implemented, impacts would remain significant.

KOP 2 – Looking West from Primm Valley Golf Course toward Ivanpah 1, (roughly 1.5 miles).

VISUAL RESOURCES Figures 8A and **8B.**

KOP 1 and 2 represent, in effect, two portions of a single sensitive viewing location, the golf course. The affected field of view at the golf course is too wide to fit into a single photograph; thus two photographs are needed to depict the breadth of the project's effects. Views similar to those represented in KOPs 1 and 2 would, however, be experienced as a single panoramic view from many locations within the golf course. Therefore staff considers that KOP 2 is analyzed under the preceding discussion of KOP 1, with the same conclusions.

Ivanpah Valley – I-15 Motorists

I-15 views are all located within the valley and have moderate overall visual sensitivity, with moderate existing visual quality, moderately high viewer concern, and high viewer exposure.. Viewer numbers on this segment of highway are extremely high, particularly on Friday evenings and
other peak periods, although the recreational destination for the majority of such motorists is Las Vegas rather than the Mojave Desert, thus the level of concern with scenic quality of many motorists is likely to be moderate or low.

KOP 3 – Looking West from I-15 near Yates Well Road (Toward Ivanpah 2 and 3), 2.5 Miles from site (Ivanpah 2). **VISUAL RESOURCES Figures 9 A** and **9B**.

KOP 4 – Looking West from I-15 near Yates Well Road (Toward Ivanpah 1), 1 Mile from site. **VISUAL RESOURCES Figures 10A** and **10B**.

KOP 3 depicts views of Ivanpah 2 and 3 from I-15, near the Yates Well Road interchange south of the Primm Valley Golf Course, at a distance of roughly 2-1/2 miles from Ivanpah 2.

KOP 4, rotated slightly to the left of KOP 3, depicts views of Ivanpah 1 from the same segment of I-15, near the Yates Well Road interchange south of the Primm Valley Golf Course at a distance of roughly 1 mile from Ivanpah 1.

KOPs 3 and 4 are meant to capture the full panoramic field of view of motorists on I-15 at their closest point to the project. KOP 3 is rotated to capture the view of Ivanpah 2 and 3 in relation to the prominent rock outcropping in their visual foreground. KOP 4 is rotated to the left to capture the view of adjoining Ivanpah 1. However, the two photographs together represent different potions of what would be experienced by viewers as one panoramic view.

As depicted in Figures 9b and 10b, the project would be highly prominent from this near-middle-ground viewpoint. The tall solar collector towers would introduce strong vertical form and line contrast. This form contrast would be strongly amplified by bright illumination of the heated solar receiver at the top of each tower, as well as by light rays of reflected sunlight when ambient dust particles are present in the surrounding air. The mirror arrays would alter the character of the desert floor to a distinctly man-made texture, including the mechanical structures of mirror units closest to the viewer, and the bright, reflective mirror surfaces visible beyond the solar towers. Although the form and line contrast of the mirror arrays would be weak, the textural contrast they would introduce is considered strong due to the vast scale and visual magnitude of the affected area, which is so broad that it could not be seen in one view. Visible areas of disturbed soil between Ivanpah 1 and 2 could contrast sharply in color and brightness with any surrounding undisturbed soil surface.

In addition to this strong level of contrast, the project would exhibit strong spatial and scale dominance. The vast scale of the project would be such that it could not be taken in in a single view.

The project would not physically obstruct existing scenic views of Clark Mountain due to the low height of the mirror fields, and the relatively large distances between the vertical solar power towers. However, the very bright solar receiver units could tend to dominate or even interfere with such views.

The combination of strong contrast, strong spatial and scale dominance, and strong view blockage represent a strong level of overall visual change. The panoramic expanse of man-made texture on the ground plane, together with strong form contrast of 45-story towers and strong color contrast of glowing receivers and mirror surfaces would demand attention, could not be overlooked, and would fundamentally alter the perceived character of the existing landscape from an intact natural to distinctly man-altered setting.

Impact Significance - This strong level of overall visual change would not be compatible with the moderate overall sensitivity level of the Ivanpah Valley as seen by motorists in the visual middle-ground. These effects are thus considered a potentially significant visual impact.

Staff Comment on Contrast Rating of KOPs 3 and 4

Staff concludes that from foreground and near-middle-ground viewpoints on I-15, the project would not be consistent with the moderate overall sensitivity level associated with its existing scenic quality, viewer concern, and viwer exposure. Staff also notes the following:

From a visual assessment point of view, there are two somewhat different aspects of visual impact highlighted by the ISEGS project. The method of assessing visual impact applied in this study is oriented toward the preservation of natural landscapes perceived to be of scenic value, as an implicit goal. Thus, the level of project contrast with the baseline landscape *per se* is the measure of impact, rather than the ultimate level of visual quality with the project. These two measures of visual impact are not the same.

From the perspective of ultimate visual quality, it is worth noting that the proposed project as seen from KOPs 3 and 4 would, in addition to strong overall contrast, also exhibit strong visual unity and simplicity, attributes that are generally associated with positive visual quality. This condition is in contrast to scenes of visual disorder and disunity that are generally equated with low visual quality or 'visual blight.' For example, a mining operation or manufacturing facility might present scenes of strong visual disorder and thus, low visual quality or 'blight.' The proposed project, in comparison, would exhibit moderate visual quality and would likely appear more acceptable than many other forms of intensive urban or industrial development.

Thus, staff notes that within an urban frame of reference not all viewers would find the project disagreeable or unattractive; indeed, many viewers could find the project interesting to view due to its novelty. Overall, it would exhibit moderate visual quality and preserve scenic (though strongly altered) views. Within an urban frame of reference, this level of impact might be considered acceptable. However, within a landscape conservation-oriented frame of reference, the project would represent a substantial change and impairment of a previously intact natural landscape.

Mitigation – No available mitigation measures were identified to fully address the level of contrast of the project. However, if the project is approved, staff recommends Condition of Certification **VIS-1**, Surface Color Treatment of Structures, to minimize structure contrast, especially of the mirror arrays, to the greatest degree feasible.

Residual Impact Significance After Mitigation with Staff-Recommended Measures - No measures were identified by staff to fully address impacts. Impacts would remain significant and unavoidable.

Staff Comments on Applicant's Simulations

As discussed above under KOP 1, staff notes that the simulations of KOPs 3 and 4 do not clearly depict the mirror arrays, which would appear as a large field of angular, 12-foot-tall metallic structures with a distinctly man-made texture in views of Ivanpah 1 due to its proximity to viewers. Staff understands that this may reflect technical limitations in the visual simulation process. Staff's observation is made to inform the reader that the simulation may (unavoidably) understate the actual level of contrast that would be experienced by viewers. The visible mirror surfaces would appear as distinct, angular

structures with highly variable surface color and brightness, including occasional areas of specular glare, and a dense, machinery texture as illustrated in **VISUAL RESOURCES Figure 7a, above.** Again, brightness of solar receivers cannot be reproduced in printed simulations.

KOP 5 - Looking Northwest from I-15 at Nipton Road, 4 Miles from Site. **VISUAL RESOURCES Figures 11A** and **11B**.

KOP 5 depicts views of I-15 motorists at their farthest point from the project site, as they enter the Ivanpah Valley from the south at background distance. This viewpoint demonstrates the relatively high degree of visual exposure toward I-15 created by the site's open, eastward sloping terrain. It is meant to illustrate the I-15 experience at the farthest point from the project, and complement KOPs 3 and 4, which depict the nearest point to the project.

Contrast of the project at this farthest viewpoint on I-15 would be moderate, rapidly increasing to strong contrast as motorists progressed northward. Visual exposure to the site is high until motorists reach the Primm Valley Golf Course, which obstructs highway views to the site.

Project dominance would remain moderate (co-dominant) at this distance. Scale and prominence of the mirror fields would be large but co-dominant within the overall field of view.

View blockage would be moderate from this location. The bright solar receivers would strongly attract attention, but would appear largely to the right (east) of Clark Mountain, the principal object of scenic views.

Overall, the project would exhibit moderate visual change from this and other background distance viewpoints.

Impact Significance – Arguably, the majority of motorists on I-15 are not highly concerned with the scenic quality of the setting. However, the very high number of viewers (up to 40,000 per day) makes it difficult to consider this KOP as having low sensitivity; under BLM guidelines, for example, 40,000 vehicles per *year* may indicate a high level of viewer sensitivity (USDOI, 1987)(H-8410-1). This KOP is analyzed in terms of a moderate overall visual sensitivity rating, including a moderately high level of viewer concern. In addition, the affected segment of I-15 within the project viewshed has been identified by San Bernardino County as a county scenic route, as discussed further under Compliance with Applicable LORS.

Moderate contrast as depicted in this background-distance view would be compatible with its moderate overall sensitivity and be less than significant. However, as motorists progressed northward, visual exposure of the project would remain high and contrast and dominance would increase to strong levels. Although no intermediate locations on Highway I-15 were simulated, for the greater part of the drive between Nipton Road and Yates Well Road, which occurs within the middle-ground distance zone (under 3 miles), contrast would be considered strong, and impacts potentially significant.

Mitigation – No available mitigation measures were identified to fully address these impacts. However, if the project is approved, staff recommends Condition of Certification VIS-1, surface color treatment of structures to minimize structure contrast to the greatest degree feasible.

Residual Impact Significance After Mitigation with Staff-Recommended Measures – No measures were identified by staff to fully address impacts. Impacts for most of the I-15 exposure within middle-ground (under four miles) distance would thus be significant and unavoidable.

Staff Comments on Applicant's Simulation

Previous comments on the color and texture of the simulated mirror fields also apply in this view. At certain times of day, diffused glare from the mirror surfaces would be prominent, similar to a lake surface in sunlight; at other times it would not, as in this simulation. The color and texture contrast of the nearer portion of the mirror fields would vary greatly depending upon surface treatment. Brightness of solar receivers cannot be reproduced.

Ivanpah Valley – Ivanpah Lakebed

KOP 6 – View of Ivanpah 2 and 3 Looking West Toward Site from Eastern Side of Ivanpah Lake, 4 Miles from Site. **VISUAL RESOURCES Figures 12A** and**12B**.

KOP 6 is taken from the most heavily-used access point to the dry lakebed by wind sailors, on the eastern edge of the lakebed at a distance of roughly 4 miles.

Staff Comments on Applicant's Simulation

Staff notes that the framing of the view, by focusing on Ivanpah 2 and 3, necessarily omits Ivanpah 1, which would appear to the left of this view and would be closer and more prominent to viewers.

As depicted in **VISUAL RESOURCES Figure 12b**, because of distance and the relatively oblique vertical angle of view, the mirror arrays would occupy a narrow portion of the field of view, appearing relatively flat from Ivanpah Lake viewpoints. Form, line and color contrast of the mirror fields would thus be relatively weak. The vertical 459-foot towers and bright glow of solar receivers would have greater line and color contrast but would remain moderate and co-dominant with other features in the view. Light rays, when present as depicted in the simulation, would be prominent, but would remain generally subordinate within the overall view. Based on currently available data, project contrast would range from weak to moderate depending on prevalence of light rays and brightness of solar receivers.

Due particularly to the low, oblique viewing angle, project visual scale and spatial dominance would remain subordinate to other prominent components of the view from this location.

The bright power tower receivers would intrude into views of Clark Mountain. However at this distance they are anticipated to have a moderate level of view intrusion.

Overall visual change would thus be moderate under sunny conditions, and weak during cloudy conditions.

Impact Significance – The weak to moderate levels of overall project visual change would be compatible with the moderate overall visual sensitivity of the setting from this viewpoint. Impacts would thus be less than significant.

Mitigation – None required.

KOP 7 - Looking Southwest Toward Site from Western Side of Ivanpah Lake, 3 Miles from Site. **VISUAL RESOURCES Figures 13A** and 13**B**.

KOP 7 is taken from a second heavily-used wind sailing access point on the west side of the lakebed west of I-15, and illustrates the nearer range of viewing conditions existing for lakebed visitors.

Staff Comments on Applicant's Simulation

Staff notes that as in KOP 6 above, the framing of the view is oriented to crop out Ivanpah 1, which would appear to the left of this view and in this case would be farther from the viewer than Ivanpah 3, to the right. As in KOPs 1 and 2, 3 and 4, and 6 and 7, the overall horizontal angle of view occupied by the project is too wide to capture in a single photograph.

Similar to KOP 6 the mirror fields would be viewed at a relatively oblique, low angle, reducing their overall prominence in the field of view. The solar receiving towers would be prominent due to the intense brightness of the illuminated solar receivers atop each tower.The overall level of project contrast would range from weak to moderate depending upon prevalence of light rays and brightness of solar receivers. In the presence of light rays as depicted in the simulation, or high levels of receiver illumination, contrast would be moderate.

Both mirror fields and towers would be more visually dominant than at KOP 4 due to greater proximity and correspondingly greater visual magnitude. Based on currently available information on glare, the project structures would be visually co-dominant with other features in the view, including the existing transmission towers.

The bright power tower receivers would intrude into views of Clark Mountain. However at this distance they are anticipated to have a moderate level of view intrusion.

Overall visual change would thus be moderate under sunny conditions, and weak during cloudy conditions.

Impact Significance – The weak to moderate levels of overall project visual change would be compatible with the moderate overall visual sensitivity of the setting from this viewpoint. Impacts would thus be less than significant.

Mitigation – None required.

Ivanpah Valley - Primm

KOP 8 - Looking South from Primm, 4 Miles from Site. **VISUAL RESOURCES Figure 14.**

Primm is a high-volume visitor destination within middle-ground distance of the project, located within the larger moderate sensitivity landscape of the valley. Although scenic views toward the project site exist at the southern edge of Primm and from windows of Whiskey Pete's hotel, overall, viewer exposure and orientation to the project site are considered to be limited. Similarly, viewer concern from this indoor activity-oriented KOP is considered relatively low. Existing visual quality within Primm, dominated by large parking areas and commercial development, is also relatively low. In addition, views toward the project site from this location would be essentially similar to those of KOP 7 (Ivanpah Lake), except from a greater distance (over 4 miles rather than 3 miles). For these reasons Energy Commission staff agreed that a simulation from this location would not be required.

Similar to KOP 7 the mirror fields would be viewed at a relatively oblique vertical angle, reducing their overall prominence in the field of view. The solar receiving towers would be prominent due to the intense brightness of the illuminated solar receivers atop each tower. In the absence of reflected light rays, the project structures would remain visually subordinate to other features in the view, including the existing transmission towers, and their overall level of contrast would be weak to moderate. In the presence of light rays as depicted in the simulation, contrast would be moderate.

Due to the oblique angle of view from this location, visual dominance of the project would remain subordinate to other components of the view.

The bright power tower receivers would intrude into views of Clark Mountain. However at this distance they are anticipated to have a moderate level of view intrusion.

Overall visual change would thus be moderate under sunny conditions, and weak during cloudy conditions.

Impact Significance – The weak to moderate levels of overall project visual change would be compatible with the moderate overall visual sensitivity of the setting from this viewpoint.
Impacts would thus be less than significant.

Mitigation – None required.

Clark Mountains

As described previously, views from within the Clark Mountains are considered to have high overall visual sensitivity, with high existing visual quality, high viewer concern associated with their Desert Protection Act status, and high viewer exposure due to the elevated vista points.

KOP 9 – Looking South from Road to Umberci Mine, 1 Mile from Site. **VISUAL RESOURCES Figures 15A** and **15B**.

KOP 9 is located on the trail to Umberci Mine, a popular hiking destination from Primm and the northern part of the Ivanpah Valley, located within the BLM Stateline Wilderness Area.

Staff Comments on Applicant's Simulation

Again, the simulation is framed to capture a portion of Ivanpah 3, in the foreground, and Ivanpah 2 farther in the distance, necessarily excluding Ivanpah 1, which would appear to the left of the view. The individual 12-foot-tall mirror units are distinguishable in this simulation. To provide a sense of scale, the towers are 459 feet tall. The backs of the mirror units are assumed in the simulation to be painted in a dark color. As discussed above and depicted in **VISUAL RESOURCES Figure 7b,** the appearance of the visible mirror surfaces would vary widely, from dark blue to bright solar diffuse glare, depending upon time and season. The visibility of mirror reflection would be greater from this and other KOPs within the Wilderness Area than from the valley floor due to the elevated viewer position.

As depicted in **VISUAL RESOURCES Figure 15B**, form, line, color and texture contrast of the project structures would all be strong from this viewpoint. Towers would exhibit strong form and line contrast. The mirror fields would exhibit strong texture contrast with the natural ground plane. The glowing solar collectors and visible areas of mirror surface would exhibit strong color contrast against the ground plane and background mountain slopes. In this particular photograph the existing transmission towers and lines are prominent in the foreground. Nevertheless, long, panoramic views of the site and Clark Mountains remain open and highly scenic from this elevated location.

Due both to relative proximity to the project and the elevated viewing angle, the scale and spatial dominance of the project would be high (dominant). As illustrated in the simulation the project would extend over the entire field of view and could not be taken in in a single view. The brightly lit solar receivers would compete with the mountain peaks and ridges for visual dominance.

Similarly, the bright solar receivers would intrude into, and potentially interfere with, scenic views of the Clark Mountains from a moderate to strong degree depending upon brightness of the solar receivers.

Overall project visual change would thus be strong. The project would demand attention, could not be overlooked, and would be dominant in the landscape.

Impact Significance –This strong level of overall project visual change contrast would not be compatible with the moderate overall visual sensitivity of the Ivanpah Valley, nor with the high overall visual sensitivity of the Stateline Wilderness Area in which this viewpoint is located. This level of impact is thus considered to be a significant visual impact.

Mitigation – No available mitigation measures were identified to adequately address these impacts. However, if the project is approved, staff recommends Condition of Certification VIS-1 Color Treatment to minimize contrast of the mirror units to the greatest extent feasible.

Residual Impact Significance After Mitigation with Staff-Recommended Measures - Impacts would remain significant and unavoidable with recommended conditions of certification.

KOP 10 – Looking East from Vicinity of Benson Mine, 4 Miles from Site. **VISUAL RESOURCES Figures 16A** and **16B**.

KOP 10, located in the vicinity of the Benson Mine, is representative of Mojave National Preserve visitors in the Clark Mountains within the project viewshed. Visitors in the vicinity of the KOP include rock climbers, hunters, OHV drivers on Yates Well, Colosseum and other roads, hikers, and campers estimated to total over 50,000 visitors per year (USDOI, 2004b; USDOI 2008b).

As depicted in Figure 16B, even at this distance the project would display a strong level of form, line, color and texture contrast, introducing an element of highly man-made character into a wide portion of the field of view. The mirror fields would vary in their appearance from dark blue to bright diffuse glare as illustrated in **VISUAL RESOURCES Figure 7b**. At certain times the mirror arrays could potentially create strong diffuse or spread glare, particularly in the morning if viewed on axis with the sun, and in late afternoon. Bright receiver glare is anticipated during all sunny periods. Potential glare impacts are discussed further under Glare Impacts, below. As noted previously, the project would exhibit a high degree of visual unity and simplicity that could be perceived as less adverse than many other types of development. The project would exhibit moderate, rather than low, overall visual quality. Nevertheless, the character of the existing intact, natural landscape would be strongly altered over a large area to a man-made character, and the project would exhibit strong contrast.

From such elevated viewpoints in the surrounding mountains, the mirror arrays would become a dominant feature in views of the valley, strongly altering a large portion of the field of view.

The project would tend to dominate, but not physically obstruct, scenic views of the valley as seen from high elevations in the mountains. The solar receivers could potentially interfere with the ability to see such views due to strong nuisance glare.

Overall, project visual change would thus be strong. The project would demand attention, could not be overlooked, and would be dominant in the landscape.

Impact Significance – This strong level of contrast would not be compatible with the moderate overall sensitivity of the Ivanpah Valley in its current condition. Implementation of the project would represent a substantial decline in scenic quality of views by MNP visitors. This level of impact is thus considered a significant visual impact.

Mitigation – No available mitigation measures were identified to fully address these impacts. However, if the project is approved, staff recommends the following Conditions of Certification:

In order to minimize the degree of color contrast of the mirror structures, staff recommends Condition of Certification VIS-1, Surface Treatment of Structures. In order to minimize color contrast of disturbed soil areas, staff recommends Condition of Certification VIS-3, Revegetation of Disturbed Soil Areas. The primary area requiring revegetation would be the large area to be used for construction laydown, and siting of a substation and other operation and support structures, located between Ivanpah 1 and 2. However, other structures including soil berms, shall also require revegetation where soil disturbance is expected to occur.

Residual Impact Significance After Mitigation with Staff-Recommended Measures – Recommended Condition of Certification VIS-1 would reduce the potential contrast of the non-mirror portions of the heliostat units. Recommended Condition of Certification VIS-3 would reduce the area and level of high contrast from soil disturbance over the long term. However, the larger impact of strong visual contrast and dominance of the mirror arrays, towers and solar receivers could not be mitigated. Impacts would thus remain significant and unavoidable.

Project Construction Impacts

Construction parking and laydown would occur within the units under construction. A 120-acre construction logistics area would be located between Ivanpah 1 and 2, including fabrication buildings. After Ivanpah 3 construction is complete, associated fabrication buildings would be removed and the area restored. In addition, a 257-acre area would be reserved for temporary construction use, and for the permanent substation site. Project construction is estimated to last for 48 months (Data Response Set 1D, # 4)(CH2ML2008g).

During construction, grading of the project phases would result in a very large area of disturbed soil surface, resulting in high color, line and texture contrast that would be prominent from the highway and elevated KOPs. The potential overall affected area of the three proposed project phases would be approximately 4 square miles or 3,613 acres. The majority of this area would eventually be transformed into mirror fields, with visual effects analyzed elsewhere in this report. The 120-acre construction area, and any graded or disturbed portions of the 257 acres used for temporary construction activities, however, could continue to have long-term adverse visual impacts. Graded areas could also result in adverse visual effects due to fugitive dust.

Nighttime construction lighting, without adequate mitigation, could result in light pollution affecting the Mojave National Preserve.

These effects together and individually could represent strong visual changes to affected KOPs on I-15 and in the Clark Mountains.

Impact Significance – Anticipated strong visual changes from construction would be incompatible with the moderate overall visual sensitivity of the Ivanpah Valley, as

experienced from affected viewpoints on the highway, and the high overall visual sensitivity of viewpoints in the Clark Mountains, and would last for a period of several years. They thus represent a potentially significant adverse impact.

Mitigation – To address potential long-term impacts of site grading, staff recommends Condition of Certification BIO-14, as specified for specifically visual concerns in Condition of Certification VIS-3, Revegetation of Disturbed Soil Surfaces. To address potential light pollution impacts, staff recommends Condition of Certification VIS-4, Night Lighting Measures. Impacts from fugitive dust have been addressed in **Air Quality** Conditions of Certification **AQ-SC3. AQ-SC4,** and **AQ-SC7** and **Soil and Water** Condition of Certification **SOIL&WATER-1**, and could be reduced to less than significant levels with implementation of these recommended conditions of certification.

Residual Impact Significance After Mitigation with Staff-Recommended Measures –

Because of the climatic constraints on successful re-vegetation in this region, it is anticipated that the impacts of disturbed areas of the site could remain substantial for the duration of project construction. However, the majority of grading effects would be replaced by the effects of the project itself, which would obscure the disturbed soil surface in all but the area between Ivanpah 1 and 2. This remaining exposed area of disturbance would contribute to the significant overall contrast of the project in the long term but in itself would occupy a small portion of the view. This residual impact of grading would be less than significant in the long term.

With recommended Condition of Certification **VIS-4**, Temporary and Permanent Exterior Lighting Measures, light pollution effects from nighttime construction lighting could be reduced to less than significant levels. Impacts from fugitive dust have been addressed elsewhere in this PSA and could be reduced to less than significant levels with recommended conditions of certification.

D. Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

Glare is a major issue of concern for the ISEGS project, not only for aesthetic reasons, but for navigation and safety reasons due to the proximity of Highway I-15, and to aircraft flight paths associated with both existing facilities and with the anticipated future Southern Nevada Supplemental Airport to be located a short distance north of the project near Jean, Nevada. Potentially affected receptors would include aircraft, motorists on I-15; hikers, climbers and other visitors in the Clark Mountains; and off-road vehicle (ORV) motorists, wind sailors, hikers and others in the valley.

Staff conducted an independent review of potential glare impacts based on available project data. The results of this review are summarized in detail in the **Traffic and Transportation** section of this FSA/DEIS. Conclusions on potential glare impacts in this visual analysis are based on that review.

In response to staff Data Requests 89 and 90, the applicant provided a series of data responses dealing with safety of reflected mirror array light beams, including

calculations of beam intensity and safety, intensity of light from the solar receiver units on top of the power towers, and receiver glare safety calculations (DR Set 1, # 89 – 90) (CH2ML2008a).

According to the applicant's data responses, the likelihood of hazard to aircraft from mirror reflection is negligible. Potential hazards or annoyance of mirror reflection to motorists or outdoor recreationists was not directly addressed.

According to Data Response DR 90-1, the potential hazard to motorists on I-15 of glare from the heated solar receiving units atop the towers would also be negligible.

However, a third-party expert review commissioned by the Clark County Department of Aviation (CCDOA) concluded that 'glare from the heliostat mirrors could be a significant hazard to air navigation (ASRC, 2009). CCDOA strongly urged the Energy Commission to study the issue of potential glare on aircraft in more detail (Clark Cty, 2009).

Subsequent to publication of the PSA, staff requested additional project data related in particular to possible glare impacts from the solar receiver units atop the power towers. Staff has also conducted additional analysis of the potential health and safety hazards or potential for distraction from both the heliostats and power tower receivers as provided in the **Traffic and Transportation** section of this document. Staff's subsequent independent analysis concludes solar radiation and light reflected from proposed project heliostats could cause a significant human health and safety hazard to observers in vehicles on adjacent roadways or air traffic flying above the site, and could cause a distraction of drivers on I-15 that would lead to road hazards and to pilots of aircraft flying over the site. Staff has proposed Condition of Certification **TRANS-3** to ensure solar radiation and light from the heliostats does not impair the vision of motorists or pilots traveling near the site and that the potential for exposure of observers does not cause a human health and safety hazard.

Staff also concludes that solar radiation and light reflected from proposed project power tower receivers is not expected to pose a significant human safety or hazard to navigation of vehicles on adjacent roadways or air traffic flying above the site, but could potentially cause a distraction of drivers on I-15 that would lead to road hazards. Staff has proposed Condition of Certification **TRANS-4** to ensure glare from power tower receivers does not impair the view of motorists or pilots traveling near the site and that the potential for exposure of observers to light reflected from the power tower receivers is minimized to the maximum extent possible.

With Condition **TRANS-4**, the anticipated level of nuisance from glare of the solar receiving units, however, could remain conspicuous. This level of glare could be dominant and could detract from the public's ability to enjoy views of Clark Mountain from the valley floor. The glare would alter the character of those views, but would not prevent them.

In addition to safety and aesthetic impacts from the mirror arrays and solar receivers, concern was expressed in EIS scoping over potential nighttime light pollution impacts of construction or other project night lighting (NPCA, 2008a). According to comments of the National Parks Conservation Association, the Mojave National Preserve contains

some of the most pristine night sky views in the continental United States, and new artificial lighting may represent a deterioration of that resource. These concerns have been addressed in recommended Condition of Certification **VIS 5,** Temporary and Permanent Exterior Lighting Measures. With these measures, shielding of all project lighting, including construction lighting, to prevent upward-directed illumination would be required. However, FAA-required aircraft safety lighting, which is anticipated to include bright strobe lighting atop the 7 project towers, could not be shielded to prevent upwardly directed light. Staff is not aware of specific thresholds by which a significant light pollution impact may be defined. However, it was assumed in this study that with adequate control of all other project lighting, the 7 new aircraft safety lights would not likely constitute a significant impact.

Indirect Impacts

By substantially lowering the prevailing visual quality of its local viewshed, the Ivanpah Valley, the project could have the indirect effect of encouraging additional subsequent development of similar character. Because the relatively intact existing landscape would appear highly compromised after introduction of the ISEGS, the incremental additional impact of other future projects could appear to be less significant than if they were occurring in the current landscape without ISEGS.

Closure and Decommissioning Impacts and Mitigation

After the end of the project's useful life, it would be decommissioned as described in the Applicant's Draft Closure, Revegetation, and Rehabilitation Plan (CH2ML2009q). The facility would be removed to a depth of three feet below grade, original contours restored, and the site revegetated. However, the removal of the existing facility would leave a very prominent visual impact over the entire site due to the strong color contrast created between graded, disturbed soil areas and undisturbed soil areas in the vicinity of the project site. In addition, revegetation of areas in this desert region are difficult and generally of limited success. Thus, visual recovery from land disturbance of closure and decommissioning would likely occur only over a very long period of time.

NO PROJECT/NO ACTION ALTERNATIVE

In the No Project / No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan.

The results of the No Project / No Action Alternative would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, potentially including another solar project.
- Numerous foreseeable locally cumulative projects were identified within the Ivanpah Valley that may not, individually or cumulatively, conform with guidelines for use under the applicable Multiple Use Class L under the CDCA Plan. These projects have the potential to cause cumulatively considerable impacts to visual resources within the Ivanpah Valley.

If this project is not approved, renewable projects would likely be developed on other sites in the Mojave Desert and elsewhere.

CUMULATIVE IMPACTS AND MITIGATION

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (California Code Regulation, Title 14, section 15130). This concept is very similar to that of NEPA, which states that cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR §1508.7).

There is the potential for substantial future development in the Ivanpah Valley area and throughout the southern California Mojave desert region. Analysis of cumulative impacts is based on data provided in the following maps and tables which are contained in the Cumulative Scenario section.

- Cumulative Impacts Figure 1, Regional Renewable Applications
  VISUAL RESOURCES 5.12-26 December 2008
- Cumulative Impacts Figure 2, Regional Renewable Applications (Detail)
- Cumulative Impacts Figure 3, Ivanpah Valley Existing and Future/Foreseeable Projects
- Cumulative Impacts Table 1, Regional Renewable Energy Projects
- Cumulative Impacts Table 2, Existing Development in the Ivanpah Valley
- Cumulative Impacts Table 3, Future Foreseeable Projects in the Ivanpah Valley Area.

The analysis in this section first defines the geographic area over which cumulative impacts to visual resources could occur. The cumulative impact analysis itself describes the potential for cumulative impacts to occur as a result of implementation of the ISEGS project along with the listed local and regional projects.

GEOGRAPHIC EXTENT

Cumulative impacts could occur if implementation of the ISEGS project would combine with those of other local or regional projects. The ISEGS project is potentially associated with two types of cumulative impact:

1. cumulative impacts within the immediate project viewshed, essentially comprising foreseeable future projects in the Ivanpah Valley; and

2. cumulative impacts of foreseeable future solar and other renewable energy projects within the southern California Mojave Desert, or other broad basin of the project's affected landscape type. The widest applicable basin of cumulative effect would

include all of the Mojave Desert landscape type, including southeastern California, southern Nevada, and western Arizona.

Local Projects (Ivanpah Valley)

ISEGS and Past Projects

Past and present projects in the Ivanpah Valley were analyzed in the main staff assessment evaluation of the existing project setting. To summarize the conclusions of that analysis briefly, the existing Ivanpah Valley setting, though the site of existing development, is considered to be predominantly intact scenically, and was assigned a moderate overall level of visual sensitivity. Cumulative effects of past projects in combination with ISEGS is thus as described in the main staff assessment analysis, above.

Past projects that have resulted in similar impacts in this area include the existing railroad track, the Primm Valley Golf Course, a transmission line, the I-15 freeway, the Bighorn electric generating station, Chevron-Texaco evaporation pond and commercial development in Primm, NV.

ISEGS and Foreseeable Future Projects

Cumulative Impacts Table 3, lists foreseeable future projects within the Ivanpah Valley. All of the projects listed in Cumulative Impacts Table 3, with the exception of the mixed-use development near Jean, Nevada, and the two wind energy projects on Mountain Pass, would lie within the viewshed of the ISEGS project. The Ivanpah Airport would be located at a sufficiently great distance as to have limited visual interaction with the ISEGS project. On the other hand, the ISEGS, GEN 3, and Nextlight Primm solar projects, along with the existing Bighorn Generating Station, proposed Ivanpah Energy Project, and City of Primm, would simultaneously be visible within middle-ground distance to I-15 motorists, and also be cumulatively dominant from viewpoints in the Clark Mountains, including KOP 10, within the Mojave National Preserve. This cumulative effect would be substantially more adverse than the significant impacts of the ISEGS project alone, or the future projects without ISEGS, both from I-15 and from the Preserve.

For I-15 motorists the cumulative effect of the existing Primm Valley Golf Course together with the ISEGS, I-15 Widening, Port of Entry, and Desert Xpress projects would be substantially adverse, converting the majority of the western highway frontage within the valley to a more urbanized, developed foreground view with potential to intrude into scenic westward highway views of the Clark Mountains. Staff does not have detailed plans of the Port of Entry Project. However, if it is of a scale and character similar to other like facilities staff is familiar with, that project could be of considerable scale and visual effect, including not only the port structures themselves, but a large area of additional lanes and other paving, numerous trucks, and bright night lighting. Regarding the Desert Xpress project, although the specific technology that would be utilized is not known by staff, the most common High Speed Rail technologies in current use require continuous above-ground catenary power lines that are highly urban in character, similar to light rail systems, as well as continuous safety fencing and other ancillary project features. If a final alignment paralleling the edge of I-15 were to be

selected, these continuous vertical and linear features could intrude into the foreground of views of Clark Mountain as seen from the highway. Additional lane widening of I-15 proposed by Caltrans would add incrementally to these urbanizing influences, by increasing the dominance of the highway itself. Other foreseeable projects include the proposed natural gas-fired combined cycle Ivanpah Energy Center Project, which would be prominent from the highway; and most importantly, two additional solar projects, which like ISEGS would be extensive in area, adding substantially to the amount of development in the valley as seen from I-15 and the Clark Mountains. These projects, taken together, would result in a marked transformation of the existing Ivanpah Valley landscape into a more urbanized visual setting, particularly as seen by I-15 motorists in the northern portion of the valley in the vicinity of the ISEGS project. In addition, there would be some likelihood of cumulative light pollution impacts due to an accumulation of night-time light sources, including the ISEGS aircraft lighting, Port of Entry and new and existing power plant lighting.

The anticipated impacts of the ISEGS project in combination with foreseeable future local projects in the Ivanpah Valley are thus considered cumulatively considerable and potentially significant.

Regional Solar/Renewable Development Projects

ISEGS and Past Regional Projects

The ISEGS project is among the first of a large number of existing solar project applications in the CDD. As such, past and present projects have had a negligible region-wide cumulative impact.

ISEGS and Foreseeable Future Projects

The analysis of cumulative impacts is not necessarily restricted to the immediate viewshed of a project, and the need for cumulative analysis over a broad geographic area may often be determined by the affected resource itself. In this case the affected resource is the unique and highly valued landscape type of which the project site forms a small part – the landscape of the Mojave Desert. The Mojave Desert and California Desert Conservation Area (CDCA) within which the ISEGS project is located are a unique and highly valued scenic resource of national importance, as reflected by the presence of three national parks and numerous Wilderness Areas within its boundaries. Cumulative Impacts Table 1 identifies 66 solar projects and 63 wind project applications with a total overall area of over one million acres within the CDCA, which is indicative of the interest in public lands for renewable energy generation at a regional level. This figure does not include renewable projects within the Nevada and Arizona portions of the Mojave Desert.

With this very high number of renewable energy applications currently filed with BLM, the potential for profound widespread cumulative impacts to scenic resources within the CDCA is clear. These cumulative impacts could include a substantial decline in the overall number and extent of scenically intact, undisturbed desert landscapes, and a substantially more urbanized character in the overall southern California Mojave Desert landscape. Viewed in the cumulative context of the Southern California Mojave Desert

as a whole, potential visual impacts of renewable energy projects are thus considered to be cumulatively considerable and potentially significant.

Cumulative Impact Conclusion

The anticipated visual impacts of the ISEGS project in combination with past and foreseeable future local projects in the Ivanpah Valley, and past and foreseeable future region-wide projects in the southern California Mojave Desert are thus considered cumulatively considerable, significant, and unavoidable.

COMPLIANCE WITH APPLICABLE LORS

VISUAL RESOURCES Table 3
Project Compliance with Laws, Ordinances, Regulations, and Standards (LORS)

LORS		Consistency with Staff-Recommended Conditions of Certification (Project)
FEDERAL		
National Environmental Policy Act (NEPA)	As discussed above, applicable federal requirements for visual impact assessment are enacted through application of the BLM VRM methodology, discussed below.	
Federal Land Policy and Management Act of 1976 (FLPMA)	Section 102 (a) of the Federal Land Policy and Management Act of 1976 (FLPMA) states that " . . . . the public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values …. " Section 103 (c) identifies "scenic values" as one of the resources for which public land should be managed. Section 201 (a) states that "The Secretary shall prepare and maintain on a continuing basis an inventory of all public lands and their resources and other values (including ... scenic values) ...."	Refer to CDCA discussion, below.

	Section 505 (a) requires that "Each right-of-way shall contain terms and conditions which will... minimize damage to the scenic and esthetic values...."	
California Desert Conservation Area Plan (CDCA Plan)	The CDCA Plan represents the Resource Management Plan (RMP) for the area required under FLPMA. The CDCA Plan did not contain VRM mapping as in most RMPs. VR Inventory mapping was prepared prior to this project by BLM. The ISEGS site is classified in the CDCA Plan as Multiple-Use Class (MUC) L (Limited Use). Multiple-Use Class L, the most restrictive under the plan, "protects sensitive, natural, scenic, ecological, and cultural resource values. Public lands designated as Class L are managed to provide for generally lower-intensity, carefully controlled multiple use of resources, while ensuring that sensitive values are not significantly diminished. Under the CDCA Plan Electrical Power Generation Facilities, including Wind/Solar facilities, may be allowed within MUC Class L if NEPA requirements are met.	Consistent. Solar electrical generation plants are specifically allowed for under the MUC Class L Guidelines if NEPA requirements are met. Disclosure of potential visual project effects under NEPA has been conducted through the analysis in this study.
Northern and Eastern Mojave (NEMO) Plan Amendments	The NEMO plan amendments to the CDCA Plan did not directly affect visual resource management.The NEMO identified visual impacts to viewers on historic routes.	Consistent with stated visual concerns. The East Mojave Heritage Trail would not be significantly affected.

	However, the only identified historic trail in the vicinity, the East Mojave Heritage Trail, would not be impacted by the ISEGS project (Murray, Tel. Con. 9/23/08).	
National Historic Preservation Act (NHPA)	Under regulations of the NHPA, visual impacts to a listed or eligible National Register property that may diminish the integrity of the property's ". . . setting . . .(or) feeling . . . ." in a way that affects the property's eligibility for listing, may result in a potentially significant adverse effect. "Examples of adverse effects . . . include . . .: Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features . . . . " (36 CFR Part 800.5)	Potentially eligible pre-historic and historic sites were identified by Energy Commission staff within the viewshed of the ISEGS project, and may potentially be affected by visual effects of the project. These potential impacts are addressed in the **Cultural Resources** section of this FSA/DEIS.
STATE		
State Scenic Highway Program (CA. Streets and Highways Code, Section 260 et seq.)	The State Scenic Highway Program promotes protection of designated State scenic highways through certification and adoption of local scenic corridor protection programs that conform with requirements of the State program.	Consistent. Highway I-15 within the project viewshed is not an eligible or designated State scenic highway.
LOCAL		
County of San Bernardino General Plan Applicable Conservation Element Goals, Objectives, Programs	GOAL D/CO 1. Preserve the unique environmental features and natural resources of the Desert Region, including native wildlife, vegetation, water and scenic vistas. POLICIES D/CO 1.2 Require future land development practices to be compatible with the existing	Inconsistent. The proposed project would intrude into scenic vistas in the Clark Mountains and would require removal of approximately 4 square miles of vegetation. Inconsistent. The project would not be compatible with existing scenic vistas, and would not

	topography and scenic vistas, and protect the natural vegetation. D/CO 3.2 All outdoor lighting, including street lighting, shall be provided in accordance with the Night Sky Protection Ordinance and shall only be provided as necessary to meet safety standards.	substantially protect the natural vegetation. Likely consistent with recommended Condition of Certification **VIS-4**, which would require conformance with Night Sky Protection Ordinance.
Applicable Open Space Element Goals, Objectives, Programs	GOAL OS 5. The County will maintain and enhance the visual character of scenic routes in the County. POLICIES OS 5.1 Features meeting the following criteria will be considered for designation as scenic resources: a. A roadway, vista point, or area that provides a vista of undisturbed natural areas. b. Includes a unique or unusual feature that comprises an important or dominant portion of the viewshed (the area within the field of view of the observer). c. Offers a distant vista that provides relief from less attractive views of nearby features (such as views of mountain backdrops from urban areas). OS 5.2 Define the scenic corridor on either side of the designated route, measured from the outside edge of the right-of-way, trail, or path. Development along scenic corridors will be required to demonstrate through visual	I-15 in the project viewshed is designated as a County scenic highway (Policy OS 5.3) Inconsistent. The project would not maintain or enhance the visual character of the views on I-15 within its viewshed. Inconsistent. Visual analysis of the project concluded that the proposed project would not retain the existing scenic qualities of the viewshed.

	analysis that proposed improvements are compatible with the scenic qualities present. OS 5.3 The County desires to retain the scenic character of visually important roadways throughout the County. A "scenic route" is a roadway that has scenic vistas and other scenic and aesthetic qualities that over time have been found to add beauty to the County. Therefore, the County designates the following routes as scenic highways and applies all applicable policies to development on these routes (see Figures 2-4A through 2-4C of the Circulation and Infrastructure Background Report): (MULTIPLE REGIONS): c. *Interstate 15 from the junction with Interstate 215 northeast to the Nevada state line*, excepting those areas within the Barstow Planning Area and the community of Baker where there is commercial /industrial development; those portions within the Yermo area from Ghost Town Road to the East Yermo Road overcrossing on the south side only and from First Street to the East Yermo Road overcrossing on the north side; and all incorporated areas.	
Night Sky Protection Ordinance	Commercial and industrial outdoor lighting must be fully shielded, "so that no light is	Consistent with recommended Condition of Certification **VIS-4**.

Ord. 3900 (San Bernardino County Code 87.0921)	emitted above the horizontal plane . . . . do not direct light or light trespass onto adjacent property . . . .or to any member of the public who may be traveling on adjacent roadways . . . ."	FAA aircraft lighting could not be shielded.

NOTEWORTHY PUBLIC BENEFITS

No noteworthy public benefits in the area of visual resources were identified.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

The following commentors submitted letter comments on the PSA, dated as indicated:

Tasha LaDoux (Letter dated January 30, 2009)(PUB2009d):

Comment 1: Comment raises concern over impacts of light pollution.

This subject is addressed in the PSA on page 5.12-26 and in the FSA/DEIS under the discussion of potential project glare effects, CEQA Criterion d. Night lighting of this project is relatively minimal, and potential light pollution effects of both temporary and permanent exterior lighting are addressed in Condition of Certification **VIS-4**.

Wilderness Society and NRDC comments on visual resources (Letter dated January 23, 2009)(WS2009a):

1. The commentors recommend that CEC and BLM consider whether the benefits of the ISEGS project outweigh the visual and other effects.

2. The commentors urge the CEC and BLM to consider the desert-wide cumulative visual and other impacts from renewable energy and transmission projects.

3. The commentors urge the CEC and BLM to avoid permitting solar projects on lands in VRM Classes I and II, and that they be systematically prioritized for siting on already impaired landscapes.

Comments are noted. Both Energy Commission and BLM will weigh in its respective license and ROW permit decisions the potential benefits of the project against the potential environmental impacts, including visual impacts. The desert-wide cumulative visual impacts of the project are discussed in the FSA/DEIS under the Cumulative Impacts discussion in the visual analysis. It is unlikely that any project application could be accepted by BLM on VRM Class I lands, since within the CDCA these would virtually all fall within Desert Protection Act-designated Wilderness Areas or National Park Service lands. Staff strongly concurs with the recommendation that projects not be sited on lands with VR (Inventory) Class II lands, as well as the recommendation to prioritize siting on already impaired or, by implication, VRI Class IV, lands. (There are no

assigned VRM Classes within the CDCA). One important question that cannot be answered at this time is whether sufficient visually impaired (VRI Class IV) lands are available to meet demand for renewable energy applications on BLM lands within the CDCA. Commentors should also note that assigned VR Management (VRM) Classes do not necessarily reflect existing scenic quality of a landscape but, rather, visual objectives for a land unit that are established in relation to other land use objectives.

Clark County Department of Aviation (Letter dated January 23, 2009)(ClarkCty, 2009):

1. Commentor strongly urges Energy Commission to study the issue of potential glare effects on aviation in more detail with respect to both the proposed Southern Nevada Supplemental Airport, and existing Jean Airport.

2. Commentor cites a third-party study of potential project effects on aviation, including glare, commissioned by CCDOA. The study concluded that 'glare from the heliostat mirrors could be a significant hazard to air navigation.' The solar receiver tower was also identified as a possible source of glare to aircraft. Commentor also cites a letter from FAA expressing concern over this issue, received in response to the project NOI.

Following publication of the PSA, staff requested additional needed data of applicant and conducted an independent review of potential project glare impacts based on available information. That independent review is summarized in detail in the **Traffic and Transportation** section of this FSA/DEIS and concludes that there would not be a significant impact to aviation resulting from glare.

Sierra Club (Letter dated January 22, 2009)(SC2009a):

- Commentors express concern with the potential visual effects of ISEGS on views from the Mojave National Preserve.

The commentors concur with staff's conclusions in the PSA. Typically, the National Park Service and CEC would apply a high standard of acceptable impact reflecting the Preserve's special scenic value.

Basin and Range Watch (Letter dated January 31, 2009)(BRW2009a):

- Commentors note that the PSA analysis fails to address how visual impacts of the ISEGS could affect local tourism. Commentors express a negative opinion of the visual effects of the project.

Comments are noted. Staff notes that typically, the focus of analysis under CEQA is on physical changes to the environment. It would be difficult to quantify secondary economic effects of the project's visual effects, although staff recognizes that some such impact could possibly take place. In the **Socioeconomics and Environmental Justice** section of the FSA/DEIS, staff concludes that the proposed ISEGS would not cause a significant adverse direct, indirect, or cumulative impact on population, employment, housing, public finance, local economies, or public services.

CONCLUSIONS AND RECOMMENDATIONS

Staff concludes that the proposed project would result in a substantial adverse impact to existing scenic resource values as seen from several Key
Observation Points in the Ivanpah Valley and Clark Mountains, including:

- The Primm Valley Golf Course;
- Middle-ground-distance viewpoints on Highway I-15;
- Viewpoints in the Mojave National Preserve, throughout the east face of Clark; and Mountain
- Viewpoints in the Stateline Wilderness Area, including the Umberci Mine and vicinity.

Moreover, staff concludes that these visual impacts would be significant in terms of the four criteria of CEQA Appendix G, and in terms of the context and intensity of the effects in general. Regarding the latter, the context of the project is one directly adjoining a national park and two designated wilderness areas, and a land-sailing site of regional or greater importance. Intensity of potential effects involve the unique scenic characteristics of the local landscape as indicated by the national park and wilderness designations of portions of the project viewshed; concerns expressed by public commentors to date; a degree of uncertainty as to the level of discomfort or disability glare from the solar tower receivers; and concern over cumulative visual effects of renewable projects on the CDCA and Mojave Desert as a whole.

Staff found that with recommended conditions of certification, potentially significant visual impacts at the Primm Valley Golf Course (KOPs 1 and 2) could be mitigated to less than significant levels in the long term.

However, staff has concluded that potentially significant visual impacts at the other locations cited above could not be mitigated to less than significant levels and would thus result in significant and unavoidable impacts.

Because the project has the potential to result in exposure of aircraft pilots, motorists, and hikers to solar radiation reflected from project heliostats and/or power tower receivers, **Traffic and Transportation** Conditions of Certification **TRANS-3** and **TRANS-4** are recommended to ensure that potential glare from the project is minimized to the maximum extent possible and does not pose a health and safety risk. Staff also concludes that the solar receiver units atop the solar power towers would generate conspicuously bright levels of glare for foreground viewers. Staff, however, concludes that with these measures, remaining glare, while not representing a hazard, could represent a visually dominant feature as seen from the viewpoints named above. Remaining glare could alter the character of views of Clark Mountain from the valley floor, affecting the public's ability to enjoy those views, though not preventing them.

With these conditions, the anticipated level of nuisance glare of the solar receiving units, however, would remain conspicuous. This remaining level of glare could detract from the public's enjoyment of views of Clark Mountain from the valley floor, but would not prevent such views.

In addition, staff concludes that the project would not conform with applicable goals and policies of the San Bernardino General Plan Conservation and Open Space Elements as follows:

1. Conservation Element Goal D/CO 1, calling for preservation of scenic vistas in the County. Staff found that the project would have adverse effects on scenic vistas.

2. Open Space Element Goal OS 5, calling for the County to maintain and enhance the visual character of scenic routes in the County; and Policy OS 5.2, which states that "Development along scenic corridors will be required to demonstrate through visual analysis that proposed improvements are compatible with the scenic qualities present." The visual analysis of the project found that it would not be compatible with the scenic qualities present in the viewshed of portions of Highway I-15 designated as a County scenic route.

Additionally, staff concludes that the project in combination with foreseeable future projects could have significant and unavoidable cumulative visual impacts of two kinds:

1. Cumulative impacts within the immediate project viewshed, essentially comprising foreseeable future projects in the Ivanpah Valley; and

2. Cumulative impacts of foreseeable future solar and other renewable energy projects within the southern California Mojave Desert.

Finally, staff notes the following:

Staff believes the analysis clearly establishes that the proposed project would represent a substantial change and impairment of a natural landscape that it largely intact. However, it may also be worthwhile to note that within an urban frame of reference, not all viewers would find the project disagreeable or unattractive; indeed, many viewers could find the project interesting to view due to its novelty. Overall, it would exhibit a moderate level of visual quality and would leave scenic views of Clark Mountain unobstructed physically, though strongly impaired by glare. Within an urban frame of reference, where preservation of natural landscapes is not a primary goal, this level of impact might be considered acceptable.

This fact may be relevant within the context of the cumulative impact scenario foreseen within the Ivanpah Valley, since development of any of the proposed renewable energy projects, or a preponderance of other foreseeable projects, would result in such an urbanized setting. If a number of the foreseeable cumulative projects are developed, the Ivanpah Valley landscape would, with or without the ISEGS project, quickly reach a point at which the level of scenic intactness is impaired to a *de facto* VR Class IV, low visual quality and sensitivity condition, becoming an urbanized environment, in apparent conflict with the area's Multiple-Use Class L status under the CDCA Plan and the County of San Bernardino's scenic highway policies.

As stated previously, staff concluded that the project would have significant unavoidable adverse impacts. However, if the Commission approves the project, staff recommends that all proposed conditions of certification be adopted in order to minimize impacts to the greatest feasible extent.

MITIGATION MEASURES/PROPOSED CONDITIONS OF CERTIFICATION

The Energy Commission should adopt the following conditions of certification if it approves the project.

SURFACE TREATMENT OF PROJECT STRUCTURES AND BUILDINGS

VIS-1 The project owner shall treat the surfaces of all project structures and buildings visible to the public such that a) their colors minimize visual intrusion and contrast by blending with the existing tan and brown color of the surrounding landscape; b) their colors and finishes do not create excessive glare; and c) their colors and finishes are consistent with local policies and ordinances. The transmission line conductors shall be non-specular and non-reflective, and the insulators shall be non-reflective and non-refractive.

The project owner shall submit for CPM review and approval, a specific Surface Treatment Plan that will satisfy these requirements. The treatment plan shall include:

A. A description of the overall rationale for the proposed surface treatment, including the selection of the proposed color(s) and finishes;

B. A list of each major project structure, building, tank, pipe, and wall; the transmission line towers and/or poles; and fencing, specifying the color(s) and finish proposed for each. Colors must be identified by vendor, name, and number; or according to a universal designation system;

C. One set of color brochures or color chips showing each proposed color and finish;

D. A specific schedule for completion of the treatment; and

E. A procedure to ensure proper treatment maintenance for the life of theproject.

The project owner shall not specify to the vendors the treatment of any buildings or structures treated during manufacture, or perform the final treatment on any buildings or structures treated in the field, until the project owner receives notification of approval of the treatment plan by BLM's Authorized Officer and the CPM. Subsequent modifications to the treatment plan are prohibited without BLM's Authorized Officer and CPM approval.

Verification: At least 90 days prior to specifying to the vendor the colors and finishes of the first structures or buildings that are surface treated during manufacture, the project owner shall submit the proposed treatment plan to BLM's Authorized Officer and the CPM for review and approval and simultaneously to San Bernardino County for review and comment. If BLM's Authorized Officer and the CPM determine that the plan requires revision, the project owner shall provide to BLM's Authorized Officer and the CPM a plan with the specified revision(s) for review and approval by BLM's Authorized Officer and the CPM before any treatment is applied. Any modifications to the treatment

plan must be submitted to BLM's Authorized Officer and the CPM for review and approval.

Prior to the start of commercial operation, the project owner shall notify BLM's Authorized Officer and the CPM that surface treatment of all listed structures and buildings has been completed and they are ready for inspection and shall submit to each one set of electronic color photographs from the same key observation points identified in (d) above. The project owner shall provide a status report regarding surface treatment maintenance in the Annual Compliance Report. The report shall specify a): the condition of the surfaces of all structures and buildings at the end of the reporting year; b) maintenance activities that occurred during the reporting year; and c) the schedule of maintenance activities for the next year.

LANDSCAPE SCREENING OF GOLF COURSE

VIS-2 At the request of, and in consultation with BLM's Authorized Officer, the CPM and the golf course owner, the project owner shall prepare a perimeter landscape screening plan to reduce the visibility of the proposed ISEGS project as seen from the golf course. The intent of the plan shall be to provide screening of the power project, particularly the mirror fields, while retaining as much of the scenic portion of the overall views of Ivanpah Valley and Clark Mountains as feasible. The design approach shall be developed with prior consultation with the golf course owner, and implemented only at the golf course owner's request. The project owner shall submit to BLM's Authorized Officer and the CPM for review and approval and simultaneously to the golf course owner for review and comment a preliminary conceptual landscaping plan whose objective is to provide an attractive visual screen to views of the ISEGS project mirror fields. Upon approval by BLM's Authorized Officer and the CPM and golf course owner, the project owner shall submit to BLM's Authorized Officer and the CPM for review and approval and simultaneously to the golf course owner for review and comment a landscaping plan whose proper implementation will satisfy these requirements. The plan shall include:

A. A detailed landscape, grading, and irrigation plan, at a reasonable scale. The plan shall demonstrate how the requirements stated above shall be met. The plan shall provide a detailed installation schedule demonstrating installation of as much of the landscaping as early in the construction process as is feasible in coordination with project construction.

B. A list (prepared by a qualified professional arborist familiar with local growing conditions) of proposed species, specifying installation sizes, growth rates, expected time to maturity, expected size at five years and at maturity, spacing, number, availability, and a discussion of the suitability of the plants for the site conditions and mitigation objectives, with the objective of providing the widest possible range of species from which to choose;

C. Maintenance procedures, including any needed irrigation and a plan for routine annual or semi-annual debris removal for the life of the project;

D. A procedure for monitoring for and replacement of unsuccessful plantings for the life of the project; and

E. One set each for BLM's Authorized Officer and the CPM of 11"x17" color photo-simulations of the proposed landscaping at five years and twenty years after planting, as viewed from adjoining segments of I-15 .

The plan shall not be implemented until the project owner receives finalapproval from BLM's Authorized Officer and the CPM.

Verification: The landscaping plan shall be submitted to BLM's Authorized Officer and the CPM for review and approval and simultaneously to the golf course owner for review and comment at least 90 days prior to installation of the landscaping. If BLM's Authorized Officer and the CPM determine that the plan requires revision, the project owner shall provide to BLM's Authorized Officer and the CPM and simultaneously to the golf course owner a revised plan for review and approval by BLM's Authorized Officer and the CPM.

The planting must occur during the first optimal planting season following site mobilization. The project owner shall simultaneously notify BLM's Authorized Officer and the CPM and the golf course owner within seven days after completing installation of the landscaping, that the landscaping is ready for inspection.

The project owner shall report landscape maintenance activities, including replacement of dead or dying vegetation, for the previous year of operation in each Annual Compliance Report.

REVEGETATION OF DISTURBED SOIL AREAS

VIS-3 The project owner shall revegetate disturbed soil areas to the greatest practical extent, as described in Condition of Certification **BIO-14**. In order to address specifically visual concerns, the required Closure, Revegetation and Rehabilitation Plan shall include reclamation of the area of disturbed soils used for laydown, project construction, and siting of the substation and other ancillary operation and support structures.

Verification: Refer to Condition of Certification **BIO-14**.

TEMPORARY AND PERMANENT EXTERIOR LIGHTING

VIS-4 To the extent feasible, consistent with safety and security considerations, the project owner shall design and install all permanent exterior lighting and all temporary construction lighting such that a) lamps and reflectors are not visible from beyond the project site, including any off-site security buffer areas; b) lighting does not cause excessive reflected glare; c) direct lighting does not illuminate the nighttime sky, except for required FAA aircraft safety lighting; d) illumination of the project and its immediate vicinity is minimized, and e) the plan complies with local policies and ordinances. The project owner shall submit to BLM's Authorized Officer and the CPM for review and approval and simultaneously to the County of San Bernardino for review and comment a lighting mitigation plan that includes the following:

A. Location and direction of light fixtures shall take the lighting mitigation requirements into account;

B. Lighting design shall consider setbacks of project features from the site boundary to aid in satisfying the lighting mitigation requirements;

C. Lighting shall incorporate fixture hoods/shielding, with light directed downward or toward the area to be illuminated;

D. Light fixtures that are visible from beyond the project boundary shall have cutoff angles that are sufficient to prevent lamps and reflectors from being visible beyond the project boundary, except where necessary for security;

E. All lighting shall be of minimum necessary brightness consistent with operational safety and security; and

F. Lights in high illumination areas not occupied on a continuous basis (such as maintenance platforms) shall have (in addition to hoods) switches, timer switches, or motion detectors so that the lights operate only when the area is occupied.

Verification: At least 90 days prior to ordering any permanent exterior lighting or temporary construction lighting, the project owner shall contact BLM's Authorized Officer and the CPM to discuss the documentation required in the lighting mitigation plan. At least 60 days prior to ordering any permanent exterior lighting, the project owner shall submit to BLM's Authorized Officer and the CPM for review and approval and simultaneously to the County of San Bernardino for review and comment a lighting mitigation plan. If BLM's Authorized Officer and the CPM determine that the plan requires revision, the project owner shall provide to BLM's Authorized Officer and the CPM a revised plan for review and approval by BLM's Authorized Officer and the CPM.

The project owner shall not order any exterior lighting until receiving BLM Authorized Officer and CPM approval of the lighting mitigation plan.

Prior to commercial operation, the project owner shall notify BLM's Authorized Officer and the CPM that the lighting has been completed and is ready for inspection. If after inspection, BLM's Authorized Officer and the CPM notify the project owner that modifications to the lighting are needed, within 30 days of receiving that notification the project owner shall implement the modifications and notify BLM's Authorized Officer and the CPM that the modifications have been completed and are ready for inspection.

Within 48 hours of receiving a lighting complaint, the project owner shall provide BLM's Authorized Officer and the CPM with a complaint resolution form report as specified in the Compliance General Conditions including a proposal to resolve the complaint, and a schedule for implementation. The project owner shall notify BLM's Authorized Officer and the CPM within 48 hours after completing implementation of the proposal. A copy of the complaint resolution form report shall be submitted to BLM's Authorized Officer and the CPM within 30 days.

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APPENDIX VR-1

ENERGY COMMISSION VISUAL RESOURCE ANALYSIS EVALUATION CRITERIA

Energy Commission staff conducts a visual resource analysis according to Appendix G, "Environmental Checklist Form—Aesthetics," California Environmental Quality Act (CEQA). The CEQA analysis requires that commission staff make a determination of impact ranging from "Adverse and Significant" to "Not Significant."

Staff's analysis is based on Key Observation Points or KOPs. KOPs are photographs of locations within the project area that are highly visible to the public — for example, travel routes; recreational and residential areas; and bodies of water as well as other scenic and historic resources.

Those photographs are taken to indicate existing conditions without the project and then modified to include a simulation of the project. Consequently, staff has a visual representation of the viewshed before and after a project is introduced and makes its analysis accordingly. Information about that analytical process follows.

Visual Resource Analysis Without Project

When analyzing KOPs of existing conditions without the project, staff considers the following conditions: visual quality, viewer concern, visibility, number of viewers, duration of view. Those conditions are then factored into an overall rating of viewer exposure and viewer sensitivity. Information about each condition and rating follows.

Visual Quality

An expression of the visual impression or appeal of a given landscape and the associated public value attributed to the resource. Visual quality is rated from *high* to *low*. A high rating is generally reserved for landscapes viewers might describe as picture-perfect.

Landscapes rated high generally are memorable because of the way the components combine in a visual pattern. In addition, those landscapes are free from encroaching elements, thus retaining their visual integrity. Finally, landscapes with high visual quality are visually coherent and harmonious when each element is considered as part of the whole. On the contrary, landscapes rated *low* are often dominated by visually discordant human alterations.

Viewer Concern

Viewer concern represents the reaction of a viewer to visible changes in the viewshed — an area of land visible from a fixed vantage point. For example, viewers have a high expectation for views formally designated as a scenic area or travel corridor as well as for recreational and residential areas. Viewers generally expect that those views will be preserved. Travelers on highways and roads, including those in agricultural areas, are generally considered to have moderate viewer concerns and expectations.

However, viewers tend to have low-to-moderate viewer concern when viewing commercial buildings. And industrial uses typically have the lowest viewer concern. Regardless, the level of concern could be lower if the existing landscape contains discordant elements. In addition, some areas of lower visual quality and degraded visual character may contain particular views of substantially higher visual quality or interest to the public.

Visibility

Visibility is a measure of how well an object can be seen. Visibility depends on the angle or direction of views; extent of visual screening; and topographical relationships between the object and existing homes, streets, or parks. In that sense, visibility is determined by considering any and all obstructions that may be in the sightline—trees and other vegetation; buildings; transmission poles or towers; general air quality conditions such as haze; and general weather conditions such as fog.

Number of Viewers

Number of viewers is a measure of the number of viewers per day who would have a view of the proposed project. *Number of viewers* is organized into the following categories: residential according to the number of residences; motorist according to the number of vehicles; and recreationists.

Duration of View

Duration of view is the amount of time to view the site. For example, a high or extended view of a project site is one reached across a distance in two minutes or longer. In contrast, a low or brief duration of view is reached in a short amount of time—generally less than ten seconds.

Viewer Exposure

Viewer exposure is a function of three elements previously listed, *visibility*, *number of viewers*, and *duration of view*. Viewer exposure can range from a *low* to *high*. A partially obscured and brief background view for a few motorists represents a low value; and unobstructed foreground view from a large number of residences represents a high value.

Visual Sensitivity

Visual sensitivity is comprised of three elements previously listed, *visual quality*, *viewer concern*, and *viewer exposure*. Viewer sensitivity tends to be higher for homeowners or people driving for pleasure or engaged in recreational activities and lower for people driving to and from work or as part of their work.

Visual Resource Analysis with Project

Visual resource analyses with photographic simulations of the project involve the elements of contrast, dominance, view blockage, and visual change. Information about each element follows.

Contrast

Contrast concerns the degree to which a project's visual characteristics or elements — form, line, color, and texture — differ from the same visual elements in the existing landscape. The degree of contrast can range from *low* to *high*. A landscape with forms, lines, colors, and textures similar to those of a proposed energy facility is more visually absorbent; that is, more capable of accepting those characteristics than a landscape in which those elements are absent.[1] Generally, visual absorption is inversely proportional to visual contrast.

Dominance

Dominance is a measure of (a) the proportion of the total field of view occupied by the field; (b) a feature's apparent size relative to other visible landscape features; and (c) the conspicuousness of the feature due to its location in the view.

A feature's level of dominance is lower in a panoramic setting than in an enclosed setting with a focus on the feature itself. A feature's level of dominance is higher if it is (1) near the center of the view; (2) elevated relative to the viewer; or (3) has the sky as a backdrop. As the distance between a viewer and a feature increases, its apparent size decreases; and consequently, its dominance decreases. The level of dominance ranges from *low* to *high*.

View Blockage

The extent to which any previously visible landscape features are blocked from view constitutes view disruption. The view is also disrupted when the continuity of the view is interrupted. When considering a project's features, higher quality landscape features can be disrupted by lower quality project features, thus resulting in adverse visual impacts. The degree of view disruption can range from *none* to *high*.

Visual Change

Visual change is a function of *contrast*, *dominance*, and *view disruption*. Generally, *contrast* and *dominance* contribute more to the degree of visual change than does *view disruption*.

[1] Typically, the Energy Commission does not consider texture in its visual analyses.

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VISUAL RESOURCES - FIGURE 1

Ivanpah Solar Electric Generating System - Views of Site



a.



b.



c.



d.

a. Panorama of Ivanpah Valley, Looking East from Site

b. Site from Highway 164, Looking West at San Bernardino County Line (approximately 14 miles)

c. Site from Ivanpah Lake, Looking West (approximately 4 miles)

d. Site from I-15 Looking Northwest (approximately 5 miles)

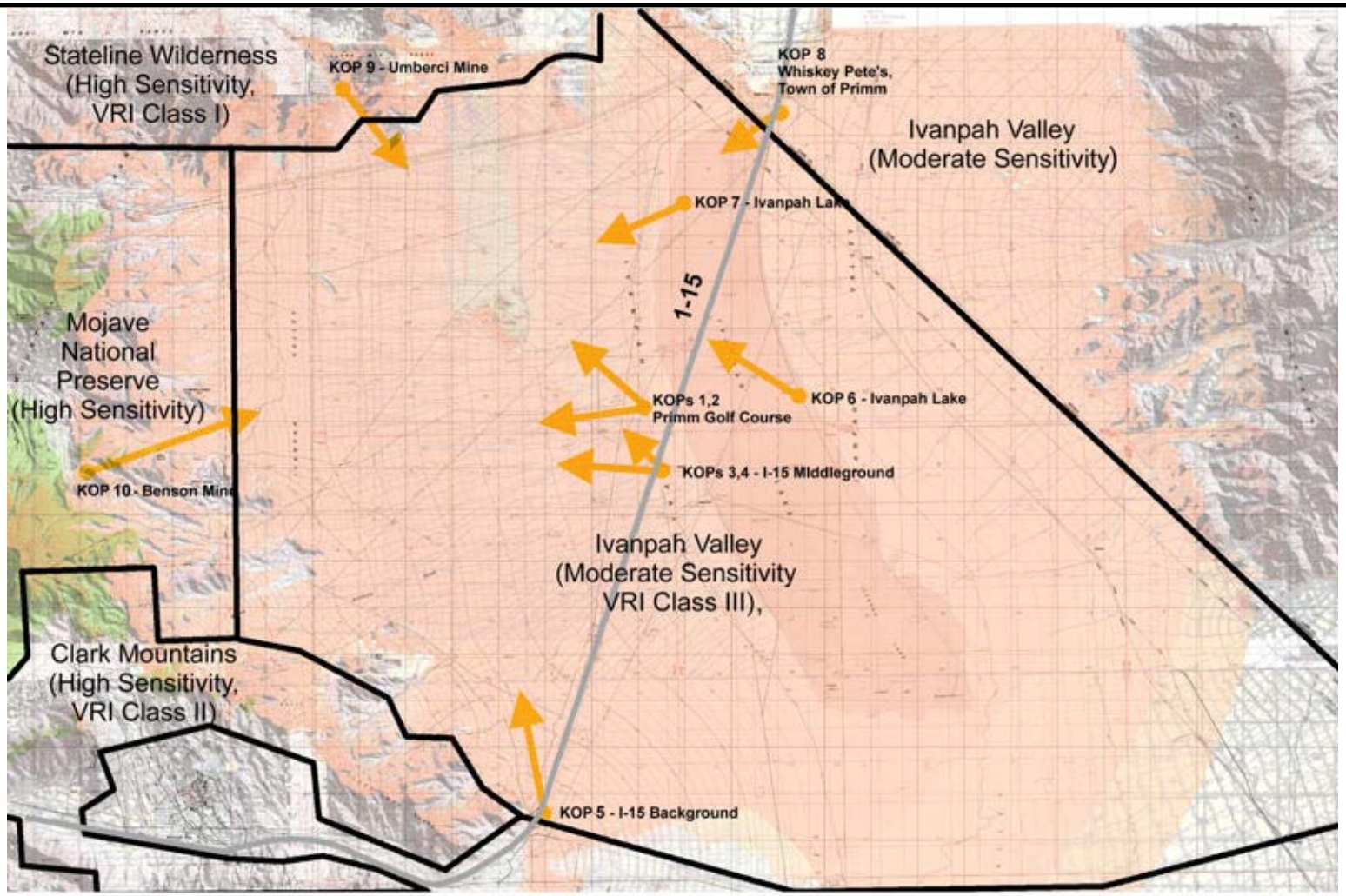
VISUAL RESOURCES

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SOURCE: WK Figure 1

VISUAL RESOURCES - FIGURE 2

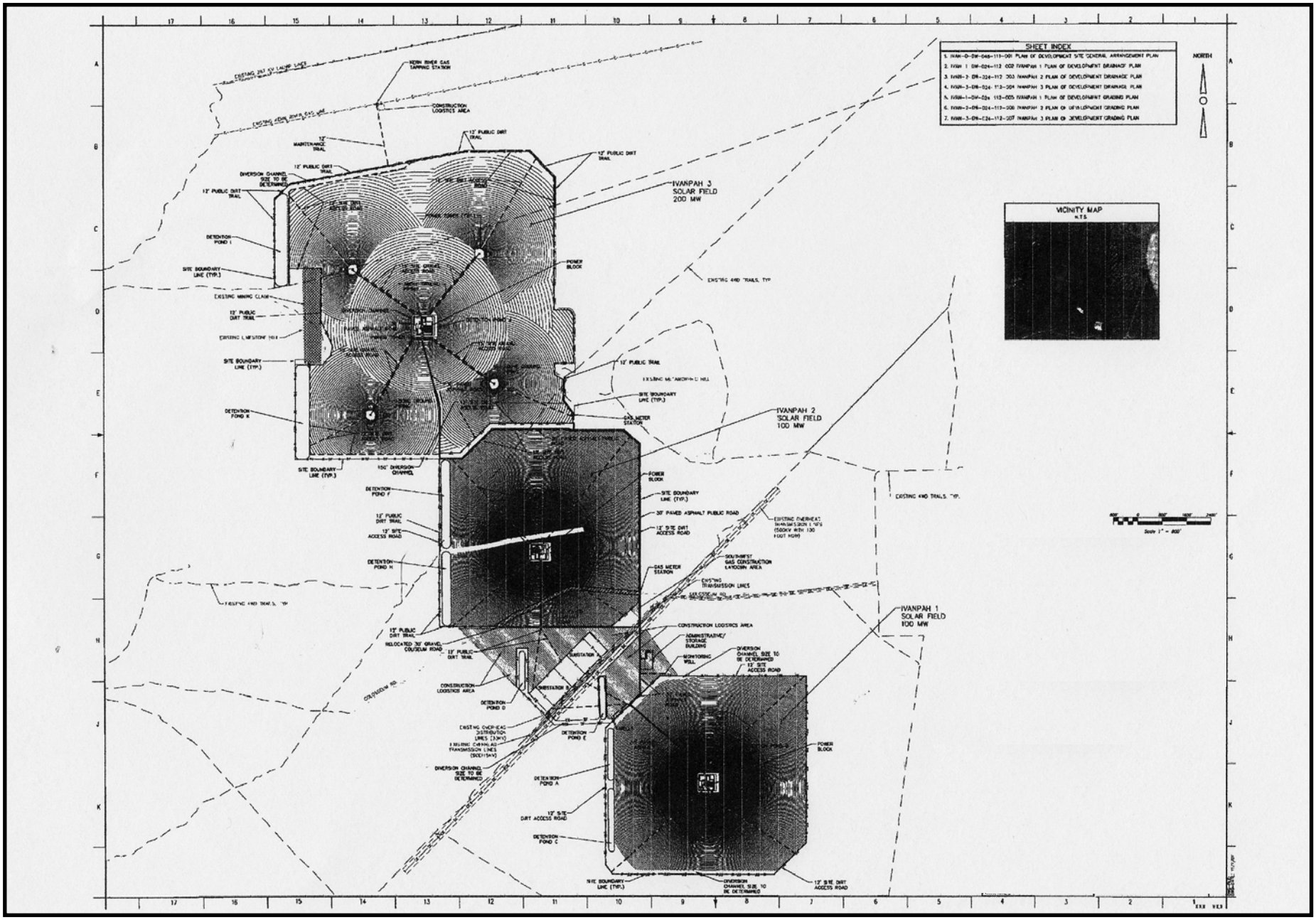
Ivanpah Solar Electric Generating System - Landscape Setting



SOURCE: WK Figure 2

VISUAL RESOURCES - FIGURE 3

Ivanpah Solar Electric Generating System - Project Layout

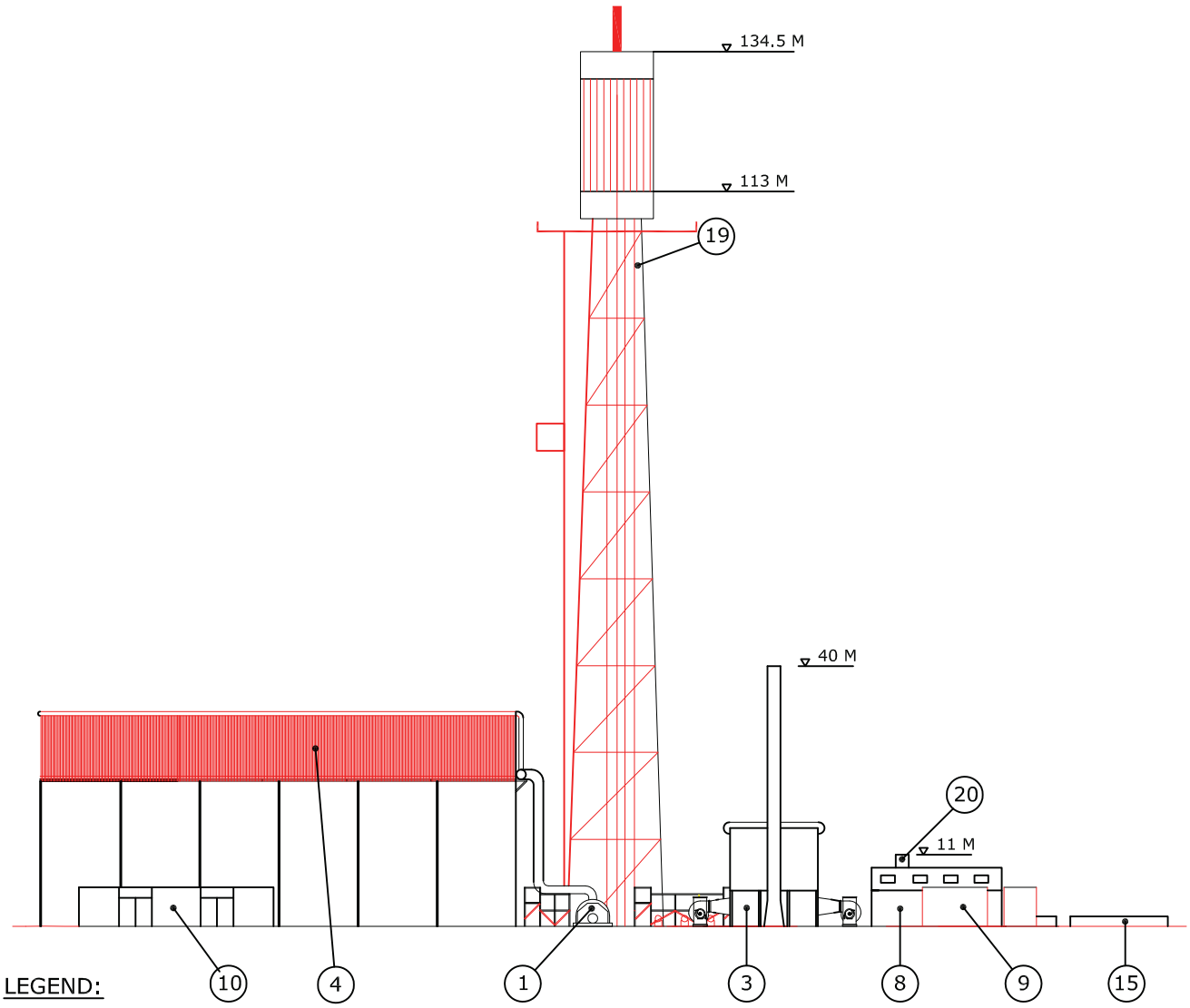


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SOURCE: DATA RESPONSE (DR) SET2A, DR 130-2, "PLAN of Development sitegeneral arrangement plan, _IVAN-0-DW-048-111-001."

VISUAL RESOURCES - FIGURE 4

Ivanpah Solar Electric Generating System - Project Elevations



LEGEND:

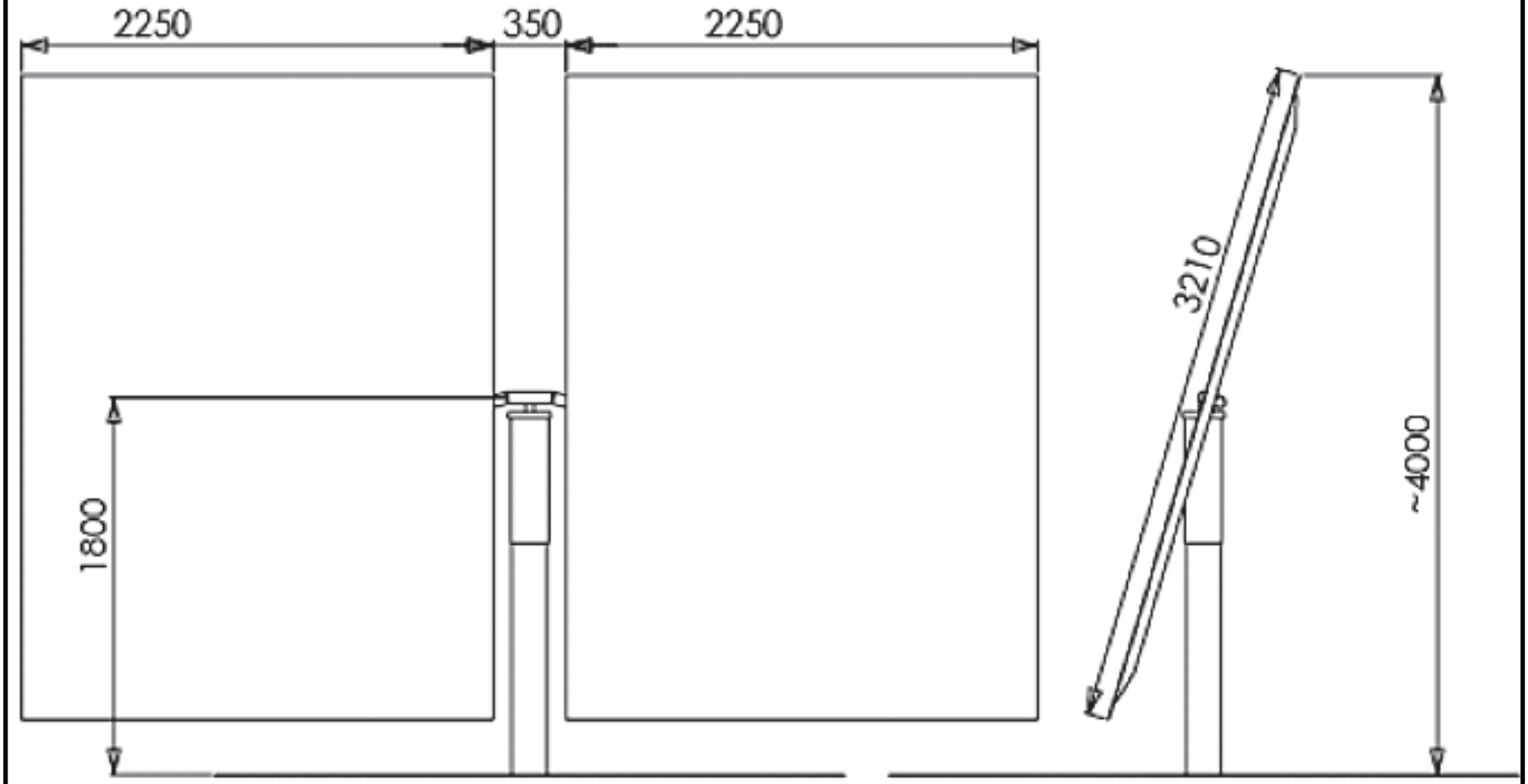
1- TURBINE
2- GENERATOR
3- BOILER
4- AIR COOLED CONDENSER
5- FEED WATER PREHEATER
6- DEAERATOR
7- STEAM DISTRIBUTOR
8- WATER TREATMENT PLANT ,ADMINISTRATION & ELECTRICAL BUILDING
9- WATER STORAGE TANKS
10- MAINTENANCE WING
11-SWITCH YARD
12-TURBINE LUBRICATION SYSTEM
13-PIPE BRIDGE
14-GAS PIPE
15-EVAPORATION PITS
16-[RESERVED]
17-EMERGENCY GENERATOR
18-DIESEL FIRE PUMP
19- REHEATER TOWER
20- EMERGENCY GENERATOR EXHAUST

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SOURCE: AFC Figure 2.2-C

VISUAL RESOURCES - FIGURE 5

Ivanpah Solar Electric Generating System - Mirror Elevations



Double-mirror heliostat

Note: Units are in millimeters.

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SOURCE: DR SET 1D # 102-1R

VISUAL RESOURCES - FIGURE 6

Ivanpah Solar Electric Generating System - Simulation From Golf Course Hole 1

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SOURCE: DR1D #102 Figure 5.13-9bR

VISUAL RESOURCES - FIGURE 7

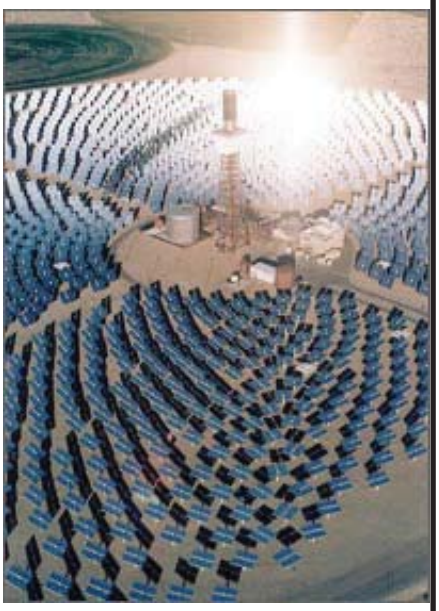
Ivanpah Solar Electric Generating System - Solar Thermal Project Example Photos



A. Solúcar Project, Seville, Spain



B. Solar One Project, Dagget, California



C. Solar One Project



D. Solar One Project

VISUAL RESOURCES - FIGURE 8

Ivanpah Solar Electric Generating System - Simulation From Golf Course Hole 8

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VISUAL RESOURCES

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SOURCE: DR 1D #102 Figure 5.13-10bR

VISUAL RESOURCES - FIGURE 9

Ivanpah Solar Electric Generating System - Simulation Ivanpah 2, 3 From I-15, Yates Well Road, 2.5 Miles

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SOURCE: DR 1D #102 Figure DR97-1BR

VISUAL RESOURCES - FIGURE 10

Ivanpah Solar Electric Generating System - Simulation Ivanpah 1 FR I-15, Yates Well Road, 1 Mile

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SOURCE: DR 1D #102 Figure DR97-2BR

VISUAL RESOURCES - FIGURE 11

Ivanpah Solar Electric Generating System - I-15 FR Nipton Road, 4 Miles



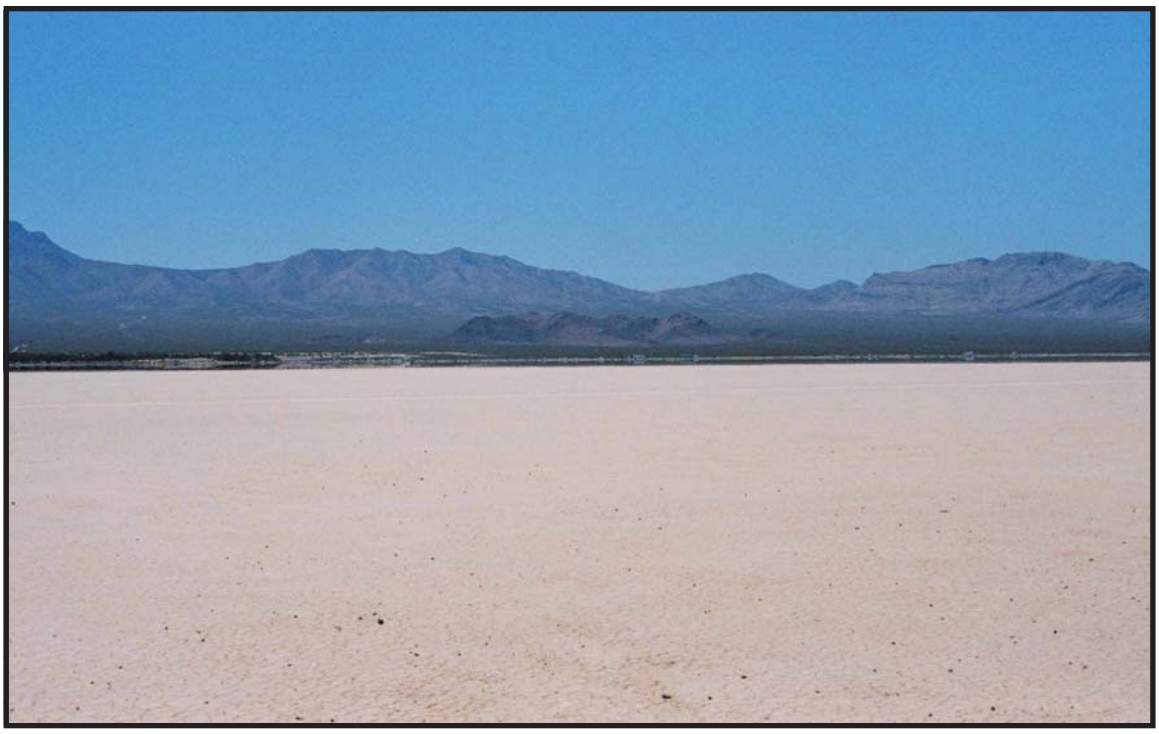


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SOURCE: DR SET 2C #148 Figure DR148-3, DR 2C #148 Figure DR 147-4

VISUAL RESOURCES - FIGURE 12

Ivanpah Solar Electric Generating System - Ivanpah 2, 3 From East Side of Lake





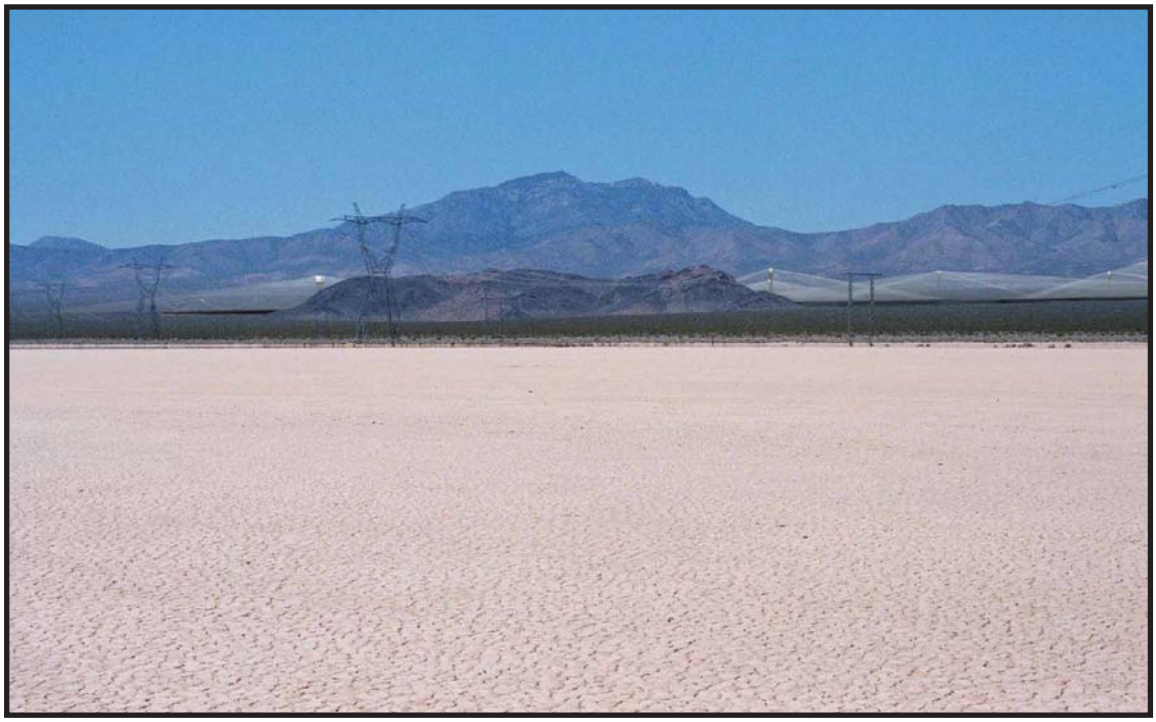
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SOURCE: DR 2C #147 FIgure DR 148-4, Figure DR 147-5

VISUAL RESOURCES - FIGURE 13

Ivanpah Solar Electric Generating System - Ivanpah 2, 3 From West Side of Lake





U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009

SOURCE: DR 2C #147 Figure DR 148-5, Figure DR 147-6

VISUAL RESOURCES - FIGURE 14

Ivanpah Solar Electric Generating System - View From Whiskey Pete's

OCTOBER 2009



VISUAL RESOURCES

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SOURCE: DR 2C #148 Figure DR 148-6

VISUAL RESOURCES - FIGURE 15

Ivanpah Solar Electric Generating System - View From Umberci Mine





U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009

SOURCE: DR 2C #148 Figure DR 148-1, Figure DR 147-2

VISUAL RESOURCES - FIGURE 16

Ivanpah Solar Electric Generating System - View From Benson Mine/Mojave Preserve





U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009

SOURCE: DR 2C #148 Figure DR 148-2, Figure DR 147-3

WASTE MANAGEMENT

Prepared by Ellie Townsend-Hough

SUMMARY OF CONCLUSIONS

U.S. Bureau of Land Management (BLM) and the California Energy Commission staff (hereafter jointly referred to as staff) conclude that management of the waste generated during construction and operation of the Ivanpah Solar Electric Generating System (ISEGS) would not result in any significant adverse impacts under CEQA or NEPA, and would comply with applicable waste management laws, ordinances, regulations, and standards if the measures proposed in the Application for Certification (AFC) and staff's proposed conditions of certification are implemented. Conditions of Certification referred to herein serve the purpose of both the Energy Commission's Conditions of Certification for purposes of the California Environmental Quality Act (CEQA) and BLM's Mitigation Measures for purposes of the National Environmental Policy Act (NEPA).

INTRODUCTION

This Final Staff Assessment/Draft Environmental Impact Statement (FSA/DEIS) presents an analysis of issues associated with wastes generated from the proposed construction and operation of the ISEGS. The technical scope of this analysis encompasses solid wastes existing on site and those to be generated during facility construction and operation. Management and discharge of wastewater is addressed in the **Soil and Water Resources** section of this document. Additional information related to waste management may also be covered in the **Worker Safety** and **Hazardous Materials Management** sections of this document.

The BLM and Energy Commission staff's (hereafter jointly referred to as staff) objectives in conducting this waste management analysis are to ensure that:

- the management of project wastes would be in compliance with all applicable laws, ordinances, regulations, and standards (LORS). Compliance with LORS ensures that wastes generated during the construction and operation of the proposed project would be managed in an environmentally safe manner.
- the disposal of project wastes would not result in significant adverse impacts to existing waste disposal facilities.
- upon project completion, the site is managed in such a way that project wastes and waste constituents would not pose a significant risk to humans or the environment.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The following federal, state, and local environmental laws, ordinances, regulations, and standards (LORS) have been established to ensure the safe and proper management of both solid and hazardous wastes in order to protect human health and the environment. Project compliance with the various LORS is a major component of staff's determination regarding the significance and acceptability of the ISEGS with respect to management of waste.

WASTE MANAGEMENT Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
Title 42, United States Code, §§ 6901, et seq. Solid Waste Disposal Act of 1965 (as amended and revised by the Resource Conservation and Recovery Act of 1976, et al.)	The Solid Waste Disposal Act, as amended and revised by the Resource Conservation and Recovery Act (RCRA) et al., establishes requirements for the management of solid wastes (including hazardous wastes), landfills, underground storage tanks, and certain medical wastes. The statute also addresses program administration, implementation, and delegation to states, enforcement provisions, and responsibilities, as well as research, training, and grant funding provisions. RCRA Subtitle C establishes provisions for the generation, storage, treatment, and disposal of hazardous waste. RCRA Subtitle D establishes provisions for the design and operation of solid waste landfills.
Title 40, Code of Federal Regulations (CFR), Subchapter I – Solid Wastes	These regulations were established by U.S. EPA to implement the provisions of the Solid Waste Disposal Act and RCRA (described above). Among other things, the regulations establish the criteria for classification of solid waste disposal facilities (landfills), hazardous waste characteristic criteria and regulatory thresholds, hazardous waste generator requirements, and requirements for management of used oil and universal wastes. U.S. EPA implements the regulations at the federal level. However, California is an authorized state so the regulations are implemented by state agencies and authorized local agencies in lieu of U.S. EPA.
Title 49, CFR, Parts 172 and 173 Hazardous Materials Regulations	U.S. Department of Transportation established standards for transport of hazardous materials and hazardous wastes. The standards include requirements for labeling, packaging, and shipping of hazardous materials and hazardous wastes, as well as training requirements for personnel completing shipping papers and manifests. Section 172.205 specifically addresses use and preparation of hazardous waste manifests in accordance with Title 40, CFR, Section 262.20.
State	
California Health and Safety Code, Chapter 6.5, §§ 25100, et seq. Hazardous Waste Control Act of 1972, as amended	This California law creates the framework under which hazardous wastes must be managed in California. The law provides for the development of a state hazardous waste program that administers and implements the provisions of the federal RCRA program. It also provides for the designation of California-only hazardous wastes and development of standards (regulations) that are equal to or, in some cases, more stringent than federal requirements. The California Environmental Protection Agency (Cal/EPA), Department of Toxic Substances Control (DTSC) administers and implements the provisions of the law at the state level. Certified Unified Program Agencies (CUPAs) implement some elements of the law at the local level.
Title 22, California Code of	These regulations establish requirements for the management and disposal of hazardous waste in accordance with the provisions of the

Applicable Law	Description
Regulations (CCR), Division 4.5 Environmental Health Standards for the Management of Hazardous Waste	California Hazardous Waste Control Act and federal RCRA. As with the federal requirements, waste generators must determine if their wastes are hazardous according to specified characteristics or lists of wastes. Hazardous waste generators must obtain identification numbers, prepare manifests before transporting the waste off site, and use only permitted treatment, storage, and disposal facilities. Generator standards also include requirements for record keeping, reporting, packaging, and labeling. Additionally, while not a federal requirement, California requires that hazardous waste be transported by registered hazardous waste transporters. The Title 22 regulations are established and enforced at the state level by DTSC. Some generator standards are also enforced at the local level by CUPAs.
California Health and Safety Code, Chapter 6.11 §§ 25404–25404.9 Unified Hazardous Waste and Hazardous Materials Management Regulatory Program (Unified Program)	The Unified Program consolidates, coordinates, and makes consistent the administrative requirements, permits, inspections, and enforcement activities of the six environmental and emergency response programs listed below. • Aboveground Storage Tank Program • Business Plan Program • California Accidental Release Prevention (CalARP) Program • Hazardous Materials Management Plan / Hazardous Materials Inventory Statement Program • Hazardous Waste Generator / Tiered Permitting Program • Underground Storage Tank Program The state agencies responsible for these programs set the standards for their programs while local governments implement the standards. The local agencies implementing the Unified Program are known as Certified Unified Program Agencies (CUPAs). San Diego County Department of Environmental Health is the area CUPA.
Title 27, CCR, Division 1, Subdivision 4, Chapter 1, §§ 15100, et seq. Unified Hazardous Waste and Hazardous Materials Management Regulatory Program	While these regulations primarily address certification and implementation of the program by the local CUPAs, the regulations do contain specific reporting requirements for businesses. • Article 9 – Unified Program Standardized Forms and Formats (§§ 15400–15410). • Article 10 – Business Reporting to CUPAs (§§ 15600–15620).
Public Resources Code, Division 30, §§ 40000, et seq. California Integrated Waste Management Act of 1989.	The California Integrated Waste Management Act of 1989 (as amended) establishes mandates and standards for management of solid waste. Among other things, the law includes provisions addressing solid waste source reduction and recycling, standards for design and construction of municipal landfills, and programs for county waste management plans and local implementation of solid waste requirements.

Applicable Law	Description
California Health and Safety Code, Division 20, Chapter 6.5, Article 11.9, §25244.12, et seq. Hazardous Waste Source Reduction and Management Review Act of 1989 (also known as SB 14).	This law was enacted to expand the state's hazardous waste source reduction activities. Among other things, it establishes hazardous waste source reduction review, planning, and reporting requirements for businesses that routinely generate more than 12,000 kilograms (~ 26,400 pounds) of hazardous waste in a designated reporting year. The review and planning elements are required to be done on a 4-year cycle, with a summary progress report due to DTSC every 4th year.
Title 22, CCR, § 67100.1 et seq. Hazardous Waste Source Reduction and Management Review.	These regulations further clarify and implement the provisions of the Hazardous Waste Source Reduction and Management Review Act of 1989 (noted above). The regulations establish the specific review elements and reporting requirements to be completed by generators subject to the act.
California Fire Code	Controls storage of hazardous materials and wastes and the use and storage of flammable/combustible liquids. Waste will be accumulated and stored in accordance with Fire Code requirements. Permits for storage containers will be obtained, as needed, from the San Bernardino County Fire Department.
Local	
San Bernardino County, Countywide Integrated Waste Management Plan	This document sets forth the county's goals, policies, and programs for reducing dependence on landfill solid wastes and increasing source reduction, recycling, and reuse of products and waste, in compliance with the CIWMA. The plan also addresses the siting and development of recycling and disposal facilities and programs within the county.

SETTING

The applicant proposes to develop the ISEGS project in three phases that are designed to generate a total of 400 megawatts (MW) of electricity. The first two phases of the project, Ivanpah 1 and 2 are designed to provide 100 MW of electricity and the third phase, Ivanpah 3, is designed to provide 200 MW of electricity. The 100 MW phases, Ivanpah 1 and 2, would each occupy approximately 914 acres and 921 acres respectively; the 200 MW phase, Ivanpah 3, would require occupy approximately 1,837 acres. All three phases would be developed on contiguous property, sharing an administration building, an operation and maintenance building and a substation within a common logistics area between Ivanpah 1 and 2 that would also be used for construction laydown and staging activities. The proposed project would cause permanent disturbance of about 3,713 acres, temporary disturbance of 321 acres, and including the existing transmission line corridor of about 39 acres within the Construction Logistics area, ISEGS would utilize about 4,073 acres (6.4 square miles) of federal land managed by BLM (CH2ML 2009f).

Rows of heliostats (mirrors) would be used to concentrate solar energy on distributed power towers, which converts water to steam. Each power plant would include a power block containing a Rankine-cycle reheat steam turbine, solar reheat tower, package boiler, air-cooled condenser, deaerator, water storage tanks, emergency generator, diesel fire pump and a switchyard. The power plant would be operated from just after sunrise to sunset, and during times when the insolation is high enough to keep the turbines online (BSE 2007a, p 1-2).

Natural gas for the project would be obtained by a new 6-mile long natural gas pipeline connection to the Kern River Gas Transmission Line, less than a half a mile to the north of the project site. Raw water for the project would be supplied by two groundwater wells northwest of Ivanpah 1 and within the Construction Logistics Area. The water would be treated and used as boiler make-up water and to wash the heliostats. The plant would use a dry-cooling condenser to save water in the site's desert environment (BSE2007a, pages 1-2, 1-3 and 5.14-2).

Non-hazardous solid wastes generated during construction would include approximately 280 tons of scrap wood, concrete, steel/metal, paper, glass, scrap metals and plastic waste (BSE2007a, § 5.14.4.1.1). All non-hazardous wastes would be recycled to the extent possible and non-recyclable wastes would be collected by a licensed hauler and disposed in a Class III solid waste disposal facility. Generation of hazardous wastes anticipated during construction includes over 100 5-gallon empty hazardous material containers which would include 4,300 pounds of solvents, waste paint, and adhesives; 3,000 pounds of oil absorbents, used oil, oily rags; varying amounts of universal wastes; and waste oil filters (BSE2007a, § 5.14.4.1.1). Universal wastes are hazardous wastes that contain mercury, lead, cadmium, copper, and other substances hazardous to human and environmental health. Examples of universal wastes are batteries, fluorescent tubes, and some electronic devices. Hazardous wastes would be recycled to the extent possible and disposed in either a Class I or II waste facility as appropriate.

All operational wastes produced at ISEGS would be properly collected, treated (if necessary), and disposed of at either a Class I or II waste facility as appropriate. Wastes include process and sanitary wastewater, nonhazardous waste and hazardous waste, both liquid and solid. A septic system for sanitary wastewater would be located at the administration building/operations and maintenance area, located between Ivanpah 1 and 2. Portable toilets would be placed in the power block areas of each the three solar facilities and pumped by a sanitary service provider. Process wastewater from all equipment, including the boilers and water treatment equipment would be recycled. If necessary, a small filter/purification system would be used to treat project groundwater and provide potable water at the administration building. Any reject streams from water treatment would be trucked off site for treatment or disposal at either a Class I or II waste facility as appropriate. Additionally, two concrete-lined holding basins, approximately 40 feet by 60 feet by 6 feet deep in size, would be part of each power block facility, and would serve for boiler commissioning and emergency outfalls from any of the processes.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

This waste management analysis addresses: a) existing project site conditions and the potential for contamination associated with prior activities on or near the project site, and b) the impacts from the generation and management of wastes during project construction and operation.

Existing Project Site Conditions and Potential for Contamination

For any site in California proposed for the construction of a power plant, the applicant must provide documentation about the nature of any potential or existing releases of hazardous substances or contamination at the site. If potential or existing releases or contamination at the site are identified, the significance of the release or contamination would be determined by site-specific factors, including, but not limited to: the amount and concentration of contaminants or contamination; the proposed use of the area where the contaminants/contamination is found; and any potential pathways for workers, the public, or sensitive species or environmental areas to be exposed to the contaminants. Any unmitigated contamination or releases of hazardous substances that pose a risk to human health or environmental receptors would be considered significant by Energy Commission staff.

As a first step in documenting existing site conditions, the Energy Commission's power plant site certification regulations require that a Phase I Environmental Site Assessment (ESA) be prepared[1] and submitted as part of an AFC. The Phase I ESA is conducted to identify any conditions indicative of releases and threatened releases of hazardous substances at the site and to identify any areas known to be contaminated (or a source of contamination) on or near the site.

In general, the Phase I ESA uses a qualified environmental professional to conduct inquiries into past uses and ownership of the property, research hazardous substance releases and hazardous waste disposal at the site and within a certain distance of the site, and visually inspect the property, making observations about the potential for contamination and possible areas of concern. After conducting all necessary file reviews, interviews, and site observations, the environmental professional then provides findings about the environmental conditions at the site. In addition, since the Phase I ESA does not include sampling or testing, the environmental professional may also give an opinion about the potential need for any additional investigation. Additional investigation may be needed, for example, if there were significant gaps in the information available about the site, an ongoing release is suspected, or to confirm an existing environmental condition.

[1] Title 20, California Code of Regulations, section 1704(c) and Appendix B, section (g)(12)(A). Note that the Phase I ESA must be prepared according to American Society for Testing and Materials protocol or an equivalent method agreed upon by the applicant and the Energy Commission staff.

If additional investigation is needed to identify the extent of possible contamination, a Phase II ESA may be required. The Phase II ESA usually includes sampling and testing of potentially contaminated media to verify the level of contamination and the potential for remediation at the site.

In conducting its assessment of a proposed project, Energy Commission staff will review the project's Phase I ESA and work with the appropriate oversight agencies as necessary to determine if additional site characterization work is needed and if any mitigation is necessary at the site to ensure protection of human health and the environment from any hazardous substance releases or contamination identified.

Impacts from Generation and Management of Wastes during Construction, Operation and Project Closure/Decommissioning

Regarding the management of project-related wastes generated during construction, operation, and closure/decommissioning of the proposed project, staff reviewed the applicant's proposed solid and hazardous waste management methods and determined if the methods proposed are consistent with the LORS identified for waste disposal and recycling. The federal, state, and local LORS represent a comprehensive regulatory system designed to protect human health and the environment from impacts associated with management of both non-hazardous and hazardous wastes. Absent any unusual circumstances, staff considers project compliance with LORS to be sufficient to ensure that no significant impacts would occur as a result of project waste management.

Staff then reviewed the capacity available at off-site treatment and disposal sites and determined whether or not the proposed power plant's waste would impact the available capacity.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Existing Site Conditions

A Phase I ESA of the proposed project site, dated August 2007, was prepared by CH2MHILL in accordance with the American Society for Testing and Materials Standard Practice E 1527-00 for ESAs. The Phase I ESA is included as Appendix 5.14A in Volume 2 of the project AFC (BSE2007c, Appendix 5.14A).

The Phase I ESA conducted for the proposed ISEGS site did not identify any recognized environmental conditions associated with the proposed project site and linear facility corridors. A recognized environmental condition is the presence or likely presence of any hazardous substances or petroleum products on a property under the conditions that indicated an existing release, past release, or a material threat of a release of any hazardous substance or petroleum products into structures on the property or in the ground, groundwater, or surface water of the property.

The ISEGS site and linear features are located on undeveloped federal land under the jurisdiction of Bureau of Land Management (BLM). The project site is bounded on the north, south, and west by undeveloped land. A golf course is located to the immediate east of the ISEGS site. Overhead electrical transmission lines run within the property (BSE2007c, p. 5-1). Staff has proposed Conditions of Certification **WASTE-1** and

WASTE-2 to mitigate any previously unrecognized conditions that may be encountered during construction and operation. These proposed conditions of certification require that a registered professional geologist or engineer with experience in remedial investigation and feasibility studies be available for consultation during soil excavation and grading activities. This would be adequate to address identification and investigation of any soil or groundwater contamination that may be encountered.

Proposed Project

Proposed Project - Construction Impacts and Mitigation

Site preparation and construction of the proposed power plant and associated facilities would generate both nonhazardous and hazardous wastes in solid and liquid forms (BSE2007a, § 5.14.4.1). Before construction can begin, staff recommends the project owner be required to develop and implement a Construction Waste Management Plan, per proposed Condition of Certification **WASTE-3**, to ensure that the waste will be recycled when possible and properly landfilled when necessary.

Non-Hazardous Wastes

Non-hazardous solid wastes generated during construction would include approximately 280 tons of scrap wood, concrete, steel/metal, paper, glass, scrap metals and plastic waste (BSE2007a, § 5.14.4.1.1). All non-hazardous wastes would be recycled to the extent possible and non-recyclable wastes would be collected by a licensed hauler and disposed in a solid waste disposal facility, in accordance with Title 14, California Code of Regulations, sections 17200 et seq.

Non-hazardous liquid wastes would also be generated during construction, including sanitary wastes, dust suppression, drainage, and equipment wash water. Sanitary wastes would be collected in portable, self-contained toilets and pumped periodically for disposal at an appropriate facility. Potentially contaminated equipment wash water would be contained at designated wash areas and transported to a sanitary wastewater treatment facility. Please see the **Soil and Water Resources** section of this document for more information on the management of project wastewater.

Hazardous Wastes

The generation of hazardous wastes anticipated during construction includes over 100 5-gallon empty hazardous material containers which would include 4,300 pounds of solvents, waste paint, and adhesives; 3,000 pounds of oil absorbents, used oil, oily rags; and varying amounts of batteries, waste oil filters, etc. Table 5.14-2 contains a detailed list of wastes that would be generated during construction. The amount of waste would be minor if handled in the manner identified in the AFC (BSE2007a, § 5.14.4.1.1).

The project owner would be required to obtain a unique hazardous waste generator identification number for the site prior to starting construction, pursuant to proposed Condition of Certification **WASTE-4**. This would ensure compliance with California Code of Regulation Title 22, Division 4.5. Although the hazardous waste generator number is determined based on site location, both the construction contractor and the project owner/operator could be considered the generator of hazardous wastes at the site.

Wastes would be accumulated on site for less than 90 days and then properly manifested, transported, and disposed at a permitted hazardous waste management facility by licensed hazardous waste collection and disposal companies. Staff reviewed the disposal methods described in AFC section 5.14.4.1.1 and concluded that all wastes would be disposed of in accordance with all applicable LORS. Should any construction waste management-related enforcement action be taken or initiated by a regulatory agency, the project owner would be required by proposed Condition of Certification **WASTE-5** to notify the Energy Commission's Compliance Project Manager (CPM) whenever the owner becomes aware of any such action.

In the event that construction excavation, grading, or trenching activities for the proposed project encounter potentially contaminated soils and/or specific handling, disposal, and other precautions that may be necessary pursuant to hazardous waste management LORS, staff finds that proposed Conditions of Certification **WASTE-1** and **WASTE-2** would be adequate to address any soil contamination contingency that may be encountered during construction of the project and would ensure compliance with LORS. Absent any unusual circumstances, staff considers project compliance with LORS to be sufficient to ensure that no significant impacts would occur as a result of project waste management activities.

Proposed Project - Operation Impacts and Mitigation

The proposed ISEGS would generate non-hazardous and hazardous wastes in both solid and liquid forms under normal operating conditions. Table 5.14-3 of the project AFC gives a summary of the operation waste streams, expected waste volumes and generation frequency, and management methods proposed. Before operations can begin, the project owner would be required to develop and implement an Operation Waste Management Plan pursuant to proposed Condition of Certification **WASTE-6**. This would ensure that an accurate record is maintained of the project's waste storage, generation, and disposal, and compliance with waste regulations is maintained during operation.

Non-Hazardous Solid Wastes

The generation of 240 tons per year of non-hazardous solid wastes expected during project operation include routine maintenance wastes (such as used air filters, spent deionization resins, sand and filter media) as well as domestic and office wastes (such as office paper, newsprint, aluminum cans, plastic, and glass) (BSE 2007a page 5.14-5). All non-hazardous wastes would be recycled to the extent possible, and non-recyclable wastes would be regularly transported off site to a local solid waste disposal facility (BSE2007a, § 5.14.4.1.2).

Non-Hazardous Liquid Wastes

Non-hazardous liquid wastes would be generated during facility operation and are discussed in the **Soil and Water Resources** section of this document.

Hazardous Wastes

The project owner/operator would be considered the generator of hazardous wastes at the site during facility operations. The project would generate approximately four tons of

hazardous waste. Therefore, the project owner's unique hazardous waste generator identification number, obtained prior to construction in accordance with proposed Condition of Certification **WASTE-4**, would be retained and used for hazardous waste generated during facility operation.

The generation of hazardous wastes expected during routine project operation includes used hydraulic fluids, oils, greases, oily filters and rags, cleaning solutions and solvents, and batteries. In addition, spills and unauthorized releases of hazardous materials or hazardous wastes may generate contaminated soils or materials that may require corrective action and management as hazardous waste. Proper hazardous material handling and good housekeeping practices would help keep spill wastes to a minimum. However, to ensure proper cleanup and management of any contaminated soils or waste materials generated from hazardous materials spills, staff proposes Condition of Certification **WASTE-7** requiring the project owner/operator to report, clean up, and remediate as necessary, any hazardous materials spills or releases in accordance with all applicable federal, state, and local requirements. More information on hazardous material management, spill reporting, containment, and spill control and countermeasures plan provisions for the project are provided in the **Hazardous Materials Management** section of the PSA.

The amount of hazardous wastes generated during the operation of ISEGS would be minor, with source reduction and recycling of wastes implemented whenever possible. The hazardous wastes would be temporarily stored on site, transported off site by licensed hazardous waste haulers, and recycled or disposed at authorized disposal facilities in accordance with established standards applicable to generators of hazardous waste (Title 22, CCR, §§ 66262.10 et seq.). Should any operations waste management-related enforcement action be taken or initiated by a regulatory agency, the project owner would be required by proposed Condition of Certification **WASTE-5** to notify the CPM whenever the owner becomes aware of any such action.

Proposed Project - Closure and Decommissioning Impacts and Mitigation

The closure or decommissioning of the ISEGS project would produce both hazardous and non-hazardous solid and liquid waste. The project's General Compliance Conditions of Certification, including Compliance Monitoring and Closure Plan (Compliance Plan) have been established as required by Public Resources Code section 25532. The plan provides a means for assuring that the facility is constructed, operated and closed in compliance with public health and safety, environmental and other applicable regulations, guidelines, and conditions adopted or established by the California Energy Commission. Required elements of a facility's closure would be outlined in a facility closure plan as specified in Conditions of Certification **Compliance 11**, **12**, and **13**. To ensure adequate review of a planned project closure, the project owner shall submit a proposed facility closure plan to the Energy Commission for review and approval at least 12 months (or other period of time agreed to by the CPM) prior to commencement of closure activities. The facility closure plan will document non-hazardous and hazardous waste management practices including: the inventory, management, and disposal of hazardous materials and wastes, and permanent disposal of permitted hazardous materials and waste storage units.

The handling and management of waste generated by ISEGS will follow the hierarchical approach of source reduction, recycling, treatment, and disposal as specified in California Public Resources Code Sections 40051 and 40196. The first priority of the project owner will be to use materials that reduce the waste that is generated. The next level of waste management will involve reusing or recycling wastes. For wastes that cannot be recycled, treatment will be used, if possible, to make the waste nonhazardous. Finally, waste that cannot be reused, recycled or treated would be transported off site to a permitted treatment, storage, or disposal facility. Staff expects that there will be adequate landfill capacity available to dispose of both non-hazardous and hazardous waste from the closure or decommissioning of the proposed project in both California and Nevada. Conditions of Certification **WASTE-4** through -**7** would continue to apply to ISEGS during closure or decommissioning of the project.

Proposed Project - Impact on Existing Waste Disposal Facilities

Non-Hazardous Solid Wastes

During construction of the proposed project, approximately 280 tons of solid waste will be generated and recycled or disposed of in a Class III landfill (BSE2007a, § 5.14.4.2.1). The non-hazardous solid wastes generated yearly at ISEGS will also be recycled, if possible, or disposed in a Class III landfill.

Table 5.14-4 of the project AFC identifies three waste disposal facilities that could potentially take the non-hazardous construction and operation wastes generated by the ISEGS: the Sloan Transfer facility in Sloan, Nevada; Apex Regional Landfill in Las Vegas, Nevada; and Barstow Sanitary Landfill in Barstow, California. The remaining capacity for the disposal facilities is over 5 million cubic yards. The total amount of non-hazardous waste generated from the project is estimated to be less than 300 cubic yards of solid waste from construction, and approximately 250 cubic yards per year from operation. This would contribute much less than 1 percent of the available landfill capacity. Staff finds that disposal of the solid wastes generated by the ISEGS can occur without significantly impacting the capacity or remaining life of any of these facilities.

Hazardous Wastes

Section 5.14.4.2.2 of the project AFC discusses the two Class I landfills that are open in California: the Clean Harbor Landfill (Buttonwillow) in Kern County and the Chemical Waste Management Landfill (Kettleman Hills) in Kings County. The Kettleman Hills facility also accepts Class II and Class III wastes. In total, there is in excess of 11 million cubic yards of remaining hazardous waste disposal capacity at these landfills, with approximately 30 years of remaining operating lifetimes.

Hazardous wastes generated during construction and operation would be recycled to the extent possible and practical. Those wastes that cannot be recycled would be transported off site to a permitted treatment, storage, or disposal facility. The 4 tons of hazardous waste from the ISEGS requiring off-site disposal is estimated to occupy less than 10 cubic yards. This volume would be much less than the remaining capacity of either Class I waste facility. Staff believes that disposal of hazardous wastes generated by the ISEGS can occur without significantly impacting the capacity or remaining life of these facilities.

No Project / No Action Alternative

In the No Project / No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan.

The results of the No Project / No Action Alternative would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project.
- The benefits of the proposed project in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

If this project is not approved, renewable projects would likely be developed on other sites in the Mojave Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are three large solar projects proposed on BLM land in Nevada within a few miles of the Ivanpah site. In addition, there are currently 66 applications for solar projects covering 611,692 acres pending with BLM in the California Desert District. The No Project / No Action Alternative would not cause any impacts associated with Waste Management.

CUMULATIVE IMPACTS AND MITIGATION

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (California Code Regulation, Title 14, section 15130). NEPA states that cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR §1508.7).

There is the potential for substantial future development in the Ivanpah Valley area and throughout the southern California desert region. Analysis of cumulative impacts is based on data provided in the following maps and tables (see **Cumulative Scenario** section):

- Cumulative Impacts Figure 1, Regional Renewable Applications;
- Cumulative Impacts Figure 2, Regional Renewable Applications (Detail);
- Cumulative Impacts Figure 3, Ivanpah Valley Existing and Future/Foreseeable Projects;
- Cumulative Impacts Table 1, Regional Renewable Energy Projects;
- Cumulative Impacts Table 2, Existing Development in the Ivanpah Valley; and

- Cumulative Impacts Table 3, Future Foreseeable Projects in the Ivanpah Valley Area.

The analysis in this section first defines the geographic area over which cumulative impacts related to waste management could occur. The cumulative impact analysis itself describes the potential for cumulative impacts to occur as a result of implementation of the ISEGS along with the listed local and regional projects.

Geographic Extent

Cumulative impacts can occur within the Ivanpah Valley if implementation of the ISEGS could combine with those of other local or regional projects. Cumulative impacts could also occur as a result of development of some of the many proposed solar and wind development projects that have been or are expected to be under consideration by the BLM and the Energy Commission in the near future. Many of these projects are located within the California Desert Conservation Area, as well as on BLM land in Nevada and Arizona.

The geographic extent for the analysis of the cumulative impacts associated with the ISEGS includes San Bernardino County, California and Clark County, Nevada. This geographic scope is appropriate because waste generated by the ISEGS would be disposed of in one or both of these counties.

Cumulative Impact Analysis

Local Projects

The ISEGS would generate nonhazardous solid waste that would add to the total waste generated in San Bernardino County, California and Clark County, Nevada. Nonhazardous solid waste generated by all of the past, present, and reasonably foreseeable projects presented in **Cumulative Impacts Table 2** and **Cumulative Impacts Table 3** would also be disposed of within these counties. However, project wastes would be generated in modest quantities, waste recycling would be employed wherever practical, and sufficient capacity is available at several treatment and disposal facilities to handle the volumes of wastes that would be generated by the project. Most of the reasonably foreseeable projects identified in **Cumulative Impacts Table 3** are of similar or smaller scale than the ISEGS and would therefore be expected to generate a similar or smaller volume of nonhazardous waste as the ISEGS. The total amount of available solid waste landfill capacity in San Bernardino County as of June 2008 is 222 million cubic yards according to the San Bernardino County Solid Waste Management Division (Rozzi 2008). The Nevada Division of Environmental Protection Solid Waste Management Plan reports that Clark County, where the cities of Las Vegas and Sloan are located, has landfill capacity of 935 million cubic yards (Campbell 2008). Therefore, even if all 17 of these reasonably foreseeable projects were constructed, staff concludes that the waste generated by the ISEGS would not result in significant cumulative waste management impacts.

As stated above, the 4 tons of hazardous waste from the ISEGS requiring off-site disposal would be far less than the capacity remaining at either Class I waste facility.

The hazardous waste, in addition to hazardous wastes that would potentially be generated by the reasonably foreseeable projects would not result in significant cumulative waste management impacts.

Regional Projects

Implementation of the multiple solar and wind projects proposed to be developed in southeastern California, southern Nevada, and western Arizona would result in an increase in generation of hazardous and nonhazardous solid and liquid waste and would add to the total quantity of waste generated in the states of California and Nevada. However, project wastes would be generated in modest quantities, waste recycling would be employed wherever practical, and sufficient capacity is available at several treatment and disposal facilities to handle the volumes of wastes that would be generated by the project. Therefore, impacts of the ISEGS, when combined with impacts of the future solar and wind development projects currently proposed within southeastern California, southern Nevada, and western Arizona, would not result in significant and unavoidable cumulative impacts with regard to waste management.

Cumulative Impact Conclusion

Impacts of the ISEGS project would combine with impacts of past, present, and reasonably foreseeable projects to result in a contribution to local and regional cumulative impacts related to waste management.

The amount of non-hazardous and hazardous wastes generated during construction and operation of the ISEGS, would add to the total quantity of hazardous and non-hazardous waste generated in the states of California and Nevada. However, ISEGS project wastes in addition to waste that would potentially be generated by the reasonably foreseeable projects would not result in significant cumulative waste management impacts either locally or regionally.

COMPLIANCE WITH LORS

Energy Commission staff concludes that the proposed ISEGS would comply with all applicable LORS regulating the management of hazardous and non-hazardous wastes during both facility construction and operation. The applicant is required to recycle and/or dispose hazardous and non-hazardous wastes at facilities licensed or otherwise approved to accept the wastes. Because hazardous wastes would be produced during both project construction and operation, the ISEGS would be required to obtain a hazardous waste generator identification number from U.S. EPA. The ISEGS would also be required to properly store, package, and label all hazardous waste; use only approved transporters; prepare hazardous waste manifests; keep detailed records; and appropriately train employees, in accordance with state and federal hazardous waste management requirements.

NOTEWORTHY PUBLIC BENEFITS

Staff has not identified any noteworthy public benefits associated with Waste Management.

PUBLIC AND AGENCY COMMENTS ON THE PSA

County of San Bernardino Solid Waste Management Division
The county of San Bernardino Solid Waste Management Division is responsible for the management and oversight of all county landfill and waste transfer operations. In an October 3, 2007 letter, the county outlined a number of administrative procedures that the ISEGS project owner would have to address to build and operate a project in San Bernardino County (dopw2007A). In a letter dated January 5, 2009, the county found that staff's environmental analysis of the proposed project was adequate and incorporated the appropriate local, state, and federal LORS (DOPW2009a).

Basin and Range Watch
The group Basin and Range Watch's January 31, 2009 letter, asked what are the safety procedures pertaining to contamination caused by heavy metal waste spilled during construction and operation. Staff has incorporated Conditions of Certification **WASTE 1** through **7** to protect both workers and the environment against hazardous material spills. The **Public Health** and **Hazardous Materials Management** sections also provide conditions that are designed to mitigate any potential impacts due to spills.

CONCLUSIONS

Consistent with the three main objectives for staff's waste management analysis (as noted in the Introduction section of this analysis), staff provides the following conclusions:

After review of the applicant's proposed waste management procedures, staff concludes that project wastes would be managed in compliance with all applicable waste management LORS. Staff notes that both construction and operation wastes would be characterized and managed as either hazardous or non-hazardous waste. All non-hazardous wastes would be recycled to the extent feasible, and nonrecyclable wastes would be collected by a licensed hauler and disposed of at a permitted solid waste disposal facility. Hazardous wastes would be accumulated onsite in accordance with accumulation time limits and then properly manifested, transported to, and disposed of at a permitted hazardous waste management facility by licensed hazardous waste collection and disposal companies.

However, to help ensure and facilitate ongoing project compliance with LORS, staff proposes Conditions of Certification **WASTE-1** through **7**. These conditions would require the project owner to do all of the following:

- Prepare Construction Waste Management and Operation Waste Management Plans detailing the types and volumes of wastes to be generated and how wastes will be managed, recycled, and/or disposed of after generation (**WASTE-3** and **6**).
- Obtain a hazardous waste generator identification number (**WASTE-4**).
- Ensure the project site is investigated and any contamination identified is remediated as necessary, with appropriate professional and regulatory agency oversight (**WASTE-1, 2, and 7**).

- Report any waste management-related LORS enforcement actions and how violations will be corrected (**WASTE-5**).
- Ensure that all spills or releases of hazardous substances are reported and cleaned-up in accordance with all applicable federal, state, and local requirements (**WASTE-7**).

The existing available capacity for the Class III landfills that may be used to manage nonhazardous project wastes exceeds 1 billion cubic yards. The total amount of nonhazardous wastes generated from construction and operation of ISEGS would contribute less than 0.1 percent of the remaining landfill capacity. Therefore, disposal of project generated non-hazardous wastes would have a less than significant impact on Class III landfill capacity.

In addition, the Class I disposal facilities that could be used for hazardous wastes generated by the construction and operation of ISEGS have a remaining capacity in excess of 68 million cubic yards (Campbell 2008). The total amount of hazardous wastes generated by the ISEGS would contribute less than 0.02 percent of the remaining permitted capacity. Therefore, impacts from disposal of ISEGS generated hazardous wastes would also have a less than significant impact on the remaining capacity at Class I landfills.

Staff concludes that management of the waste generated during construction and operation of the ISEGS would not result in any significant direct or cumulative adverse impacts under CEQA or NEPA, and would comply with applicable LORS, if the waste management practices and mitigation measures proposed in the ISEGS AFC and staff's proposed conditions of certification are implemented.

MITIGATION MEASURES/PROPOSED CONDITIONS OF CERTIFICATION

WASTE-1 The project owner shall provide the resume of an experienced and qualified professional engineer or professional geologist, who shall be available for consultation during site characterization (if needed), demolition, excavation, and grading activities, to BLM's Authorized Officer and the CPM for review and approval. The resume shall show experience in remedial investigation and feasibility studies.

The professional engineer or professional geologist shall be given authority by the project owner to oversee any earth moving activities that have the potential to disturb contaminated soil and impact public health, safety and the environment.

Verification: At least 30 days prior to the start of site mobilization, the project owner shall submit the resume to BLM's Authorized Officer and the CPM for review and approval.

WASTE-2 If potentially contaminated soil is identified during site characterization, demolition, excavation, or grading at either the proposed site or linear

facilities, as evidenced by discoloration, odor, detection by handheld instruments, or other signs, the professional engineer or professional geologist shall inspect the site, determine the need for sampling to confirm the nature and extent of contamination, and provide a written report to the project owner, representatives of Department of Toxic Substances Control or Regional Water Quality Control Board, BLM's Authorized Officer, and the CPM stating the recommended course of action.

Depending on the nature and extent of contamination, the professional engineer or professional geologist shall have the authority to temporarily suspend construction activity at that location for the protection of workers or the public. If, in the opinion of the professional engineer or professional geologist, significant remediation may be required, the project owner shall contact BLM's Authorized Officer and the CPM and representatives of the Department of Toxic Substances Control for or the Regional Water Quality control Board, for guidance and possible oversight.

Verification: The project owner shall submit any final reports filed by the professional engineer or professional geologist to BLM's Authorized Officer and the CPM within 5 days of their receipt. The project owner shall notify BLM's Authorized Officer and the CPM within 24 hours of any orders issued to halt construction.

WASTE-3 The project owner shall prepare a Construction Waste Management Plan for all wastes generated during construction of the facility and shall submit the plan to BLM's Authorized Officer and the CPM for review and approval. The plan shall contain, at a minimum, the following:

- a description of all construction waste streams, including projections of frequency, amounts generated, and hazard classifications; and
- management methods to be used for each waste stream, including temporary on-site storage, housekeeping and best management practices to be employed, treatment methods and companies providing treatment services, waste testing methods to assure correct classification, methods of transportation, disposal requirements and sites, and recycling and waste minimization/source reduction plans.

Verification: The project owner shall submit the Construction Waste Management Plan to BLM's Authorized Officer and the CPM for approval no less than 30 days prior to the initiation of construction activities at the site.

WASTE-4 The project owner shall obtain a hazardous waste generator identification number from the United States Environmental Protection Agency prior to generating any hazardous waste during project construction and operations.

Verification: The project owner shall keep a copy of the identification number on file at the project site and provide documentation of the hazardous waste generation notification and receipt of the number to BLM's Authorized Officer and the CPM in the next scheduled Monthly Compliance Report after receipt of the number. Submittal of the notification and issued number documentation to BLM's Authorized Officer and the CPM is only needed once unless there is a change in ownership, operation, waste generation, or waste characteristics that requires a new notification to USEPA.

Documentation of any new or revised hazardous waste generation notifications or changes in identification number shall be provided to BLM's Authorized Officer and the CPM in the next scheduled compliance report.

WASTE-5 Upon becoming aware of any impending waste management-related enforcement action by any local, state, or federal authority, the project owner shall notify BLM's Authorized Officer and the CPM of any such action taken or proposed to be taken against the project itself, or against any waste hauler or disposal facility or treatment operator with which the owner contracts.

Verification: The project owner shall notify BLM's Authorized Officer and the CPM in writing within 10 days of becoming aware of an impending enforcement action. BLM's Authorized Officer and the CPM shall notify the project owner of any changes that will be required in the way project-related wastes are managed.

WASTE-6 The project owner shall prepare an Operation Waste Management Plan for all wastes generated during operation of the facility and shall submit the plan to BLM's Authorized Officer and the CPM for review and approval. The plan shall contain, at a minimum, the following:

- a detailed description of all operation and maintenance waste streams, including projections of amounts to be generated, frequency of generation, and waste hazard classifications;
- management methods to be used for each waste stream, including temporary on-site storage, housekeeping and best management practices to be employed, treatment methods and companies providing treatment services, waste testing methods to assure correct classification, methods of transportation, disposal requirements and sites, and recycling and waste minimization/source reduction plans;
- information and summary records of conversations with the local Certified Unified Program Agency and the Department of Toxic Substances Control regarding any waste management requirements necessary for project activities. Copies of all required waste management permits, notices, and/or authorizations shall be included in the plan and updated as necessary;
- a detailed description of how facility wastes will be managed and any contingency plans to be employed, in the event of an unplanned closure or planned temporary facility closure; and
- a detailed description of how facility wastes will be managed and disposed upon closure of the facility.

Verification: The project owner shall submit the Operation Waste Management Plan to BLM's Authorized Officer and the CPM for approval no less than 30 days prior to the start of project operation. The project owner shall submit any required revisions to BLM's Authorized Officer and the CPM within 20 days of notification from BLM's Authorized Officer and the CPM that revisions are necessary.

The project owner shall also document in each Annual Compliance Report the actual volume of wastes generated and the waste management methods used during the year;

provide a comparison of the actual waste generation and management methods used to those proposed in the original Operation Waste Management Plan; and update the Operation Waste Management Plan as necessary to address current waste generation and management practices.

WASTE-7 The project owner shall ensure that all spills or releases of hazardous substances, hazardous materials, or hazardous waste are reported, cleaned up, and remediated as necessary, in accordance with all applicable federal, state, and local requirements.

Verification: The project owner shall document all unauthorized releases and spills of hazardous substances, materials, or wastes that occur on the project property or related pipeline and transmission corridors. The documentation shall include, at a minimum, the following information: location of release; date and time of release; reason for release; volume released; amount of contaminated soil/material generated; how release was managed and material cleaned up; if the release was reported; to whom the release was reported; release corrective action and cleanup requirements placed by regulating agencies; level of cleanup achieved and actions taken to prevent a similar release or spill; and disposition of any hazardous wastes and/or contaminated soils and materials that may have been generated by the release. Copies of the unauthorized spill documentation shall be provided to BLM's Authorized Officer and the CPM within 30 days of the date the release was discovered.

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California Integrated Waste Management Board (CIWMB). 2008. Construction/Demolition and Inert Debris Tools and Resources. Solid Waste Cleanup Program Weights and Volumes for Project Estimates http://www.ciwmb.ca.gov/leatraining/Resources/CDI/Tools/Calculations.htm.

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DOPW2009a – Department of Public Works / N. Sansonetti (tn 49730). PSA Comment Letter from San Bernardino County's Solid Waste Management Division. Dated on 01/05/2009. Submitted to CEC / C. McFarlin on 01/16/2009.

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WORKER SAFETY AND FIRE PROTECTION

Prepared by Geoff Lesh, PE and Rick Tyler

SUMMARY OF CONCLUSIONS

U.S. Bureau of Land Management (BLM) and Energy Commission Staff (hereafter jointly referred to as staff) conclude that if the applicant for the proposed Ivanpah Solar Electric Generating System (ISEGS) provides project construction safety and health and project operations and maintenance safety and health programs, as required by Conditions of Certification **WORKER SAFETY -1, -2, -3, -4, -5,** and **-6**, the project would incorporate sufficient measures to both ensure adequate levels of industrial safety and comply with applicable laws, ordinances, regulations, and standards (LORS). These proposed conditions of certification ensure that these programs, proposed by the applicant, will be reviewed by the appropriate agencies before they are implemented. The conditions also require verification that the proposed plans adequately ensure worker safety and fire protection and comply with applicable LORS.

Staff also concludes that the proposed project would not have impacts on local fire protection services that would be significant with respect to CEQA or NEPA. The fire risks at the proposed facility do not pose significant added demands on local fire protection services. Staff also concludes that the San Bernardino County Hazmat Team and the San Bernardino County Fire Department (SBCFD) are adequately equipped and staffed to respond to hazardous materials incidents at the proposed facility with an adequate response time, given the remote location of this project (Crawford 2008).

Conditions of Certification referred to herein serve the purpose of both the Energy Commission's Conditions of Certification for purposes of CEQA and BLM's Mitigation Measures for purposes of NEPA.

INTRODUCTION

Worker safety and fire protection are regulated through federal, state, and local LORS. Industrial workers at the facility both operate equipment and handle hazardous materials daily, and could face hazards resulting in accidents and serious injury. Protection measures are employed to eliminate or reduce these hazards or minimize their risk through special training, protective equipment, and procedural controls.

The purpose of this Worker Safety and Fire Protection section of this Final Staff Assessment/Draft Environmental Impact Statement (FSA/DEIS) is to assess the worker safety and fire protection measures proposed by the ISEGS applicant and determine whether the applicant has proposed adequate measures to:

- Comply with applicable safety LORS;
- Protect workers during the construction and operation of the facility;
- Protect against fire; and
- Provide adequate emergency response procedures.

Worker Safety and Fire Protection Table 1
Laws, Ordinances, Regulations, and Standards

Applicable Law	Description
Federal	
29 U.S. Code sections 651 et seq (Occupational Safety and Health Act of 1970)	This Act mandates safety requirements in the workplace, with the purpose of "[assuring] so far as possible every working man and woman in the nation safe and healthful working conditions and to preserve our human resources" (29 USC § 651).
29 CFR sections 1910.1 to 1910.1500 (Occupational Safety and Health Administration Safety and Health Regulations)	These sections define the procedures for promulgating regulations and conducting inspections to implement and enforce safety and health procedures to protect workers, particularly in the industrial sector.
29 CFR sections 1952.170 to 1952.175	These sections provide federal approval of California's plan for enforcement of its own safety and health requirements, in lieu of most of the federal requirements found in 29 CFR §1910.1 to 1910.1500.
State	
8 CCR all applicable sections (Cal/OSHA regulations)	Requires that all employers follow these regulations as they pertain to the work involved. This includes regulations pertaining to safety matters during the construction, commissioning, and operation of power plants, as well as safety around electrical components, fire safety, and hazardous materials usage, storage, and handling.
24 CCR section 3, et seq.	Incorporates the current edition of the International Building Code.
Health and Safety Code sections 25500 to 25541	Requires a Hazardous Materials Business plan detailing emergency response plans for hazardous materials emergencies at a facility.
Local (or locally enforced)	
	San Bernardino County does not have additional LORS that apply to Hazardous Materials Handling, but administers the State of California programs as the CUPA.
2007 Edition of California Fire Code and all	NFPA standards are incorporated into the California State Fire Code. The fire code contains general provisions for fire safety, including road and building access, water supplies, fire

applicable NFPA standards (24 CCR Part 9)	protection and life safety systems, fire-resistive construction, storage of combustible materials, exits and emergency escapes, and fire alarm systems.
Title 24, California Code of Regulations (24 CCR § 3, et seq.)	The California Building Code is comprised of 11 parts containing building design and construction requirements as they relate to fire, life, and structural safety. It incorporates current editions of the International Building Code, including the electrical, mechanical, energy, and fire codes applicable to the project.

SETTING

Fire support services to the site will be under the jurisdiction of the San Bernardino County Fire Department (SBCFD). Station 53 is 40 miles from the project site, located at 65 Kingston Circle, Baker, California, and would be the first responder to ISEGS, with a response time of approximately 45 minutes. San Bernardino County Fire Department also has a Mutual Aid Agreement with Clark County (Nevada) Fire Department for responses requiring more assistance.

In San Bernardino County, hazardous materials permits and spills are handled and investigated by SBCFD. Because of the highly remote and rural area of ISEGS, services are limited and spread out. San Bernardino County Firefighters receive specialized training to address emergency responses to industrial hazards. The response time to the project site, with full resources capabilities including for large-scale hazardous materials spills, would be 3 to 4 hours. Hazardous materials service is provided out of the SBCFD station in the town of Fontana, Station #78.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

Two issues are assessed in **WORKER SAFETY AND FIRE PROTECTION**:

1. The potential for impacts on the safety of workers during demolition, construction, operations, and closure and decommissioning activities; and

2. Fire prevention/protection, emergency medical response, and hazardous materials spill response during demolition, construction, operations, and closure and decommissioning activities.

Worker safety is essentially a LORS compliance matter and if all LORS are followed, workers will be adequately protected. Thus, the standard for staff's review and determination of significant impacts on worker health is whether the applicant has demonstrated adequate knowledge of and commitment to implementation of all pertinent and relevant Cal-OSHA standards.

Staff reviews and evaluates the on-site fire-fighting systems proposed by the applicant, as well as the time needed for off-site local fire departments to respond to a fire,

medical, or hazardous material emergency at the ISEGS site. If on-site systems do not follow established codes and industry standards, staff recommends additional measures. Staff reviews local fire department capabilities and response times, and interviews local fire officials to determine if they feel they are adequately staffed, and equipped to respond to the needs of a power plant. Staff then determines if the presence of the power plant would cause a significant impact on a local fire department. If it does, staff will recommend that the applicant mitigate this impact by providing additional resources to the fire department.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Proposed Project - Worker Safety

Industrial environments are potentially dangerous during both construction and operation. Workers at the proposed project will be exposed to loud noises, moving equipment, trenches, and confined space entry and egress. Workers may sustain falls, trips, burns, lacerations, and other injuries. They may be exposed to falling equipment or structures, chemical spills, hazardous waste, fires, explosions, and electrical sparks or electrocution. It is important that ISEGS has well-defined policies and procedures, training, and hazard recognition and control to minimize these hazards and protect workers. If the facility complies with all LORS, workers will be adequately protected from health and safety hazards.

A Safety and Health Program will be prepared by the applicant to minimize worker hazards during construction and operation of the project. “Safety and Health Program,” for staff, refers to measures that will be taken to ensure compliance with the applicable LORS during the construction and operation of the project.

Construction Safety and Health Program

ISEGS includes the construction and operation of a hybrid, combined-cycle, natural gas-fired power plant and solar thermal generating equipment. For the Power Block, workers will be exposed to hazards typical of construction and operation of a gas-fired simple-cycle facility, while the solar component will present similar construction risks and minimal operational risks to workers.

Construction safety orders are published at Title 8 of the California Code of Regulations, section 1502 et seq. These requirements are promulgated by Cal/OSHA and apply to the construction phase of the project. The construction safety and health program will include the following:

- Construction injury and illness prevention program (8 CCR § 1509);
- Construction fire prevention plan (8 CCR § 1920);
- Personal protective equipment program (8 CCR §§ 1514 - 1522); and
- Emergency action program and plan.

Additional programs under General Industry Safety Orders (8 CCR §§ 3200 to 6184), Electrical Safety Orders (8 CCR §§2299 to 2974) and Unfired Pressure Vessel Safety Orders (8 CCR §§ 450 to 544) will include:

- Electrical safety program;
- Motor vehicle and heavy equipment safety program;
- Forklift operation program;
- Excavation/trenching program;
- Fall protection program;
- Scaffolding/ladder safety program;
- Articulating boom platforms program;
- Crane and material handling program;
- Housekeeping and material handling and storage program;
- Respiratory protection program;
- Employee exposure monitoring program;
- Hand and portable power tool safety program;
- Hearing conservation program;
- Back injury prevention program;
- Hazard communication program;
- Heat and cold stress monitoring and control program;
- Pressure vessel and pipeline safety program;
- Hazardous waste program;
- Hot work safety program;
- Permit-required confined space entry program; and
- Demolition procedure (if applicable).

The AFC includes adequate outlines for each of the above programs (BSE2007a, section 5.16.4.4.1). Prior to the project's start of construction, detailed programs and plans will be provided pursuant to Condition of Certification **WORKER SAFETY-1**.

Operations and Maintenance Safety and Health Program

Prior to the start-up of ISEGS, an operations and maintenance safety and health program will be prepared. This program will include the following programs and plans:

- Injury and illness prevention program (8 CCR § 3203);
- Fire prevention program (8 CCR § 3221);
- Personal protective equipment program (8 CCR §§ 3401 to 3411); and
- Emergency action plan (8 CCR § 3220).

In addition, the requirements under General Industry Safety Orders (8 CCR §§ 3200 to 6184), Electrical Safety Orders (8 CCR §§2299 to 2974) and Unfired Pressure Vessel Safety Orders (8 CCR §§ 450 to 544) will apply to this project. Written safety programs for ISEGS, which the applicant will develop, will ensure compliance with those requirements.

The AFC includes adequate outlines for an injury and illness prevention program, an emergency action plan, a fire prevention program, and a personal protective equipment program (BSE2007a, section 5.16.4.4.2). Prior to operation of ISEGS, all detailed programs and plans will be provided pursuant to Condition of Certification **WORKER SAFETY-2**.

Safety and Health Program Elements

As mentioned above, the applicant provided the proposed outlines for both a Construction Safety and Health Program and an Operations Safety and Health Program. The measures in these plans are derived from applicable sections of state and federal law. The major items required in both Safety and Health Programs are as follows:

Injury and Illness Prevention Program (IIPP)

The IIPP will include the following components (BSE2007a, section 5.16.4.4):

- Identify persons with the authority and responsibility for implementing the program;
- Establish the safety and health policy of the plan;
- Define work rules and safe work practices for construction activities;
- Establish a system for ensuring that employees comply with safe and healthy work practices;
- Establish a system to facilitate employer-employee communication;
- Develop procedures for identifying and evaluating workplace hazards and establish necessary program(s);
- Establish methods for correcting unhealthy/unsafe conditions in a timely manner;
- Determine and establish training and instruction requirements and programs;
- Specify safety procedures; and
- Provide training and instruction.

Fire Prevention Plan

The California Code of Regulations requires an operations fire prevention plan (8 CCR § 3221). The AFC outlines a proposed fire prevention plan that is acceptable to staff (ISEGS007a, section 6.18.3.1). The plan will include the following:

- Determine general program requirements;
- Determine fire hazard inventory, including ignition sources and mitigation;
- Develop good housekeeping practices and proper materials storage;

- Establish employee alarms and/or communication system(s);
- Provide portable fire extinguishers at appropriate site locations;
- Locate fixed fire fighting equipment in suitable areas;
- Specify fire control requirements and procedures;
- Establish proper flammable and combustible liquid storage facilities;
- Identify the location and use of flammable and combustible liquids;
- Provide proper dispensing and determine disposal requirements for flammable liquids;
- Establish and determine training and instruction requirements and programs; and
- Identify contacts for information on plan contents.

Staff proposes that the applicant submit a final fire prevention plan to the California Energy Commission compliance project manager (CPM) for review and approval and to the SBCFD for review and comment to satisfy proposed conditions of certification **WORKER SAFETY-1** and **WORKER SAFETY-2**.

Personal Protective Equipment Program

California regulations require personal protective equipment (PPE) and first aid supplies whenever hazards in the environment, or from chemicals or mechanical irritants, could cause injury or impair bodily function through absorption, inhalation, or physical contact (8 CCR sections 3380 to 3400). The ISEGS operational environment will require PPE.

All safety equipment must meet National Institute of Safety and Health (NIOSH) or American National Standards Institute (ANSI) standards and will carry markings, numbers, or certificates of approval. Respirators must meet NIOSH and Cal/OSHA standards. Each employee must be provided with the following information about protective clothing and equipment:

- Proper use, maintenance, and storage;
- When protective clothing and equipment are used;
- Benefits and limitations; and
- When and how protective clothing and equipment are replaced.

The PPE program ensures that employers comply with applicable requirements for PPE and provides employees with the information and training necessary to protect them from potential hazards in the workplace, and will be required as per proposed Conditions of Certification **WORKER SAFETY-1 and -2**.

Emergency Action Plan

California regulations require an emergency action plan (8 CCR § 3220). The AFC contains a satisfactory outline for an emergency action plan (BSE2007a, section 5.16.4.4).

The outline lists the following features:

- Establishes emergency procedures for the protection of personnel, equipment, the environment, and materials;
- Identifies fire and emergency reporting procedures;
- Determines response actions for accidents involving personnel and/or property;
- Develops response and reporting requirements for bomb threats;
- Specifies site assembly and emergency evacuation route procedures;
- Defines natural disaster responses (for example, earthquakes, high winds, and flooding);
- Establishes reporting and notification procedures for emergencies (including on-site, off-site, local authorities, and/or state jurisdictions);
- Determines alarm and communication systems needed for specific operations;
- Includes a spill response, prevention, and countermeasure (SPCC) plan;
- Identifies emergency personnel (response team) responsibilities and notification roster;
- Specifies emergency response equipment and strategic locations; and
- Establishes and determines training and instruction requirements and programs.

An emergency action plan will be required as per proposed Conditions of Certification **WORKER SAFETY-1 and -2**

Written Safety Program

In addition to the specific plans listed above, additional LORS called “safe work practices” apply to the project. Both the construction and operations safety programs will address safe work practices in a variety of programs. The components of these programs include, but are not limited to, the programs found under the heading “Construction Safety and Health Program” in this staff assessment.

In addition, the project owner would be required to provide personnel protective equipment and exposure monitoring for workers involved in activities where contaminated soil and/or contaminated groundwater exist, per staff’s proposed Conditions of Certification **WORKER SAFETY-1** and **-2**.

These proposed conditions of certification ensure that workers are properly protected from any hazardous wastes presently at the site.

Safety Training Programs

Employees will be trained in the safe work practices described in the above-referenced safety programs.

Additional Safety Issues

This solar power plant will present a unique work environment that includes a solar field located in the high desert. The area under the solar arrays must be kept free from weeds and thus herbicides will be applied as necessary. Exposure to workers via inhalation and ingestion of dusts containing herbicides poses a health risk. Finally, workers will regularly inspect the solar array for broken or non-functioning mirrors by driving up and down dirt paths between the rows of mirrors and even under the mirrors. Cleaning and servicing the mirrors will also be conducted on a routine schedule. All these activities will take place year-round and especially during the summer months of peak solar power generation, when outside ambient temperatures routinely reach 115 °F and above.

The applicant has indicated that workers will be adequately trained and protected, but has not included precautions against exposure to herbicides. Therefore, to ensure that workers are indeed protected, staff has proposed additional requirements found in Condition of Certification **WORKER SAFETY-6**. This requirement consists of the following provisions:

- The development and implementation of Best Management Practices (BMP) for the storage and application of herbicides used to control weeds beneath and around the solar array.

A BMP requiring proper herbicide storage and application, as recommended in Condition of Certification **WORKER SAFETY-6,** will mitigate potential risks to workers from exposure to herbicides and reduce the chance that herbicides will contaminate either surface water or groundwater. Staff suggests that a BMP follow either the guidelines established by the U.S. EPA (EPA 1993), or more recent guidelines established by the State of California or U.S. EPA. Condition of Certification **BIO-13** also guides the application of herbicides in accordance with the Weed Management Plan.

Additional Mitigation Measures

Protecting construction workers from injury and disease is one of the greatest challenges today in occupational safety and health. The following facts are reported by NIOSH:

- More than seven million persons work in the construction industry, representing 6% of the labor force. Approximately 1.5 million of these workers are self-employed;
- Of approximately 600,000 construction companies, 90% employ fewer than 20 workers. Few have formal safety and health programs;
- From 1980-1993, an average of 1,079 construction workers were killed on the job each year, with more fatal injuries than any other industry;
- Falls caused 3,859 construction worker fatalities, or 25.6% of the total, between 1980 and 1993;
- 15% of workers' compensation costs are spent on construction-related injuries;

- Ensuring safety and health in construction is a complex task involving short-term work sites, changing hazards, and multiple operations and crews working in close proximity to one another;
- In 1990, Congress directed NIOSH to conduct research and training to reduce diseases and injury among construction workers in the United States. Under this mandate, NIOSH funds both intramural and extramural research projects.

The hazards associated with the construction industry are well documented. These hazards increase in complexity in the multi-employer worksites typical of large, complex industrial projects like gas-fired power plants. In order to reduce and/or eliminate these hazards, it has become standard industry practice to hire a construction safety supervisor to ensure a safe and healthful environment for all workers. This has been evident in the audits of power plants recently conducted by the staff. The Federal Occupational Safety and Health Administration (OSHA) has also entered into strategic alliances with several professional and trade organizations to promote and recognize safety professionals trained as construction safety supervisors, construction health and safety officers, and other professional designations. The goal of these partnerships is to encourage construction subcontractors to improve their safety and health performance; to assist them in striving to eliminate the four major construction hazards (falls, electrical, caught in/between, and struck-by hazards) that account for the majority of fatalities and injuries in this industry and have been the focus of targeted OSHA inspections; to prevent serious accidents in the construction industry through implementation of enhanced safety and health programs and increased employee training; and to recognize subcontractors that have exemplary safety and health programs.

There are no OSHA or Cal-OSHA requirements that an employer hire or provide for a construction safety officer. OSHA and Cal-OSHA regulations do, however, require that safety be provided by an employer and the term “Competent Person” appears in many OSHA and Cal-OSHA standards, documents, and directives. A “Competent Person” is defined by OSHA as an individual who, by way of training and/or experience, is knowledgeable of standards, is capable of identifying workplace hazards relating to the specific operations, is designated by the employer, and has authority to take appropriate action. Therefore, in order to meet the intent of the OSHA standard to provide for a safe workplace during power plant construction, staff proposes Condition of Certification **WORKER SAFETY-3,** which would require the applicant/project owner to designate and provide for a project site construction safety supervisor.

As discussed above, the hazards associated with the construction industry are well documented. These hazards increase in complexity in the multi-employer worksites typical of large, complex industrial projects like gas-fired power plants.

Accidents, fires, and a worker death have occurred at Energy Commission-certified power plants in the recent past because of both the failure to recognize and control safety hazards and the inability to adequately monitor compliance with occupational safety and health regulations. Safety problems have been documented by Energy

Commission staff in safety audits conducted in 2005, at several power plants under construction. The findings of the audit include, but are not limited to, safety oversights like:

- Lack of posted confined-space warning placards/signs;
- Confusing and/or inadequate electrical and machinery lockout/tagout permitting and procedures;
- Confusing and/or inappropriate procedures for handing over lockout/tagout and confined space permits from the construction team to the commissioning team, and then to operations;
- Dangerous placement of hydraulic elevated platforms under one another;
- Inappropriate placement of fire extinguishers near hotwork;
- Dangerous placement of numerous power cords in standing water on the site, increasing the risk of electrocution;
- Inappropriate and unsecure placement of above-ground natural gas pipelines inside the facility, but too close to the perimeter fence; and
- Lack of adequate employee or contractor written training programs that address the proper procedures to follow in the event of the discovery of suspicious packages or objects either onsite or offsite.

In order to reduce and/or eliminate these hazards, it is necessary for the Energy Commission to require a professional Safety Monitor on-site to track compliance with Cal-OSHA regulations and periodically audit safety compliance during construction, commissioning, and the hand-over to the operations staff. These requirements are outlined in Condition of Certification **WORKER SAFETY-4**. A Safety Monitor, hired by the project owner but reporting to the Chief Building Official (CBO), BLM's Authorized Officer and the Compliance Project Manager (CPM), will serve as an extra set of eyes to ensure that safety procedures and practices are fully implemented during construction at all power plants certified by the Energy Commission. During audits conducted by staff, most site safety professionals welcomed the audit team and actively engaged them in questions about the team's findings and recommendations. These safety professionals recognized that safety requires continuous vigilance and that the presence of an independent audit team provides a "fresh perspective" of the site.

Proposed Project - Fire Hazards

During construction and operation of the proposed ISEGS there is the potential for small fires, major structural fires and wild fires. Electrical sparks, combustion of fuel oil, natural gas, hydraulic fluid, mineral oil, insulating fluid at the project power plant switchyard or flammable liquids, explosions, and overheated equipment, may cause small fires. Major structural fires in areas without automatic fire detection and suppression systems are unlikely at power plants. Fires and explosions of natural gas or other flammable gasses or liquids are rare. Compliance with all LORS will be adequate to ensure protection from all fire hazards associated with the project. Wild fires that would use local vegetation as its fuel and could have potential effects on workers and project facilities are not expected to be caused by the project. If wild fires are external to

the ISEGS project boundaries, they would not be the responsibility of the project owner to suppress. The applicant has proposed a number of wild fire protective measures that would help reduce the potential for harm to plant personnel and damage to facilities as discussed below under Operations. However, the applicant plans to remove all vegetation in the vicinity of the solar power towers, power blocks, substation and administration areas, and to cut and maintain vegetation in the solar fields to about 12 – 18 inches high. The access road along the perimeter fence lines will also serve as a fire break.

Staff reviewed the information provided in the AFC and spoke to a representative of the SBCFD to determine if available fire protection services and equipment would adequately protect workers, and to further determine the project's impact on fire protection services in the area. The project will rely on both onsite fire protection systems and local fire protection services. The onsite fire protection system provides the first line of defense for small fires. In the event of a major fire, fire support services, including trained firefighters and equipment for a sustained response, would be provided by the SBCFD. Clark County (Nevada) Fire Department would be called upon if needed, and as available, through a Mutual Aid Agreement with SBCFD (BSE2007a, section 5.16.4.6) (Crawford 2008).

Construction

During construction, portable fire extinguishers will be located and maintained throughout the site; safety procedures and training will also be implemented (BSE2007a, section 5.16.4.4.1). Station #53 of the SBCFD in Baker, California, will provide fire protection backup for larger fires that cannot be extinguished using the project's portable suppression equipment (BSE2007a, section 5.16.4.6) .

Operation

The information in the AFC indicates that the project intends to meet the fire protection and suppression requirements of the California Fire Code, all applicable recommended NFPA standards (including Standard 850, which addresses fire protection at electric generating plants), and all Cal-OSHA requirements. Fire suppression elements in the proposed plant will include both fixed and portable fire extinguishing systems.

The fire protection system would be designed to protect personnel and limit property loss and plant downtime in the event of a fire. The primary source of fire protection water would be stored in the 250,000 gallon raw water storage tank to be located in each power block. Approximately 100,000 gallons would be usable for plant process needs and 150,000 gallons would be reserved for fire protection. An electric jockey pump and electric motor-driven main fire pump would be provided to increase the water pressure to the level required to serve all fire fighting systems. In addition, a backup diesel engine-driven fire pump would be provided to pressurize the fire loop if the power supply to the electric motor-driven main fire pump fails. All fire protection systems would be focused on the power blocks, administration/warehouse building, and other areas of active operations. The applicant has proposed a number of wild fire protective measures that would help reduce the potential for harm to plant personnel and damage to facilities. These include removal of all vegetation in the vicinity of the solar power

towers, power blocks, substation and administration areas, and cutting and maintaining vegetation in the solar fields to about 12 – 18 inches high. The access road along the perimeter fence lines would also serve as a fire break.

In addition to the fixed fire protection system, smoke detectors, flame detectors, high-temperature detectors, appropriate class of service portable extinguishers, and fire hydrants must be located throughout the facility at code-approved intervals. These systems are standard requirements of the fire code, NFPA and staff has determined that they will ensure adequate fire protection.

The applicant would be required by conditions of certification **WORKER SAFETY-1** and **-2** to provide a final fire protection and prevention program to both staff and the SBCFD prior to the construction and operation of the project in order to confirm the adequacy of proposed fire protection measures.

Emergency Medical Services Response

A statewide survey was conducted by staff to determine the frequency of incidents requiring emergency medical services (EMS) and off-site fire-fighters for natural gas-fired power plants in California. The purpose of this analysis was to determine what impact, if any, power plants might have on local emergency services. Staff concludes that incidents at power plants requiring fire or EMS responses are infrequent and represent an insignificant impact on local fire departments. However, staff has determined that the potential for both work-related and non-work related heart attacks exists at power plants. In fact, staff's research on the frequency of EMS response to gas-fired power plants shows that many of the responses for cardiac emergencies involved non-work related incidences, including visitors. The need for prompt response within a few minutes is well documented in the medical literature. Staff believes that the quickest medical intervention can only be achieved with the use of an on-site defibrillator often called an Automatic External Defibrillator or AED; the response from an off-site provider would take longer regardless of the provider location. This fact is also well documented and serves as the basis for many private and public locations including airports, factories, and government buildings, all of which maintain on-site cardiac defibrillation devices. Therefore, staff concludes that with the availability of modern cost-effective AED devices, it is proper in a power plant environment to maintain these devices on-site in order to treat cardiac arrythmias resulting from industrial accidents or other non-work related causes. Therefore, an additional condition of certification, **WORKER SAFETY-5**, is proposed so that a portable AED will be located on site, and workers trained in its use.

Facility Closure and Decommissioning

Upon final facility closure, no workers will remain at the site, except for those necessary to maintain security over any remaining hazardous materials until they are removed from the site. During decommissioning, worker safety would be ensured by the same CAL-OSHA and other regulations requiring safety plans and training for as were needed for construction and operations. A decommissioning Illness and Injury Prevention Plan would be included as part of the decommissioning plan.

Facility fire protection systems will remain functional while hazardous materials remain on site, and as long as feasible into the decommissioning process.

No Project/No Action Alternative

As Staff concludes that the proposed project would not have significant impacts on local fire protection services, it would not cause a significant impact on the public. Thus Staff concludes that the No Project/No Action alternative would not avoid or lessen a significant impact compared to the proposed project.

Staff concludes that if the applicant for the proposed ISEGS project provides project construction safety and health and project operations and maintenance safety and health programs, as required by proposed **WORKER SAFETY** conditions of certification, ISEGS would incorporate sufficient measures to ensure adequate levels of industrial safety and comply with applicable LORS. As worker safety is a LORS-conformity requirement , the No Project/No Action alternative consideration is not applicable to the worker safety topic.

CUMULATIVE IMPACTS AND MITIGATION

Staff reviewed the impacts on the fire and emergency service capabilities of the SBCFD attributable to the construction and operation of ISEGS in conjunction with other existing and foreseeable projects as listed in the **Cumulative Scenario** section. The limited fire risks and potential for hazardous materials incidents at the proposed facility do not pose significant added demands on local fire protection services. Staff concludes that the ISEGS would not contribute to a cumulatively considerable impact on existing local fire protection services.

NOTEWORTHY PUBLIC BENEFITS

Staff has not identified any noteworthy public benefits associated with the proposed project's potential use of fire and emergency service capabilities of the SBCFD.

PUBLIC AND AGENCY COMMENTS ON THE PSA

No comments were received.

CONCLUSIONS

Staff concludes that if the applicant for the proposed ISEGS project provides project construction safety and health and project operations and maintenance safety and health programs, as required by conditions of certification **WORKER SAFETY -1**, and **-2**; and fulfills the requirements of conditions of certification **WORKER SAFETY-3** through**-6**, ISEGS would incorporate sufficient measures to ensure adequate levels of industrial safety and comply with applicable LORS. Staff also concludes that the proposed project would not have impacts on local fire protection services that would be significant with respect to CEQA or NEPA.

MITIGATION MEASURES/PROPOSED CONDITIONS OF CERTIFICATION

WORKER SAFETY-1 The project owner shall submit to BLM's Authorized Officer and the Compliance Project Manager (CPM) a copy of the Project Construction Safety and Health Program containing the following:

- A Construction Personal Protective Equipment Program;
- A Construction Exposure Monitoring Program;
- A Construction Injury and Illness Prevention Program;
- A Construction Emergency Action Plan; and
- A Construction Fire Prevention Plan.

The Personal Protective Equipment Program, the Exposure Monitoring Program, and the Injury and Illness Prevention Program shall be submitted to BLM's Authorized Officer and the CPM for review and approval concerning compliance of the program with all applicable Safety Orders. The Construction Emergency Action Plan and the Fire Prevention Plan shall be submitted to the San Bernardino County Fire Department for review and comment prior to submittal to the BLM's Authorized Officer and CPM for approval.

Verification: At least thirty (30) days prior to the start of construction, the project owner shall submit to BLM's Authorized Officer and the CPM for review and approval a copy of the Project Construction Safety and Health Program. The project owner shall provide a copy of a letter to the BLM's Authorized Officer and CPM from the San Bernardino County Fire Department stating the Fire Department's comments on the Construction Fire Prevention Plan and Emergency Action Plan.

WORKER SAFETY-2 The project owner shall submit to BLM's Authorized Officer and the CPM a copy of the Project Operations and Maintenance Safety and Health Program containing the following:

- An Operation Injury and Illness Prevention Plan;
- An Emergency Action Plan;
- Hazardous Materials Management Program;
- Fire Prevention Program (8 CCR § 3221); and;
- Personal Protective Equipment Program (8 CCR §§ 3401-3411).

The Operation Injury and Illness Prevention Plan, Emergency Action Plan, and Personal Protective Equipment Program shall be submitted to BLM's Authorized Officer and the CPM for review and approval concerning compliance of the program with all applicable Safety Orders. The Operation Fire Prevention Plan and the Emergency Action Plan shall also be submitted to the San Bernardino County Fire Department for review and comment.

Verification: At least thirty (30) days prior to the start of first-fire or commissioning, the project owner shall submit to BLM's Authorized Officer and the CPM for approval a copy of the Project Operations and Maintenance Safety and Health Program. The project owner shall provide a copy of a letter to BLM's Authorized Officer and the CPM from the San Bernardino County Fire Department stating the Fire Department's comments on the Operations Fire Prevention Plan and Emergency Action Plan.

WORKER SAFETY-3 The project owner shall provide a site Construction Safety Supervisor (CSS) who, by way of training and/or experience, is knowledgeable of power plant construction activities and relevant laws, ordinances, regulations, and standards, is capable of identifying workplace hazards relating to the construction activities, and has authority to take appropriate action to assure compliance and mitigate hazards. The CSS shall:

- Have over-all authority for coordination and implementation of all occupational safety and health practices, policies, and programs;
- Assure that the safety program for the project complies with Cal/OSHA and federal regulations related to power plant projects;
- Assure that all construction and commissioning workers and supervisors receive adequate safety training;
- Complete accident and safety-related incident investigations, emergency response reports for injuries, and inform BLM's Authorized Officer and the CPM of safety-related incidents; and
- Assure that all the plans identified in **WORKER SAFETY-1 and -2** are implemented.

Verification: At least thirty (30) days prior to the start of site mobilization, the project owner shall submit to BLM's authorized officer and the CPM the name and contact information for the Construction Safety Supervisor (CSS). The contact information of any replacement (CSS) shall be submitted to BLM's Authorized Officer and the CPM within one business day.

The CSS shall submit in the Monthly Compliance Report a monthly safety inspection report to include:

- Record of all employees trained for that month (all records shall be kept on site for the duration of the project);
- Summary report of safety management actions and safety-related incidents that occurred during the month;
- Report of any continuing or unresolved situations and incidents that may pose danger to life or health; and
- Report of accidents and injuries that occurred during the month.

WORKER SAFETY-4 The project owner shall make payments to the Chief Building Official (CBO) for the services of a Safety Monitor based upon a reasonable fee schedule to be negotiated between the project owner and the CBO.

Those services shall be in addition to other work performed by the CBO. The Safety Monitor shall be selected by and report directly to the CBO, and will be responsible for verifying that the Construction Safety Supervisor, as required in **WORKER SAFETY-3**, implements all appropriate Cal/OSHA and Commission safety requirements. The Safety Monitor shall conduct on-site (including linear facilities) safety inspections at intervals necessary to fulfill those responsibilities.

Verification: At least thirty (30) days prior to the start of construction, the project owner shall provide proof of its agreement to fund the Safety Monitor services to BLM's Authorized Officer and the CPM for review and approval.

WORKER SAFETY-5 The project owner shall ensure that a portable automatic external defibrillator (AED) is located on site during construction and operations and shall implement a program to ensure that workers are properly trained in its use and that the equipment is properly maintained and functioning at all times. During construction and commissioning, the following persons shall be trained in its use and shall be on-site whenever the workers that they supervise are on-site: the Construction Project Manager or delegate, the Construction Safety Supervisor or delegate, and all shift foremen. During operations, all power plant employees shall be trained in its use. The training program shall be submitted to BLM's Authorized Officer and the CPM for review and approval.

Verification: At least thirty (30) days prior to the start of site mobilization the project owner shall submit to BLM's Authorized Officer and the CPM proof that a portable AED exists on site and a copy of the training and maintenance program for review and approval.

WORKER SAFETY-6 The project owner shall prepare and implement a Best Management Practices (BMPs) for the storage and application of herbicides used to control weeds beneath and around the solar array. These plans shall be submitted to BLM's Authorized Officer and the CPM for review and approval.

Verification: At least thirty (30) days prior to the start of site mobilization, the project owner shall submit to BLM's Authorized Officer and the CPM for review and approval a copy of the Best Management Practices (BMPs) for the storage and application of herbicides.

REFERENCES

BSE2007a – Bright Source Energy/ Solar Partners I, LLC/ J. Woolard (tn: 42174). Application for Certification, Volumes I and II, for the Ivanpah Solar Electric Generating System. Submitted to CEC/Docket Unit on 8/31/2007.

Crawford, Douglas 2008. Telephone communication with Fire Prevention Planning and Engineering Supervisor, North and South Desert Divisions, San Bernardino County Fire Department, September 24th.

California Fire Code 2007 Title 24 Part 9. Published by the International Code Council, Whittier, CA 90601-2256

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USOSHA (United States Occupational Safety and Health Administration). 1993. *Process Safety Management / Process Safety Management Guidelines For Compliance*. U.S. Department of Labor, Washington, DC.

GEOLOGY, PALEONTOLOGY AND MINERALS

Prepared by Patrick A. Pilling, Ph.D., P.E., G.E., D.GE.

SUMMARY OF CONCLUSIONS

The proposed Ivanpah Solar Electric Generating System (ISEGS) is located in a moderately active geologic area on the west side of Ivanpah Valley, east of the Clark Mountain Range in the eastern Mojave Desert of Southern California. The main geologic hazards at this site include ground shaking; liquefaction; settlement due to compressible soils, subsidence associated with shrinkage of clay soils, hydrocompaction, or dynamic compaction; and the presence of expansive clay soils. These potential hazards can be effectively mitigated through facility design by incorporating recommendations contained in a design-level geotechnical report as required by the California Building Code (2007) and Condition of Certification **GEO-1.** Conditions of Certification **GEN-1, GEN-5,** and **CIVIL-1** in the **Facility Design** section, should also mitigate these impacts to a less than significant level.

The proposed project is currently not used for mineral production, nor is it under claim, lease, or permit for the production of locatable, leasable, or salable minerals. Sand and gravel resources are present at the site and could potentially be a source of salable resources; however, such materials are present throughout the regional area such that the ISEGS should not have a significant NEPA or CEQA impact on the availability of such resources.

Paleontological resources have been documented within 45 miles of the project, but no significant fossils were found during field explorations on the solar plant sites or near the sub-station and ancillary facilities; however, pack rat middens with plant remains were found in the carbonate bedrock outcrop west of Ivanpah 3. If encountered, potential impacts to paleontological resources contained in these materials due to construction activities will be mitigated through worker training and monitoring by qualified paleontologists, as required by Conditions of Certification **PAL-1** through **PAL-7**.

BLM and Energy Commission staff (hereafter jointly referred to as staff) believe that the potential for significant adverse cumulative impacts to the project from geologic hazards during its design life and to potential geologic, mineralogical, and paleontological resources from the construction, operation, and closure of the proposed project, is not significant with respect to CEQA or NEPA. It is staff's opinion that the ISEGS can be designed and constructed in accordance with all applicable laws, ordinances, regulations, and standards (LORS), and in a manner that both protects environmental quality and assures public safety, to the extent practical. Conditions of Certification referred to herein serve the purpose of both the Energy Commission's Conditions of Certification for purposes of the California Environmental Quality Act (CEQA) and BLM's Mitigation Measures for purposes of the National Environmental Policy Act (NEPA).

INTRODUCTION

This Final Staff Assessment/Draft Environmental Impact Statement (FSA/DEIS) discusses the potential impacts of geologic hazards on the proposed ISEGS as well as

geologic, mineralogical, and paleontological resources. Staff's objective is to ensure that there will be no consequential adverse impacts to geological, mineralogical, and paleontological resources during the project construction, operation, and closure and that operation of the plant will not expose occupants to high-probability geologic hazards. Brief geological, mineralogical, and paleontological overviews are provided. The section concludes with staff's proposed monitoring and mitigation measures for geologic hazards and geologic, mineralogical, and paleontological resources, with the proposed conditions of certification.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

Applicable LORS are listed in the application for certification (AFC) (CH2M Hill, 2007). The following briefly describes the current LORS for both geologic hazards and resources and mineralogical and paleontological resources.

Geology, Paleontology and Minerals Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
Federal Land Policy and Management Act (FLPMA) of 1976	Provides for the immediate and future protection and administration of public lands in the California desert within the framework of a program of multiple use and sustained yield, and the maintenance of environmental quality. This Statute requires the Secretary of the Interior to retain and maintain public lands in a manner that will protect the quality of Scientific, scenic, historical, ecological, environmental, air and atmospheric, water resources and archeological values.
General Mining Law of 1872	Declared all valuable mineral deposits in lands belonging to the United States to be free and open to exploration and purchase. This law remains the method for disposal of minerals in Federal lands that are not specifically provided for in later mineral leasing and sales laws.
Materials Act of July 31, 1947	Authorizes the sale of certain materials, including sand, stone, gravel, and common clay from public lands, if not otherwise expressly authorized or prohibited by law.
Surface Resources Act of 1955	Defined common varieties of sand, stone, gravel, and other materials and authorized the Government to manage and dispose of any land and surface resources that are not incident to mining on unpatented mining claims.
Mining Claims Rights Restoration Act of August 11, 1955	Permits the mining, development, and utilization of mineral resources on all public lands withdrawn or reserved for power development.
Classification and Multiple Use Act of 1964	Authorized the Secretary of the Interior to classify and Manage Bureau of Land Management land for retention or disposal, and for multiple use, including specification of dominate uses and preclusion of inconsistent uses in an area.

Applicable Law	Description
Mining and Mineral Policy Act of 1970	Declared that the Federal Government policy is to encourage private enterprise in the development of a sound and stable domestic mineral industry, domestic mineral deposits, minerals research, and methods for reclamation in the minerals industry.
California Desert Conservation Area (CDCA) Plan	Defines multiple-use classes for BLM-managed lands in the CDCA, which includes the land area encompassing the proposed project location.
Northern and Eastern Mojave Desert Management Plan (NEMO) Amendment	The purpose of this amendment to the CDCA Plan was to evaluate land use changes necessary to protect threatened and endangered species.
Antiquities Act of 1906 (16 United States Code [USC], 431-433	The proposed ISEGS is located entirely on federal (Bureau of Land Management) land. Although there is no specific mention of natural or paleontological resources in the Act itself, or in the Act's uniform rules and regulations (Title 43 Part 3, Code of Federal Regulations [43 CFR Part 3], 'objects of antiquity' has been interpreted to include fossils by the National Park Service (NPS), the Bureau of Land Management (BLM), the Forest Service (USFS), and other Federal agencies. All design will also need to adhere to any applicable BLM design standards.
Omnibus Bill (HR 554) and Paleontological Resources Preservation Act, of March 30, 2009	Provides for the protection and preservation of Paleontological Resources.
Title 43 Code of Federal Regulations	Regulate the management of Public Lands.
State	
California Building Code (2007)	The CBC (2007) includes a series of standards that are used in project investigation, design, and construction (including grading and erosion control). The CBC has adopted provisions in the International Building Code (IBC).
Alquist-Priolo Earthquake Fault Zoning Act, Public Resources Code (PRC), Section 2621–2630	Mitigates against surface fault rupture of known active faults beneath occupied structures. Requires disclosure to potential buyers of existing real estate and a 50-foot setback for new occupied buildings. The site is not located within a designated Alquist-Priolo Fault Zone.
The Seismic Hazards Mapping Act, PRC Section 2690–2699	Areas are identified that are subject to the effects of strong ground shaking, such as liquefaction, landslides, tsunamis, and seiches.

Applicable Law	Description
PRC, Chapter 1.7, Sections 5097.5, 5097.9 and 30244	Regulates removal of paleontological resources from state lands, defines unauthorized removal of fossil resources as a misdemeanor, and requires mitigation of disturbed sites.
Warren-Alquist Act, PRC, Sections 25527 and 25550.5(i)	The Warren-Alquist Act requires the Energy Commission to "give the greatest consideration to the need for protecting areas of critical environmental concern, including, but not limited to, unique and irreplaceable scientific, scenic, and educational wildlife habitats; unique historical, archaeological, and cultural sites…" With respect to paleontological resources, the Energy Commission relies on guidelines from the Society for Vertebrate Paleontology (SVP), indicated below.
California Environmental Quality Act (CEQA), PRC Sections 15000 et seq., Appendix G	Mandates that public and private entities identify the potential impacts on the environment during proposed activities. Appendix G outlines the requirements for compliance with CEQA and provides a definition of significant impacts on a fossil site.
Society for Vertebrate Paleontology (SVP), 1995	The "Measures for Assessment and Mitigation of Adverse Impacts to Non-Renewable Paleontological Resources: Standard Procedures" is a set of procedures and standards for assessing and mitigating impacts to vertebrate paleontological resources. The measures were adopted in October 1995 by the SVP, a national organization of professional scientists.
California Surface Mining and Reclamation Act (SMARA)	Requires local governments with California to regulate mining operations, and to develop planning policies that balance mineral production with maintenance of environmental quality.
Local	
San Bernardino County General Plan	Mandates compliance with a number of development standards, including safety requirements. The county also incorporates standards and provisions established by the CBC (2007).
San Bernardino County 2007 Development Code, Chapter 82.20	Defines criteria for site evaluation for paleontological and cultural resources in the county, including preliminary field surveys, monitoring during construction, and specimen recovery; also defines qualifications for professional paleontologists.
California Surface Mining and Reclamation Act (SMARA)	San Bernardino County is the lead agency for SMARA within the County, and issues permits and regulates salable mineral operations.

PROJECT DESCRIPTION

The proposed ISEGS will be constructed in three phases on a total of approximately 4,072.5 acres (6.4 square miles) located approximately 4.5 miles southwest of the California/Nevada border and Primm, Nevada, and 1 to 3.5 miles west of Interstate Highway 15 in San Bernardino County, California. The proposed project is located

entirely on federal land administered by the Bureau of Land Management (BLM), and is roughly 1.6 miles west of Ivanpah Lake, a predominantly dry playa lakebed. The power plants will be capable of generating a total 400 megawatts (MW) of electricity from the three separate electrical generating sites. Ivanpah 1, 2 and 3 will occupy the southern, central and northern portions of the overall site, respectively. Ivanpah 1 and 2 will consist of one heliostat (mirror) array that will focus sunlight onto one solar power tower receiver, and Ivanpah 3 will consist of five heliostat arrays focusing sunlight onto one solar power tower in the center of each of the five arrays. Steam produced by solar boilers will be fed to a single Rankine-cycle reheat steam turbine adjacent to each power tower. A natural gas-fired boiler will used for start-up and during periods of temporary cloud cover, but use will not exceed 4 hours on any given day.

A new 115/220-kilovolt (kV) substation will be constructed between Ivanpah 1 and 2 by Southern California Edison (SCE) adjacent to existing transmission lines. New 115 kV transmission lines will connect each power plant to the SCE grid at the new Ivanpah Substation. Auxiliary components include air-cooled condensers, water storage tanks, deaerators, back-up generators, and switchyards. Ancillary facilities include two water wells, a water treatment system, a septic system for disposal of sanitary wastewater, and an administration/maintenance/control building. A total of approximately 6 miles of 4- to 6-inch diameter natural-gas pipeline, most of which will be installed within the project boundaries, will connect to an existing Kern River Gas Transmission line located approximately 0.5 mile north of Phase 3. A total of approximately 8 miles of optic cable line will be installed both overhead on the existing Nipton 33-kV or 12-kV distribution line poles and through new underground conduits in two segments: between the Ivanpah substation and the Mountain Pass substation and from Mountain Pass substation to a designated local telecommunication carrier interface point approximately 1.5 miles away.

REGIONAL GEOLOGICAL SETTING

The ISEGS site is located at the east end of the Mojave Desert in Southern California. The region is part of the Mojave Desert geomorphic province (Norris and Webb, 1990), and the solar plant site is in the northeast corner near the boundary with the Basin and Range geomorphic province. Mountain ranges in the Mojave Desert are composed of complexly faulted and folded crystalline, metamorphic, volcanic, and carbonate basement rocks that range in age from pre-Cambrian to Mesozoic. Volcanic and sedimentary rocks deposited in the Cenozoic are common as well.

Younger faulting in the eastern half of the Mojave Desert geomorphic province is characterized by generally north- to northwest-trending normal faults associated with regional extension in the Great Basin. Detachment faults, which are large-scale normal listric faults that flatten at depth, are common in the eastern Mojave Desert of California and Southern Nevada. Thick, nearly flat-lying breccia zones that juxtapose rocks on a regional scale have been identified as the deep portions of these detachment faults, and attest to the depth of erosion in the region. Localized right-lateral strike-slip movement associated with the normal faulting is common in the eastern Mojave Desert. Extensional tectonics is predominant in the Great Basin geomorphic province to the north, although some northwest-striking right-lateral strike-slip faulting, which may or may not be associated with normal faulting, is present. Rapid subsidence has occurred

in pull-apart basins, such as the Death Valley depression, in response to strike-slip faulting (Norris and Webb, 1990; Wright and others, 1999). Strike-slip tectonics may also be partially responsible for the development of Shadow Valley, located southwest of the Clark Mountain Range, during the Miocene (Prave and McMackin, 1999).

Geology in the Clark Mountain Range, located west of the ISEGS site, is characteristic of both the Mojave Desert and Great Basin geomorphic provinces. A major thrust fault, the Keystone Thrust, which was active in the late Jurassic to early Cretaceous, has juxtaposed Paleozoic marine carbonate sediments over rocks typical of a continental setting (USGS 2006). The carbonates were deposited in a miogeoclinal environment, which, along with the Mesozoic age (Cordilleran orogeny) thrust fault relationship, is characteristic of the Basin and Range geomorphic province (USGS 2006; Norris and Webb, 1990). The southernmost occurrence of these miogeoclinal basin fill sediments that is in thrust fault contact over continental rocks occurs in the Clark Mountain Range. Mesozoic granitic, metamorphic, volcanic and sedimentary rocks in the Mojave Desert to the southwest are more typical of a magmatic arc tectonic setting.

The Clark Mountain Range, which reaches an elevation of 7,930 feet, is bounded on the west side by the Halloran Hills Detachment Fault (Fowler and Calzia, 1999). The core of the range has remained unaffected by regional extension. The Kingston Range to the west and the McCullogh Mountains to the east, however, have been affected by extension and detachment faulting that has been dated as Miocene age between 16.5 and 11.0 million years (Ma) (USGS 2006). The Clark Mountain Range appears to be a high-standing, partially detachment fault-bounded, undeformed zone that remained after major east- and west-directed detachment faulting occurred. The adjacent Ivanpah Valley, with a lakebed elevation of 2,602 feet could be primarily a product of the same relatively recent regional extension and normal listric faulting. Speculation that Shadow Valley, located on the opposite side of the Clark Mountain Range from Ivanpah Valley, is a Miocene basin that developed in partial response to strike-slip faulting (Prave and McMackin, 1999) complicates the picture. The Pahrump Valley Fault Zone and the Stateline Fault, which are interpreted to have a strike-slip sense of motion, border the east side of Ivanpah Valley. Strike-slip faulting, therefore, could be partly responsible for the formation of Ivanpah Valley, although extensional tectonics remains the primary factor.

The Cima Volcanic Field is located southwest of the ISEGS site beyond the Clark Mountain Range. The nearest cinder cone is approximately 15.5 miles away. Basaltic eruptions within the volcanic field have occurred about 330 to 480 years before present (CDMG 1994).

GEOLOGICAL DESCRIPTION OF THE PROJECT SITE

The power plant site is located on a broad alluvial bajada deposited on the eastern flank of the Clark Mountain Range. The site is situated on the west side of Ivanpah Valley, which extends northward into Las Vegas Valley. Clasts of alluvial and fluvial origin are predominantly composed of pre-Cambrian to Mesozoic granitic, metamorphic and carbonate rocks derived from sources located roughly 1 to 2.5 miles to the west and north (CDMG 1961; CDMG 1967; USGS 2006). The Quaternary sediments overlie rocks of similar age and composition to the source rocks in the Clark Mountain Range.

Outcrops of carbonate and metamorphic rocks to the west of Ivanpah 3 and northeast of Ivanpah 2, respectively, indicate that alluvial fan thickness is relatively thin in the area. However, boreholes in Ivanpah 2, which were advanced to depths up to 80 feet, did not encounter bedrock (Terracon 2007). Subsurface information is not available in the immediate vicinity of Ivanpah 1 and 3.

The Quaternary alluvium mapped across all power plants of the proposed solar plant can be grouped into two major categories based on composition of the sand and gravel clasts. Sediments composed of fine sand to boulders derived from multiple sources, including granitic, metamorphic and carbonate rocks, are present at the surface in the northern half of Ivanpah 1 and the northwest half of Ivanpah 3 (USGS 2006). All other areas are mapped as alluvium that contains coarse sand to fine gravel of predominantly granitic composition (grus). Young alluvium of both types is late Pleistocene to Holocene in age and characterized by poorly cemented and consolidated sediments with poorly developed soil horizons and desert pavement. Older young alluvium (latest Pleistocene to early Holocene) is slightly more weathered than young alluvium and contains localized weak soil and desert varnish development. Intermediate alluvial fan deposits occur only in the northwest corner of Ivanpah 3, and are middle to late Pleistocene in age. The sediments are composed of silt, sand, gravel, cobbles and boulders, and are moderately to strongly weathered with a dark brown surface clayey horizon. Desert pavement is moderately to well developed, and desert varnish is moderate to strong (USGS 2006).

Two exploratory borings were drilled within the limits of Ivanpah 2 to depths of 80 feet (Terracon 2007). Medium dense to very dense granular soils, including silty sand with gravel and silty gravel with sand, were the predominant materials encountered. Clayey sand occurred only locally, in boring B-1 (7 to 15 feet) and boring B-2 (3 to 4 feet). All soils are typical alluvial fan sediments. No fine-grained or clay soils typical of deposition in a lacustrine environment were observed. The lowest blowcount recorded was 21 blows/foot, and all but four blowcounts were above 30 blows/foot, indicative of generally dense granular soils. Sieve analyses yielded 8.4 to 16.4 percent non-plastic fines and 3.8 to 20.3 percent gravel in silty sands. Groundwater was not encountered in either boring.

Two small bedrock hills are located adjacent to Ivanpah 2 and 3. All literature sources agree that the small ridge of carbonate rocks to the west of Ivanpah 3 is Paleozoic in age, and the hills composed of metamorphic rocks to the northeast of Ivanpah 2 are early pre-Cambrian to Cambrian in age (CDMG 1961; CDMG 1967; CH2M Hill, 2007). Jennings (CDMG 1961) maps the carbonate rocks as undivided marine limestone and dolomite of either the Riggs Formation, which occurs only in the Silurian Hills to the northwest beyond the Clark Mountain Range, or the early Cambrian to Devonian Goodsprings Dolomite. Exposures of the Goodsprings Dolomite, which is described as a dark gray, fine-grained, thick-bedded and locally mottled dolomite (CDMG 1961; CDMG 1967), are abundant in the Clark Mountain Range several miles north of the project site (CDMG 1967). The unit generally lacks fossils, except for echinoderm plates. The Geologic Hazards section of the AFC (CH2M Hill, 2007) also refers to the carbonate bedrock adjacent to Ivanpah 3 as Goodsprings Dolomite. However, the Paleontological Resources section interprets the rocks to be part of the Bonanza King Formation, which is similarly fine-grained, thick-bedded and devoid of fossils, based on

field examination of the outcrops (CH2M Hill, 2007). The Cambrian Bonanza King Formation does occupy the same relative stratigraphic position as the Goodsprings Dolomite (CDMG 1967; Miller and Walker, 2002).

McCleod (2007) speculates that the carbonate bedrock belongs to the Mississippian age Monte Cristo Limestone or Pennsylvanian age Bird Spring Formation. Both units are mapped in the Clark Mountain Range to the north (CDMG 1961; CDMG 1967). The basal portions of the Bird Spring Formation and certain members of the Monte Cristo Limestone contain abundant marine fossils. The lack of fossils in the outcrop near the project site makes positive determination of the age and formation of the rocks difficult.

The east half of the Clark Mountain Range is mapped as much older pegmatite dikes and gneisses of granitic composition that could be Archean in age (CDMG 1961; CDMG 1967). The hills northeast of Ivanpah 2 are composed of gray quartzites and other metamorphic rocks that are undifferentiated in most literature sources. The rocks are tentatively assigned to the lower Cambrian Zabriskie Quartzite in the Paleontological Resources section of the AFC (CH2M Hill, 2007) based on field observations. Although the unit is not mapped in the Clark Mountain Range in the vicinity of the project, the Tapeats Sandstone is a red quartzite of Cambrian age mapped north of the nearby Mesquite Pass (CDMG 1967). The Tapeats Sandstone occupies the same stratigraphic position as the Zabriskie Quartzite (CDMG 1967; Miller and Walker, 2002).

REGIONAL TECTONTIC SETTING

Several active and potentially active faults related to regional strike-slip faulting to the west and north, as well as to extensional tectonics in the Great Basin and eastern Mojave Desert, are present within 100 miles of the ISEGS project area. EQFAULT™ Version 3.00, a computer program for the deterministic estimation of peak site acceleration using three-dimensional articulated planar elements (faults), was used to model seismogenic sources (Blake, 2006a). The site latitude and longitude inputs were 35.5588 degrees and -115.4672 degrees, respectively, which is centrally located in Ivanpah 2. The search radius was 100 miles. The attenuation relationship used was that recommended by Boore, et al. (1997) for Site Class D. The various faults are listed in **Geology, Paleontology and Minerals Table 2**, along with the distance from the project site and maximum earthquake magnitude. The peak acceleration and estimated intensity the site would experience during a maximum magnitude earthquake on each fault is also given. The fault locations can be found on the Fault Activity Map of California (CDMG 1994).

Geology, Paleontology and Minerals Table 2
Active Faults in the Project Area

Fault Name, Zone or System	Approximate Distance (mi [km])	Estimated Maximum Earthquake Event		
		Maximum Earthquake Magnitude (Mw)	Peak Site Surface Acceleration (g)	Estimated Site Intensity (Modified Mercali Scale)
Death Valley (South)	51.3 (82.5)	7.1	0.080	VII
Garlock (East)	51.3 (82.6)	7.5	0.098	VII
Owl Lake	67.0 (107.9)	6.5	0.047	VI
Pisgah-Bullion Mountain – Mesquite Lake	76.8 (123.6)	7.3	0.065	VI
Death Valley (Graben)	79.6 (128.1)	7.1	0.069	VI
Fault Name, Zone or System	**Approximate Distance (mi [km])**	**Estimated Maximum Earthquake Event**		
		Maximum Earthquake Magnitude (Mw)	**Peak Site Surface Acceleration (g)**	**Estimated Site Intensity (Modified Mercali Scale)**
Panamint Valley	80.9 (130.2)	7.4	0.065	VI
Calico – Hidalgo	84.1 (135.4)	7.3	0.060	VI
Landers	92.3 (148.6)	7.3	0.056	VI
Emerson South – Copper Mountain	93.3 (150.1)	7.0	0.047	VI
Gravel Hills – Harper Lake	94.4 (151.9)	7.1	0.050	VI
Blackwater	94.6 (152.3)	7.1	0.049	VI
Johnson Valley (Northern)	97.9 (157.6)	6.7	0.039	V
Tank Canyon	98.7 (158.9)	6.4	0.040	V
Lenwood-Lockhart-Old Woman Springs	99.2 (159.6)	7.5	0.059	VI

Geology, Paleontology and Minerals Table 2 presents only the active faults with Holocene age (less than 10,000 years) activity. One northwest-striking fault, the Stateline Fault, has had movement in the early to middle Pleistocene (700,000 to 1,600,000 years) (CDMG 1994). The fault is located approximately 4.5 miles to the northeast, and closely follows the California-Nevada border. The Stateline Fault is the southern segment of the Pahrump Valley Fault Zone, which has been interpreted to be a right-lateral strike-slip structure with some vertical movement (USGS 2006). The fault borders the east side of Ivanpah Valley, and crosses the valley north of the solar plant site. No other fault with Pleistocene activity is present within 35 miles of the proposed solar plant. Numerous older bedrock faults are mapped in all mountain ranges, including the Clark Mountain Range, in the eastern Mojave Desert, but are not considered to be active. The Ivanpah Fault, which is shown by the CDMG (1961 and 1994) to be concealed beneath Quaternary sediments of Ivanpah Valley, is located roughly 4,500 to 5,500 feet southwest of the site. The fault separates predominantly pre-cambrian granitic and metaporphic rocks in the western portion of the Clark Mountain Range from Paleozoic carbonates in the eastern half (CDMG 1961; CDMG 1967). Several bedrock faults have also mapped on the small metamorphic rock outcrop just northeast of Ivanpah 2 (CDMG 1961).

As discussed in Section 14 Soil and Water, groundwater depth on the ISEGS site is not precisely known. The only local information available indicates that groundwater does

not occur within 80 feet of the existing ground surface at two boring sites within the limits of Ivanpah 2 (Terracon 2007). It is recommended that the areas of the project that lack subsurface information be investigated to establish depths to groundwater and bedrock, as well as other geologic conditions, per CBC (2007) requirements and proposed Condition of Certification **GEO-1**. Data from wells within Ivanpah Valley, which was obtained from the California Department of Water Resources (CDWR 2004), show high historic groundwater levels at 367, 90, 24 and 85 feet in the south central, central, western margin and north central parts of the basin, respectively. Levels have fluctuated between 6 and 8.5 feet since about 1916-1917.

Local subsidence in the form of sinkholes has been observed at the site and along the northern edge of Ivanpah Dry Lake. While its potential cause can sometimes be attributed to groundwater withdrawal as well as other causes, in this case, the cause is believed to be from dehydration of clays between the soil surface and the water table that can result in a major loss of volume, and thus the collapse of overlying soils (Broadbent 2009). The potential for such shrinkage to affect structural components will need to be mitigated through facility design.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

This section considers two types of impacts. The first is geologic hazards, which could impact the proper functioning of the proposed facility and create life/safety concerns. The second is the potential impacts the proposed facility could have on existing geologic, mineralogical, and paleontological resources in the area.

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

Federal agencies are required to review major federal actions such as the ISEGS project under the National Environmental Policy Act (NEPA). This document has been prepared in consultation and coordination with the Bureau of Land Management (BLM) to also address federal environmental issues. The BLM and CEC have conducted a joint environmental review of the project in a single NEPA/California Environmental Quality Act (CEQA) process. The Federal Land Policy and Management Act of 1976 (FLPMA) establishes the agency's multiple-use mandate to serve present and future generations.

The California Environmental Quality Act (CEQA) guidelines, Appendix G, provide a checklist of questions that lead agencies typically address.

- Section (V) (c) includes guidelines that determine if a project will either directly or indirectly destroy a unique paleontological resource or site, or a unique geological feature.
- Sections (VI) (a), (b), (c), (d), and (e) focus on whether or not the project would expose persons or structures to geologic hazards.
- Sections (X) (a) and (b) concern the project's effects on mineral resources.

The California Building Standards Code (CBSC) and CBC (2007) provide geotechnical and geological investigation and design guidelines, which engineers must follow when designing a facility. As a result, the criteria used to assess the significance of a geologic

hazard include evaluating each hazard's potential impact on the design and construction of the proposed facility. Geologic hazards include faulting and seismicity, liquefaction, dynamic compaction, hydrocompaction, subsidence, expansive soils, landslides, tsunamis, and seiches.

Staff has reviewed geologic and mineral resource maps for the surrounding area, as well as site-specific information provided by the applicant, to determine if geologic and mineral resources exist in the area. Staff also reviewed the operating procedures of the proposed facility, in particular groundwater extraction and mass grading, to determine if those operations could adversely affect geologic and mineralogical resources.

To evaluate whether the proposed project and alternatives would generate a potentially significant impact as defined by CEQA on mineral resources, the staff evaluated them against checklist questions posed in the 2006 CEQA Guidelines, Appendix G, Environmental Checklist established for Mineral Resources. These questions are:

A. Would the project result in the loss of availability of a known mineral resource that would be of value to the region and residents of the state?

B. Would the project result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?

Under NEPA, the impact of the proposed project and alternatives on mineral resources would be considered significant if they would directly or indirectly interfere with active mining claims or operations, or would result in reducing or eliminating the availability of important mineral resources. The staff's evaluation of the significance of the impact of the proposed project on mineral resources includes an assessment of the context and intensity of the impacts, as defined in the NEPA implementing regulations 40 CFR Part 1508.27.

The Antiquities Act of 1906 (16 United States Code [USC]) requires that objects of antiquity be taken into consideration for federal projects and the California Environmental Quality Act, Appendix G, also requires the consideration of paleontological resources. The Paleontological Resources Preservation Act of 2009 requires the Secretaries of the United States Department of the Interior and Agriculture to manage and protect paleontological resources on Federal land using scientific principles and expertise. The potential for discovery of paleontological resources or the impact of surface disturbing activities to such resources is assessed using the Potential Fossil Yield Classification (PYFC) system. This system includes three conditions (Condition 1 [areas known to contain vertebrate fossils]; Condition 2 [areas with exposures of geological units or settings that have high potential to contain vertebrate fossils]; and Condition 3 [areas that are very unlikely to produce vertebrate fossils]). The PYFC class ranges from Class 5 (very high) for Condition 1 to Class 1 (very low) for Condition 3.

The proposed conditions of certification allow BLM's Authorized Officer, the Energy Commission's compliance project manager (CPM) and the applicant to adopt a

compliance monitoring scheme ensuring compliance with LORS applicable to geologic hazards and the protection of geologic, mineralogical, and paleontological resources.

Based on the information below, it is staff's opinion that the potential for significant adverse impacts to the project from geologic hazards, and to potential geologic, mineralogical, and paleontological resources from the proposed project, is low.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Proposed Project – Geologic Hazards

The main geologic hazards at this site include ground shaking; liquefaction; settlement due to compressible soils, subsidence associated with shrinkage of clay soils, hydrocompaction, or dynamic compaction; and the possible presence of expansive clay soils. The potential hazards can be effectively mitigated through facility design as required by the California Building Code (2007) and proposed Condition of Certification **GEO-1**. Proposed Conditions of Certification **GEN-1, GEN-5, and CIVIL-1** in the **Facility Design** section are also intended to mitigate these impacts to a less than significant level.

The AFC (CH2M Hill, 2007) provides documentation of potential geologic hazards at the ISEGS plant site, although no site-specific subsurface information was available for Ivanpah 1 and 3 at the time the AFC was submitted. Review of the AFC, coupled with staff's independent research, indicates that the possibility of geologic hazards affecting the operation of the plant site during its practical design life is low. However, geologic hazards, such as strong ground shaking during seismic events; liquefaction; settlement due to compressible soils, subsidence associated with shrinkage of clay soils, hydrocompaction, or dynamic compaction; and expansive clay soils must be addressed in a project geotechnical report per CBC (2007) requirements and proposed Condition of Certification **GEO-1**.

Staff's independent research included the review of available geologic maps, reports, and related data of the ISEGS plant site. Geological information was available from the California Geological Survey (CGS), (CDMG), and other governmental organizations.

Faulting and Seismicity

Staff reviewed the CDMG publication *Fault Activity Map of California and Adjacent Areas with Locations and Ages of Recent Volcanic Eruptions* (1994) and Alquist-Priolo Special Studies Zone mapping and reports (CDMG 2003; CGS 2002; and Hart and Bryant, 1999). No active faults are shown on published maps as crossing the boundary of new construction on the proposed ISEGS site or in the vicinity of the proposed gas pipeline. The closest mapped active faults to the plant site are the Death Valley Fault Zone and Garlock Fault located approximately 51 miles to the west. Movement on the north-northwest-striking Death Valley Fault is normal, related to extensional tectonics in the Great Basin, coupled with right-lateral strike-slip, related to San Andreas-style transform faulting. The Garlock Fault is a major east-west-striking, left-lateral strike-slip fault, also associated with regional transform faulting to the west. One northwest-striking fault, the Stateline Fault, has had movement in the early to middle Pleistocene (700,000

to 1,600,000 years) (CDMG 1994). The fault is located approximately 4.5 miles to the northeast, and closely follows the California-Nevada border.

Geology, Paleontology and Minerals Table 2, page 9, lists all Holocene age faults within 100 miles of the solar plant site. The majority, including the Pisgah-Bullion Mountain-Mesquite Lake, Calico-Hidalgo, Landers, Emerson-Copper Mountain, Gravel Hills-Harper Lake, Blackwater, Johnson Valley, and Lenwood-Lockhart-Old Woman Springs Faults, are right-lateral strike-slip faults similar in style and orientation to the San Andreas Fault. These structures are located in the western Mojave Desert. The Panamint Valley Fault is located east of the Death Valley Fault Zone, and sense-of-movement and orientation are similar. The Owl Lake Fault, which strikes northeast, and the Tank Canyon Fault, which is a north-striking reverse fault, appear to be associated with the regional left-lateral Garlock Fault.

The Garlock Fault is the only structure designated as a Type A fault (CDMG 1994; ICBO 1998). All others listed in Table 2 are Type B. Type A faults have slip-rates of $\geq$5 mm/yr and are capable of producing an earthquake of magnitude 7.0 or greater. Type B faults have slip-rates of 2 to 5 mm/yr and are capable of producing an earthquake of magnitude 6.5 to 7.0.

The Alquist-Priolo Act of 1973 and subsequent California state law (California Code of Regulations, 2001) require that all occupied structures be set back 50 feet or more from the surface trace of an active fault. Since no active faults have been documented within the ISEGS power plant site, setbacks for occupied structures will not be required.

Estimates of potential seismic ground motion generated using the Seismic Hazard Curves, Response Parameters and Design Parameters software found at the United States Geological Survey website (http://eartquake.usgs.gov/research/hazmaps/design) indicate that the peak bedrock ground acceleration is expected to be 0.15g at the site. The resulting deterministic peak surface accelerations on the site for each fault are summarized in **Geology, Paleontology and Minerals Table 3**.

Geology, Paleontology and Minerals Table 3
Estimated Deterministic Peak Surface Accelerations

Latitude North	Longitude West	Date	Depth (km)	Earthquake Magnitude	Peak Site Surface Acc. (g)	Site Modified Mercali Scale Intensity	Approx. Distance (mi [km])	Location of Epicenter
36.000	117.000	11/04/1908	0.0	6.5	0.045	VI	91.1 (146.6)	Southwest of Death Valley, CA
36.000	117.000	11/10/1916	0.0	5.5	0.027	V	91.1 (146.6)	South of Death Valley, CA
36.705	116.293	06/29/1992	8.0	5.4	0.025	V	91.6 (147.3)	Lathrop Wells, NV
34.516	116.495	06/01/1975	4.5	5.2	0.023	IV	92.5 (148.9)	South of Hector, CA
34.250	116.167	03/20/1945	0.0	5.0	0.019	IV	98.7 (158.8)	East of Landers, CA
35.967	114.817	05/04/1939	0.0	5.0	0.035	V	46.1 (74.1)	Boulder City, NV
34.711	116.027	09/26/1965	8.3	5.0	0.026	V	66.5 (107.1)	S. Bristol Mtns., CA
34.860	116.390	10/21/1999	4.0	5.0	0.025	V	71.0 (114.2)	Hector, CA
34.860	116.410	10/22/1999	1.0	5.0	0.025	V	71.8 (115.6)	Hector, CA
34.983	116.550	04/10/1947	0.0	6.2	0.046	VI	72.8 (117.2)	East of Barstow, CA
34.950	116.533	04/10/1947	0.0	5.0	0.024	V	73.6 (118.0)	East of Barstow, CA
34.967	116.550	04/10/1947	0.0	5.1	0.026	V	73.5 (118.2)	East of Barstow, CA
34.967	116.550	04/11/1947	0.0	5.0	0.024	V	73.5 (118.2)	East of Barstow, CA
34.800	116.410	10/21/1999	1.0	5.0	0.024	V	74.7 (120.2)	Hector, CA
34.680	116.280	10/16/1999	8.0	5.8	0.036	V	76.1 (122.4)	Southeast of Hector Mine, CA
Latitude North	Longitude West	Date	Depth (km)	Earthquake Magnitude	Peak Site Surface Acc. (g)	Site Modified Mercali Scale Intensity	Approx. Distance (mi [km])	Location of Epicenter
34.533	115.983	07/18/1946	0.0	5.6	0.032	V	76.6 (123.3)	N. Bullion Mtns., CA
34.830	116.520	09/26/1929	0.0	5.1	0.024	V	77.8 (125.3)	Hector, CA
34.594	116.271	10/16/1999	0.0	7.1	0.068	VI	80.6 (129.7)	Southeast of Hector Mine, CA
34.583	116.319	07/05/1992	0.0	5.4	0.027	V	82.8 (133.2)	Southeast of Hector, CA
34.712	116.503	09/25/1965	10.6	5.2	0.025	V	82.7 (133.1)	South of Hector, CA
34.970	116.819	03/18/1997	1.0	5.1	0.023	IV	86.4 (139.0)	Calico Mtns., CA
34.333	115.800	12/22/1943	0.0	5.5	0.028	V	86.7 (139.5)	Bullion Mtns., CA
34.442	116.248	10/16/1999	1.0	5.7	0.030	V	88.9 (143.0)	Southeast of Hector Mine, CA

EQSEARCH™ Version 3.00 software was used to search an abbreviated and modified version of the published CGS earthquake catalog for California in order to obtain the information presented in **Geology, Paleontology and Minerals Table 3** (Blake, 2006a). The site latitude and longitude inputs were 35.5588 degrees and -115.4672 degrees, respectively, which is centrally located in Ivanpah 2. The range of historic earthquake magnitudes selected was 5.0 to 9.0, and the search radius was 100 miles. The location of each seismic event was obtained from the USGS 7.5 Minute Topographic Map Series and the California Historical Earthquake Online Database (http://www.consrv.ca.gov/cgs/rghm/quakes/historical/).

Twenty-three historic earthquakes of Magnitude 5.0 (M5.0) or greater have occurred on active faults between 51 and 100 miles of the site (CGS 2007). Only three of these, with epicenters located near the Hector Mine (M7.1), southwest of Death Valley (M6.5) and east of Barstow (M6.2), were of Magnitude 6.0 or greater. Nearly all of the faults are predominantly associated with strike-slip faulting. The earthquakes in the Death Valley region resulted from a combination of extensional and strike-slip faulting. The earthquake at Lathrop Wells, Nevada occurred in the vicinity of an east-west-striking left-lateral strike-slip fault within the poorly understood Southern Nevada Seismic Zone that extends eastward across Nevada from the Death Valley area (NBMG1998).

The appropriate soil profile for Ivanpah 2 is Type D based on information contained in the project geotechnical report (Terracon 2007). Depth to bedrock is expected to vary across the site, so the soil profile is also assumed to be Type D for Ivanpah 1 and 3. A design-level geotechnical report, as required by **GEO-1**, is needed to confirm the soil profile and provide appropriate seismic design parameters.

The estimated peak horizontal bedrock acceleration for the power plant is 0.084 times the acceleration of gravity (0.084g) based on a 10 percent probability of exceedence in 50 years, while the estimated peak horizontal bedrock acceleration is 0.152 times the acceleration of gravity (0.152g) based on a 2 percent probability of exceedence in 50 years (CBC 2007).

The potential of surface rupture on a fault at the energy facility footprint is considered to be very low, since no faults are known to have ruptured the ground surface of the proposed energy facility location.

Liquefaction

Liquefaction is a condition where in a cohesionless soil may lose shear strength because of sudden increase in pore water pressure caused by an earthquake. Medium dense to very dense sandy and gravelly soils encountered in borings in Ivanpah 2, coupled with a groundwater table that is below 80 feet, would indicate no potential for liquefaction; however, no subsurface information was presented in the AFC for Ivanpah 1 and 3 of the ISEGS site such that liquefaction potential for these areas of the project should be addressed in a project-specific geotechnical report as required by the CBC (2007) and proposed Condition of Certification **GEO-1**.

Dynamic Compaction

Dynamic compaction of soils results when relatively unconsolidated granular materials experience vibration associated with seismic events. The vibration causes a decrease in soil volume, as the soil grains tend to rearrange into a more dense state (an increase is soil density). The decrease in volume can result in settlement of overlying structural improvements. Medium dense to very dense granular soils encountered in borings in Ivanpah 2 are not likely to be susceptible to dynamic compaction during an earthquake. It is not possible to assess the potential for dynamic compaction in Ivanpah 1 and 3 without site-specific geotechnical exploration. The potential for and mitigation of the effects of dynamic compaction of site soils during an earthquake should be addressed in a project-specific geotechnical report as required by the CBC (2007) and proposed Condition of Certification **GEO-1**. Common mitigation methods include deep foundations

(driven piles; drilled shafts) for severe conditions, geogrid reinforced fill pads for moderate severity and over-excavation and replacement for areas of minimal hazard.

Hydrocompaction

Hydrocompaction (also known as hydro-collapse) is generally limited to young soils that were deposited rapidly in a saturated state, most commonly by a flash flood. The soils dry quickly, leaving an unconsolidated, low density deposit with a high percentage of voids. Foundations built on these types of compressible materials can settle excessively, particularly when landscaping irrigation dissolves the weak cementation that is preventing the immediate collapse of the soil structure. Medium dense to very dense sands and gravels present in borings in Ivanpah 2 are not generally susceptible to hydrocompaction. It is not possible to assess the potential for hydrocompaction in Ivanpah 1 and 3 without site-specific geotechnical exploration. The potential for and mitigation of the effects of hydrocompaction of site soils should be addressed in a project-specific geotechnical report as required by the CBC (2007) and proposed Condition of Certification **GEO-1**. Typical mitigation measures would include over-excavation/replacement, mat foundations or deep foundations, depending on severity and foundation loads.

Subsidence

Consolidation settlement may occur when areas containing compressible soils are subjected to surcharge loads. Although consolidation testing was not performed on soil samples from borings in Ivanpah 2, the coarse-grained soils encountered are not considered highly sensitive to surcharge loading. It is not possible to assess the potential for consolidation settlement in Ivanpah 1 and 3 without site-specific geotechnical exploration. The potential for and mitigation of the effects of consolidation settlement at the site should be addressed in a project-specific geotechnical report as required by the CBC (2007) and proposed Condition of Certification **GEO-1**. Mitigation is normally accomplished by over-excavation and replacement of the surifical materials, or by incorporating deep foundations for deeper deposits.

Regional ground subsidence is typically caused by petroleum or groundwater withdrawal that increases the effective unit weight of the soil profile, which in turn increases the effective stress on the deeper soils. This results in consolidation or settlement of the soils. No known petroleum or gas fields are located within hundreds of miles of the project site (CDC 2001) such that subsidence due to petroleum withdrawal is not anticipated. However, regional subsidence associated with shrinkage of clay soils may be occurring (Broadbent 2009), and possible evidence of subsidence has been found on the playa surface to the east of the project site in the form of sinkholes and possible degradation of a portion of the Interstate Highway 15 road base. Subsidence associated with shrinkage of clay soils will need to be addressed in the design-level geotechnical report required by proposed Condition of Certification **GEO-1** and mitigated through facility design.

Groundwater pumping can also contribute to regional subsidence. Staff's assessment as noted in the Cumulative Impacts and Mitigation analysis of the **Soil and Water** section also concludes that groundwater withdrawal is not causing a local lowering of the water table, and thus would not contribute to subsidence.

Expansive Soils

Soil expansion occurs when clay-rich soils with an affinity for water exist in-place at a moisture content below their plastic limit. The addition of moisture from irrigation, capillary tension, water line breaks, etc. causes the clay soils to collect water molecules in their structure, which in turn causes an increase in the overall volume of the soil. This increase in volume can correspond to movement of overlying structural improvements. Although expansion testing was not performed on soil samples from borings in Ivanpah 2, the coarse-grained, generally non-plastic soils encountered are not considered to be expansive. It is not possible to assess the potential for expansive soils in Ivanpah 1 and 3 without site-specific geotechnical exploration. The potential for and mitigation of the effects of expansive soils on the site should be addressed in a project-specific geotechnical report as required by the CBC (2007) and proposed Condition of Certification **GEO-1**. Mitigation is normally accomplished by over-excavation and replacement of the expansive soils. For deep-seated conditions, deep foundations are commonly used. Lime-treatment (chemical modification) is often used to mitigate expansive clays in pavement areas.

Landslides

Landslide potential at the ISEGS site is negligible since the proposed energy facility is located on a broad, gently east-sloping alluvial fan.

Flooding

The Federal Emergency Management Agency (FEMA) has identified the ISEGS site and gas pipeline route as lying in a Zone D, which is an area in which flood hazards are undetermined (FEMA 1997). Flooding potential is further addressed in the **Soil and Water** section.

Tsunamis and Seiches

The proposed ISEGS power plant site is not located near a large body of water that could be inundated by a tsunami or seiche, such as a lake or open ocean. As a result, there is no potential for a tsunami or seiche to affect the facility.

Proposed Project – Mineral Resources

Staff has reviewed applicable geologic maps and reports for this area (CDC 2001; CDMG 1961; CDMG 1967; CDMG 1987; CDMG 1990; CDMG 1998; CDMG 1999; CH2M Hill, 2007; McCleod, 2007; Scott, 2007; Terracon 2007; and UCMP 2007). The ISEGS site is mapped as Mineral Resource Zone 4 (CDMG 1987). MRZ-4 refers to “areas where geologic information does not rule out either the presence or absence of industrial mineral resources”. The carbonate bedrock outcrop just west of Ivanpah 3 is designated as MRZ-3a, which is an “area underlain by geologic terranes within which undiscovered industrial mineral resources similar to known deposits in the same producing district or region may reasonably expected to exist (hypothetical resources). Such areas may include prospects of undetermined significance”. These carbonate rocks could be encountered at shallow depths in Ivanpah 3.

There are a variety of active mining operations in the general area near the proposed project location, but no active operations occur within the proposed project boundaries.

The closest current mining operation is the Chevron Mining, Inc. Rare Earth facility (formerly Molycorp) located in at Mountain Pass, approximately 8 miles to the west of the proposed project location. Other mining operations that have occurred in the local area in the past include the Colosseum Mine, which produced gold at a location approximately 5 miles west of the proposed project location from 1988 to 1993. Regionally, mineral production includes gold, silver, barite, boron, hectorite, bentonite, gypsum, tungsten, talc, zeolites, sodium, limestone, sand, gravel, stone, and turquoise. The nearest prospects and historic workings are located approximately 8,000 feet northwest of Ivanpah 3 and 12,500 feet southwest of Ivanpah 2 and 3 (CDMG 1987; CDMG 1998). Base metal and limestone prospects are also located roughly 6,000 feet northwest of the northern end of the proposed gas pipeline. A pit is located 7,500 feet east of Ivanpah 1, and is the closest known source of borrow material (USGS 1985).

The proposed project location is located on alluvial fan materials. The general area is potentially leasable, and there has been limited exploration for oil and gas. However, there has been no production, and the area is considered to have low potential for leasable minerals. The nearest oil and gas fields are located at least 75 miles west and southwest of Barstow, California, which is roughly 100 miles to the southwest of the project site (CDC 2001). Some dry lake beds in California are sources of brine and salt production, but Ivanpah Dry Lake is not expected to be a potential resource for these materials.

The presence of alluvial fan materials on the proposed project location means that the property could potentially be accessed a source for of salable sand and gravel resources. During construction, the applicant may need or desire to move sand and gravel either offsite, or between the different units of the facility. Should this occur, the applicant would be required to comply with BLM regulations in at 43 CFR Part 3600, which regulates the production and use of sand and gravel from public lands. Use of sand and gravel or other mineral materials within the boundaries of an authorized Right-of-way (ROW) is permitted, however, removal of these materials from an authorized ROW would require payment to the US of the fair market value of those materials.

Adjacent to the western boundary of the proposed project location is an outcrop feature known as Limestone Hill. Limestone Hill is the location of two active locatable minerals claims, including a lode claim and a placer claim. These claims are identified as Numbers CAMC234026 and CAMC237293. Underground exploration is being conducted sporadically, however, commercial economic production is not apparent from either claim. The extent of the underground workings is not known.

Although active mining claims exist on Limestone Hill directly adjacent to the proposed property boundary, there are no indications that these would become active economic commercial operations. If they become active economic operations, the existence of the proposed facility is not expected to interfere with the ability of the claimant to access those minerals. The only potential conflict would occur if the claimant or another person locates a new claim for locatable minerals located underneath the proposed project, within the project boundaries. This could potentially occur, as the proposed project location has not been withdrawn from mineral entry. The potential for this scenario is expected to be low. If it did occur, conflicts between the surface use of the land for solar

energy production and access to the subsurface minerals would be addressed in accordance with appropriate regulations.

The proposed project site is currently not used for mineral production, nor is it under claim, lease, or permit for the production of locatable, leasable, or salable minerals. Sand and gravel resources are present at the site; however, such materials are present throughout the regional area such that the ISEGS should not have a significant impact on the availability of such resources. In addition, the potential resource would become available again following decommissioning of the project. In addition, only limited exploration for oil and gas resources has been performed in the area, and no active oil or gas operations are located in the immediate vicinity of the project. As a result, the ISEGS project would not impact any current or reasonably foreseeable development of geologic or mineral resources.

Proposed Project – Paleontologic Resources

Staff has reviewed the paleontological resources assessment in Section 5.8 of the AFC (CH2M Hill, 2007) and the paleontological records search attached in Appendix 5.8A (Scott, 2007). Staff has also reviewed the paleontological literature and records search conducted by the Natural History Museum of Los Angeles County (McCleod, 2007), as well as the online records database maintained by the University of California, Museum of Paleontology (UCMP 2007). Site-specific information generated by the applicant for the ISEGS was also reviewed. All research was conducted in accordance with accepted assessment protocol (SVP 1995) to determine whether any known paleontological resources exist in the general area. If present or likely to be present, conditions of certification which outline required procedures to mitigate impacts to potential resources, and proposed as part of the projects approval. Based on a review of this information, no paleontological resources have been documented on the ISEGS plant site or at the proposed lay down area.

Young to intermediate (middle Pleistocene to Holocene) age alluvial fan sediments represent all soils that are mapped at the surface of the ISEGS site. These deposits are considered to have a low paleontological sensitivity due to the high energy environment of deposition and/or are too young to yield fossils of scientific significance. There is a low potential to impact paleontological resources during grading and trenching in such materials (McLeod, 2007; Scott, 2007). Quaternary lacustrine sediments are considered to have a high paleontological sensitivity because vertebrate and plant fossils have been recovered from deposits east of the project site around Ivanpah Lake and roughly 30 miles to the northwest near Tecopa, California (McLeod, 2007; Scott, 2007); however, it is unlikely that lake bed sediments are present beneath the site within the anticipated depths of grading and trenching such that there is a low potential to impact paleontological resources in these materials.

The carbonate bedrock west of Ivanpah 3 is assigned a high paleontological sensitivity rating, based on the presence of Late Quaternary packrat middens that occupy solution cavities in the outcrops and the occurrence of time-restrictive marine fauna in late Cambrian rocks in the Clark Mountain Range (UCMP 2007; CH2M Hill, 2007; Scott, 2007). Since shallow carbonate bedrock may be present in the western portion of Ivanpah 3 and could be encountered during project excavation in this area, there is a

high potential to impact paleontological resources in this area. The Pre-Cambrian metamorphic rocks in the bedrock outcrops northeast of Ivanpah 2 is considered to have negligible paleontological sensitivity.

Based on the above discussion, SVP criteria, and the confidential paleontological report appended to the AFC, staff considers the probability that paleontological resources will be encountered during grading and excavation in the western portion of Ivanpah 3 to be high. Proposed Conditions of Certification **PAL-1** to **PAL-7** are designed to mitigate potential impacts to paleontological resource to less than significant levels. These conditions essentially require a worker education program in conjunction with the monitoring of earthwork activities by a qualified professional paleontologist (paleontological resource specialist; PRS).

The extent and distribution of lakebed sediments associated with Ivanpah Lake relative to the solar plant sites is difficult to determine. No fine-grained or clay soils were encountered in the two 80-foot-deep borings at Ivanpah 2. The nearest mapped surface exposure of lacustrine sediments, which are latest Pleistocene to Holocene in age, is roughly 1.35 miles east of Ivanpah 1 (USGS 2006). The lowest elevation on the solar plant site is approximately 2,765 feet above MSL, which is nearly 130 feet above the highest exposure of Quaternary lakebed sediments (approximate elevation 2,638 feet) and 163 feet above the floor of Ivanpah Lake (elevation 2,602 feet). The Nevada Bureau of Mines and Geology (NBMG 1979) has determined that precipitation rates were not high enough to overcome rapid evaporation rates that persisted in the Southern Nevada group of pluvial lakes, of which Ivanpah Lake is a part, during the Wisconsinan pluvial period (late Pleistocene beginning 72,000 years ago). Establishment of perennial lakes of substantial depths for consequential periods of time was unlikely under these environmental conditions. The lack of ancient shoreline features in Ivanpah Valley supports this conclusion (NBMG 1979). Therefore, the probability of impacting paleontological resources in Quaternary lakebed sediments is considered to be low since the lakebed deposits are present at approximate depths of 130 feet below the lowest existing ground surface at the site.

The Pre-Cambrian metamorphic rocks in the bedrock outcrops northeast of Ivanpah 2 are considered to have negligible paleontological sensitivity. However, the carbonate bedrock west of Ivanpah 3 is assigned a high paleontological sensitivity rating, based on the presence of Late Quaternary packrat middens that occupy solution cavities observed during the site investigation conducted for the AFC (CH2M Hill, 2007). Packrat middens are known to contain paleobotanical material as old as 40,000 years that is well preserved in the dry Mojave Desert climate (CH2M Hill, 2007; Spaulding, 1990). One midden contained remains of juniper or cedar twigs (*Juniperus* sp.), greasebush leaves (*Forsellesia nevadensis*), snowberry twigs and fruit (*Symphoricarpos longiflorus* sp.), and globemallow epidermis (*Sphaeralcea* sp.), most of which are indicative of present-day higher elevation woodland environments. The University of California Museum of Paleontology also possesses 8 specimens of a marine branched thrombolite (*Favosamaceria cooperi*) collected from a location somewhere in the Clark Mountain Range (UCMP 2007). The thrombolite, which is a plant species similar to stromatolites, is restricted to the Late Cambrian *Saukia* Trilobite Zone (Shapiro and Awramik, 2006). Many sources agree that the carbonates adjacent to Ivanpah 3 are probably Cambrian in age (CDMG 1961; CH2M Hill, 2007). Although no fossils were observed in the

limestone/dolomite outcrops, the potential to impact paleontological resources is still considered to be high in excavations that might encounter shallow carbonate bedrock, particularly on the west side of Ivanpah 3. These excavations could uncover packrat middens buried by young alluvium or time-restricted late Cambrian thrombolites in the carbonate rock.

Several paleontological sites are documented in Quaternary lacustrine sediments within 45 miles of the ISEGS project area. The San Bernardino County Museum collection contains remains of tortoise (*Gopherus* sp.), kangaroo rat (*Dipodomys* sp.), wood rat (*Neotoma* sp.), and other small vertebrates from a locality between 1 and 2 miles southeast of the site on the west side of Ivanpah Lake (Scott, 2007). The site also yielded hackberry seed (*Celtus* sp.) and tufa deposited in the lake. The Natural History Museum of Los Angeles collection includes several paleontological remains from similar lakebed sediments near Tecopa, California, approximately 45 miles to the northwest. The fossil specimens consist of mastodon (*Mammut*), mammoth (*Mammuthus*), rhinoceros (*Rhinocerotidae*), horse (*Equus*), [rpngjprn antelope (*Antilocapridae*), and camels (*Camelops* and *Capricamelus gettyi*) (McCleod, 2007). *Capricamelus gettyi* is a species of short-legged camel named from specimens found at the Tecopa lakebed site.

Proposed Project - Construction Impacts and Mitigation

Geologic Hazards

The design-level geotechnical investigation required for the project by the CBC (2007) and proposed Condition of Certification **GEO-1** should provide standard engineering design recommendations for mitigation of potential geologic hazards that include strong ground shaking; liquefaction; settlement due to compressible soils, subsidence associated with shrinkage of clay soils, hydrocompaction, or dynamic compaction; and the presence of expansive clay soils.

Mineral Resources

Construction of the proposed project would directly remove approximately 4,072.5 acres from potential use for sand and gravel production under BLM's salable mineral program. In general, sand and gravel resources are widely available throughout the region. The primary consideration in the economic viability of sand and gravel operations is the transportation cost, which is driven by the proximity of the operation to its point of use. There is likely to be widespread development in Ivanpah Valley that would require sand and gravel resources, removal of the 4,072.5-acre area from potential production is not expected to have any significant impact. The proposed project site represents a small fraction of the total sand and gravel resource available within the valley. As a result, the ISEGS project would not impact any current or reasonably foreseeable development of geologic resources. However, during construction, the applicant may need or desire to move sand and gravel either offsite, or between the different units of the facility. Should this occur, the applicant would be required to comply with BLM regulations in at 43 CFR Part 3600, which regulates the production and use of sand and gravel from public lands. Use of sand and gravel or other mineral materials within the boundaries of an

authorized Right-of-way (ROW) is permitted, however, removal of these materials from an authorized ROW would require payment to the US of the fair market value of those materials.

The proposed project would not have any direct or indirect impact on the production of locatable or leasable minerals outside of the proposed project boundaries. Although active mining claims exist on Limestone Hill directly adjacent to the proposed property boundary, there are no indications that these could become economic commercial operations. If they become economic operations, the existence of the proposed facility is not expected to interfere with the ability of the claimant to access those minerals. The only potential conflict would occur if the claimant or another person locates a new claim, for locatable minerals underneath the proposed project, within the project boundaries. This could potentially occur, as the proposed project location has not been withdrawn from mineral entry. The potential for this scenario is expected to be low. If it did occur, conflicts between the surface use of the land for solar energy production and access to the subsurface minerals would be addressed in accordance with appropriate regulations. Therefore, the ISEGS project would not impact any current or reasonably foreseeable development of mineral resources.

Paleontological Resources

Significant paleontological resources, specifically pack rat middens, have been documented in nearby Paleozoic carbonate bedrock that could be encountered during construction of the Ivanpah 3 plant and linear facilities. The nearest vertebrate fossil locality is 1 to 2 miles away and was recovered from Quaternary lacustrine sediments, although the potential to encounter similar sediments during grading and trenching is low. The young to intermediate age alluvium that underlies the majority of the site, as well as Pre-Cambrian metamorphic rocks located just northeast of Ivanpah 2, are considered to be of low to negligible sensitivity with respect to containing paleontological resources. Construction of the proposed project will include grading, foundation excavation, utility trenching and possibly drilled shafts. Staff considers the probability of encountering paleontological resources to be generally high on portions of the site, particularly the west side of Ivanpah 3, based on the soils profile, SVP assessment criteria, and the near surface occurrence of the sensitive geologic units. The potential for encountering fossils hosted in Quaternary lake bed sediments will increase with the depth of cut. Excavations for ancillary facilities and new pipelines and on-site excavations deeper than 5 feet may have a higher probability of encountering potentially high sensitivity materials, although sensitive materials could occur nearer the surface.

Proposed Conditions of Certification **PAL-1 to PAL-7** are designed to mitigate any paleontological resource impacts, as discussed above, to a less than significant level. Essentially, these conditions require a worker education program in conjunction with monitoring of earthwork activities by qualified professional paleontologists (PRS). Earthwork is halted any time potential fossils are recognized by either the paleontologist or the worker. When properly implemented, the conditions of certification yield a net gain to the science of paleontology since fossils that would not otherwise have been discovered can be collected, identified, studied, and properly curated. A paleontological resource specialist is retained, for the project by the applicant, to produce a monitoring

and mitigation plan, conduct the worker training, and provide the on the monitoring. During the monitoring, the PRS can and often does petition the CEC for a change in the monitoring protocol. Most commonly, this is a request for lesser monitoring after sufficient monitoring has been performed to ascertain that there is little change of finding fossils. In other cases, the PRS can propose increased monitoring due to unexpected fossil discoveries or in response to repeated out-of-compliance incidents by the earthwork contractor.

Based upon the literature and archives search, field surveys, and compliance documentation for the ISEGS, the applicant has proposed monitoring and mitigation measures to be followed during the construction of the ISEGS. Energy Commission staff believes that the facility can be designed and constructed to minimize the effect of geologic hazards at the site during project design life and that impacts to vertebrate fossils encountered during construction of the power plant and associated linear projects would be mitigated to a level of insignificance.

Proposed Project - Operation Impacts and Mitigation

Operation of the proposed plant facilities should not have any adverse impact on geologic, mineralogical, or paleontological resources. Potential geologic hazards, including strong ground shaking; liquefaction; settlement due to compressible soils, subsidence associated with shrinkage of clay soils, hydrocompaction, or dynamic compaction, and the presence of expansive clay soils can be effectively mitigated through facility design (See proposed **Conditions of Certification GEO-1,** and **GEN-1, GEN-5**, and **CIVIL-1** in the **Facility Design** section) such that these potential hazards should not affect operation of the facility.

Proposed Project – Closure and Decommissioning Impacts and Mitigation

The decommissioning and closure of the project should not negatively affect geologic, mineralogical, or paleontological resources since the majority of the ground disturbed during plant decommissioning and closure would have been already disturbed, and mitigated as required, during construction and operation of the project. Facility closure will make land occupied by the proposed project once again available for potential future development of geologic or mineralogical resources within the former project borders.

No Project/No Action Alternative

In the No Project/No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multirole use and sustained yield, and the maintenance of environmental quality [43 USC 1781 (b)] in conformance with applicable statures, regulations, policy, and land use plan.

The results of the No Project/No Action Alternative would be the following:

- The Impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project.
- The benefits of the proposed project in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.
- The No Project/No Action alternative would leave the proposed project area undisturbed and would therefore have no affect on existing geologic or paleontological resources in the area other than to maintain their availability for potential future development.

If this project is not approved, renewable projects would likely be developed on other sites in the Mojave Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State /Federal mandates. For example, there are three large solar projects proposed on BLM land in Nevada within a few miles of the Ivanpah Site. In addition, as of August 2009 there are currently 66 applications for solar projects covering 611,692 acres pending with the BLM in the California Desert District.

CUMULATIVE IMPACTS AND MITIGATION

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (California Code Regulations, Title 14, Section 15130). NEPA states that cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR §1508.7).
There is the potential for substantial future development in the Ivanpah Valley area and throughout the southern California desert region. Analysis of cumulative impacts is based on data provided in the following maps and tables (see the **Cumulative Scenario** section of this FSA/DEIS):

- Cumulative Impacts Figure 1, Regional Renewable Applications
- Cumulative Impacts Figure 2, Regional Renewable Applications (Detail)
- Cumulative Impacts Figure 3, Ivanpah Valley Existing and Future/Foreseeable Projects
- Cumulative Impacts Table 1, Regional Renewable Energy Projects
- Cumulative Impacts Table 2, Existing Development in the Ivanpah Valley
- Cumulative Impacts Table 3, Future Foreseeable Projects in the Ivanpah Valley Area.

The analysis in this section first defines the geographic area over which cumulative impacts to geology or paleontology could occur. The cumulative impact analysis itself describes the potential for cumulative impacts to occur as a result of implementation of the ISEGS project along with the listed local and regional projects.

GEOGRAPHIC EXTENT

Cumulative impacts can occur if implementation of the ISEGS project could combine with those of other local or regional projects. Cumulative impacts would occur locally if ISEGS project impacts combined with impacts of projects located within the Ivanpah Valley. Cumulative impacts could also occur as a result of development of some of the many proposed solar and wind development projects that have been or are expected to be under consideration by the BLM and the Energy Commission in the near future. Many of these projects are located within the California Desert Conservation Area, as well as on BLM land in Nevada and Arizona.

However, with the exception of geologic subsidence, cumulative impacts related to geology only have the potential to occur within the boundaries of the project site itself. This is because geologic materials occur at specific locales and are unaffected by activities not acting on them directly and any impacts of the ISEGS project would be site-specific. Therefore the geographic extent for cumulative impacts associated with geology is the project location itself (including all linear facilities).

The geographic extent for the analysis of local cumulative impacts associated with the ISEGS project includes the Ivanpah Valley Basin. Regional cumulative impacts for this analysis are impacts that would occur as a result of implementation of future solar and wind development projects that are currently proposed on over one million acres of the California Desert Conservation Area, as well as on BLM land in Nevada and Arizona. Therefore, the geographic extent for the analysis of regional cumulative impacts is defined as the desert areas of southeastern California, southern Nevada, and western Arizona, as shown on Cumulative Impacts Figure 1 (Regional Renewable Applications).

CUMULATIVE IMPACT ANALYSIS – LOCAL PROJECTS

Most cumulative impacts related to geology and paleontology only have the potential to occur within boundaries of the project site itself because geologic materials occur at specific locales and are unaffected by activities not acting on them directly. Most geologic impacts of the ISEGS project would be site-specific and would therefore not have the potential to combine with impacts from other projects.

Geologic Hazards

Local subsidence in the form of sinkholes has been observed at the site and along the northern edge of Ivanpah Dry Lake. While its cause can sometimes be attributed to groundwater withdrawal as well as other causes, in this case, the cause is believed to be from dehydration of clays between the soil surface and the water table that can result in a major loss of volume, and thus the collapse of overlying soils (Broadbent 2009). Staff's assessment as noted in the Cumulative Impacts and Mitigation analysis of the **Soil and Water** section also concludes that groundwater withdrawal is not causing a local lowering of the water table, and thus would not contribute to subsidence. The project's groundwater use would contribute only 1.8 percent to the existing and only 1.7 percent of the reasonable foreseeable cumulative pumping volume in the Ivanpah Valley Groundwater Basin. Staff believes the project's proposed contribution to the

cumulative groundwater pumping in the Ivanpah Valley Groundwater Basin is not significant. Staff has determined that the project would not substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level. Staff has estimated that Ivanpah Valley Groundwater Basin still has a surplus outflow to the Las Vegas Valley of approximately 1,351 to 2,666 acre-feet per year (AFY). Therefore, staff does not believe that groundwater pumping associated with ISEGS would contribute to subsidence in the Ivanpah Valley. When combined with impacts of past, present, and reasonably foreseeable projects, ISEGS would not be considered cumulatively considerable.

Mineral Resources

The proposed project site is currently not used for mineral production, nor is it under claim, lease, or permit for the production of locatable, leasable, or salable minerals. Sand and gravel resources are present at the site; however, such materials are present throughout the region and the ISEGS should not have a significant impact on the availability of such resources. In addition, the potential resource would become available again following decommissioning of the project. As a result, the ISEGS project would not impact any current or reasonably foreseeable development of geologic or mineral resources.

Paleontological Resources

As discussed above, no paleontological resources have been documented on the ISEGS project site or at the proposed lay down area. However, based on the geology of the site and because paleontological resources have been discovered on sites within two miles of the ISEGS project, the probability of encountering paleontological resources is considered to be generally high on portions of the ISEGS site. For the same reasons, it is likely that paleontological resources have been uncovered during construction of past projects in the Ivanpah Valley and will likely be uncovered during construction of at least some of the reasonably foreseeable projects presented in **Table 3** of the **Cumulative Scenario** section. However, the ISEGS project includes conditions of certification that would require a worker education program in conjunction with monitoring of earthwork activities by qualified professional paleontologists, which would require that earthwork be halted any time potential fossils are recognized by either the paleontologist or the worker. When properly implemented, the conditions of certification yield a net gain to the science of paleontology since fossils that would not otherwise have been discovered can be collected, identified, studied, and properly curated. It is reasonable to assume that the reasonably foreseeable projects presented in **Table 3** of the **Cumulative Scenario** section would include similar measures to identify, study, and curate any paleontological resources discovered during construction. Therefore, implementation of past, present, and reasonably foreseeable projects would likely result in a net gain to the science of paleontology and would not combine to result in cumulatively considerable impacts to paleontological resources.

CUMULATIVE IMPACT ANALYSIS - REGIONAL PROJECTS

Because no impacts from geologic hazards, or to mineralogical or paleontological resources have been identified for the ISEGS project, there would be no potential for these impacts to combine on a regional level.

As discussed above, no paleontological resources have been documented on the ISEGS project site or at the proposed lay down area. However, based on the geology of the site and because paleontological resources have been discovered on sites within two miles of the ISEGS project, the probability of encountering paleontological resources is considered to be generally high on portions of the ISEGS site. Additionally, because many other paleontological resources occur throughout the Mojave Desert, it is likely that paleontological resources will be uncovered during construction of at least some of the reasonably foreseeable renewable energy projects shown on **Cumulative Scenario Figure 1** and **Figure 2**. However, as discussed above for local cumulative impacts, the ISEGS project includes measures such as monitoring earthwork activities by qualified professional paleontologists, and identifying, studying, and properly curating any paleontological resources discovered. It is reasonable to assume that the reasonably foreseeable projects shown on **Cumulative Scenario Figure 1** and **Figure 2** would include similar measures to identify, study, and curate any paleontological resources discovered during construction. Therefore, implementation of the ISEGS project and the reasonably foreseeable renewable energy projects proposed within southeastern California, southern Nevada, and western Arizona, would likely result in a net gain to the science of paleontology. Therefore, impacts of the ISEGS project would not have the potential to combine with impacts of the reasonably foreseeable renewable energy projects proposed within southeastern California, southern Nevada, and western Arizona to result in cumulative impacts to known paleontological resources.

CUMULATIVE IMPACT CONCLUSION

Impacts of the ISEGS project would not have the potential to combine with impacts of past, present, and reasonably foreseeable projects to result in any other significant contributions to local or regional cumulative impacts.
Impacts of the ISEGS project would not have the potential to combine with impacts of past, present, and reasonably foreseeable projects to result in a significant contribution to either local or regional cumulative impacts to mineralogical and/or paleontological resources.

NOTEWORTHY PUBLIC BENEFITS

Excavation activities during construction of the proposed ISEGS project may uncover important paleontological resources which, with proper collection and curation by the project PRS, would enhance the understanding of prehistoric climate and geography of the region for the benefit of current and future generations.

PUBLIC AND AGENCY COMMENTS ON THE PSA

Staff has not received any agency or public comments regarding geologic hazards, mineral resources, or paleontology at this time.

CONCLUSIONS

The applicant would be able to comply with applicable LORS, provided that the proposed conditions of certification are followed. The design and construction of the

project should have no adverse impact with respect to geologic, mineralogical, and paleontological resources, and thus would not have significant impacts with respect to either CEQA or NEPA. Staff proposes to ensure compliance with applicable LORS through the adoption of the proposed conditions of certification listed below.

MITIGATION MEASURES/PROPOSED CONDITIONS OF CERTIFICATION

The proposed ISEGS is situated in an active geologic environment. Strong ground shaking potential must be mitigated through foundation and structural design as required by the CBC (2007). Settlement due to compressible soils, groundwater withdrawal, hydrocompaction, or dynamic compaction, as well as potential impacts due to expansive soils and possible liquefaction, must be mitigated in accordance with a design-level geotechnical investigation as required by the CBC (2007), proposed Condition of Certification **GEO-1**, and proposed Conditions of Certification **GEN-1, GEN-5, and CIVIL-1** under **Facility Design**. Paleontological resources have been documented in the general area of the project and in sediments similar to those that are present near the site. The potential impacts to paleontological resources due to construction activities will be mitigated as required by proposed Conditions of Certification **PAL-1 to PAL-7**.

The proposed conditions of certification allow BLM's Authorized Officer and the Energy Commission Compliance Project Manager (CPM) and the applicant to adopt a compliance monitoring scheme ensuring compliance with applicable LORS for geologic hazards and geologic, mineralogical, and paleontological resources.

GEO-1 The Soils Engineering Report required by Section 1802A of the 2007 CBC should specifically include laboratory test data, associated geotechnical engineering analyses, and a thorough discussion of the potential for liquefaction; settlement due to compressible soils, subsidence associated with shrinkage of clay soils, hydrocompaction, or dynamic compaction; and the presence of expansive clay soils. The report should also include recommendations for ground improvement and/or foundation systems necessary to mitigate these potential geologic hazards, if present.

Verification: The project owner shall include in the application for a grading permit a copy of the Soils Engineering Report which addresses the potential for liquefaction; settlement due to compressible soils, groundwater withdrawal, hydrocompaction, or dynamic compaction; and the possible presence of expansive clay soils, and a summary of how the results of the analyses were incorporated into the project foundation and grading plan design for review and comment by the Chief Building Official (CBO). A copy of the Soils Engineering Report, application for grading permit and any comments by the CBO are to be provided to BLM's Authorized Officer and the CPM at least 30 days prior to grading.

PAL-1 The project owner shall provide BLM's Authorized Officer and the Compliance Project Manager (CPM) with the resume and qualifications of its PRS for review and approval. If the approved PRS is replaced prior to completion of project mitigation and submittal of the Paleontological Resources Report, the

project owner shall obtain BLM's Authorized Officer and CPM approval of the replacement PRS. The project owner shall keep resumes on file for qualified Paleontological Resource Monitors (PRMs). If a PRM is replaced, the resume of the replacement PRM shall also be provided to BLM's Authorized Officer and the CPM.

The PRS resume shall include the names and phone numbers of references. The resume shall also demonstrate to the satisfaction of BLM's Authorized Officer and the CPM the appropriate education and experience to accomplish the required paleontological resource tasks.

As determined by BLM's Authorized Officer and the CPM, the PRS shall meet the minimum qualifications for a vertebrate paleontologist as described in the Society of Vertebrate Paleontology (SVP) guidelines of 1995. The experience of the PRS shall include the following:

1. Institutional affiliations, appropriate credentials, and college degree;

2. Ability to recognize and collect fossils in the field;

3. Local geological and biostratigraphic expertise;

4. Proficiency in identifying vertebrate and invertebrate fossils; and

5. At least three years of paleontological resource mitigation and field experience in California and at least one year of experience leading paleontological resource mitigation and field activities.

The project owner shall ensure that the PRS obtains qualified paleontological resource monitors to monitor as he or she deems necessary on the project. Paleontological Resource Monitors (PRMs) shall have the equivalent of the following qualifications:

- BS or BA degree in geology or paleontology and one year of experience monitoring in California; or
- AS or AA in geology, paleontology, or biology and four years' experience monitoring in California; or
- Enrollment in upper division classes pursuing a degree in the fields of geology or paleontology and two years of monitoring experience in California.

Verification: (1) At least 60 days prior to the start of ground disturbance, the project owner shall submit a resume and statement of availability of its designated PRS for on-site work.

(2) At least 20 days prior to ground disturbance, the PRS or project owner shall provide a letter with resumes naming anticipated monitors for the project, stating that the identified monitors meet the minimum qualifications for paleontological resource monitoring required by the condition. If additional monitors are obtained during the project, the PRS shall provide additional letters and resumes to BLM's Authorized

Officer and the CPM. The letter shall be provided to BLM's Authorized Officer and the CPM no later than one week prior to the monitor's beginning on-site duties.

(3) Prior to the termination or release of a PRS, the project owner shall submit the resume of the proposed new PRS to BLM's Authorized Officer and the CPM for review and approval.

PAL-2 The project owner shall provide to the PRS, BLM's Authorized Officer and the CPM, for approval, maps and drawings showing the footprint of the power plants, construction lay down areas, and all related facilities. Maps shall identify all areas of the project where ground disturbance is anticipated. If the PRS requests enlargements or strip maps for linear facility routes, the project owner shall provide copies to the PRS, BLM's Authorized Officer and CPM. The site grading plan and plan and profile drawings for the utility lines would be acceptable for this purpose. The plan drawings should show the location, depth, and extent of all ground disturbances and be at a scale of 1 inch = 40 feet to 1 inch = 100 feet range. If the footprint of the project or its linear facilities change, the project owner shall provide maps and drawings reflecting those changes to the PRS, BLM's Authorized Officer and CPM.

If construction of the ISEGS project proceeds in phases, maps and drawings may be submitted prior to the start of each power plant. A letter identifying the proposed schedule of each project power plant shall be provided to the PRS, BLM's Authorized Officer and CPM. Before work commences on affected power plants, the project owner shall notify the PRS, BLM's Authorized Officer and CPM of any construction phase scheduling changes.

At a minimum, the project owner shall ensure that the PRS or PRM consults weekly with the project superintendent or construction field manager to confirm area(s) to be worked the following week, and until ground disturbance is completed.

Verification: (1) At least 30 days prior to the start of ground disturbance, the project owner shall provide the maps and drawings to the PRS, BLM's Authorized Officer and CPM.

(2) If there are changes to the footprint of the project, revised maps and drawings shall be provided to the PRS, BLM's Authorized Officer and CPM at least 15 days prior to the start of ground disturbance.

(3) If there are changes to the scheduling of the construction phases of each power plant, the project owner shall submit a letter to BLM's Authorized Officer and the CPM within 5 days of identifying the changes.

PAL-3 If after review of the plans provided pursuant to **PAL-2**, the PRS determines that materials with moderate, high, or unknown paleontological sensitivity could be impacted, the project owner shall ensure that the PRS prepares, and the project owner submits to BLM's Authorized Officer and the CPM for review and approval, a paleontological resources monitoring and mitigation plan (PRMMP) to identify general and specific measures to minimize potential

impacts to paleontological resources. Approval of the PRMMP by BLM's Authorized Officer and the CPM shall occur prior to any ground disturbance. The PRMMP shall function as the formal guide for monitoring, collecting, and sampling activities, and may be modified with BLM's Authorized Officer and CPM approval. This document shall be used as the basis of discussion when on-site decisions or changes are proposed. Copies of the PRMMP shall reside with the PRS, each monitor, the project owner's on-site manager, BLM's Authorized Officer and the CPM.

The PRMMP shall be developed in accordance with the guidelines of the Society of Vertebrate Paleontology (SVP 1995) and shall include, but not be limited, to the following:

1. Assurance that the performance and sequence of project-related tasks, such as any literature searches, pre-construction surveys, worker environmental training, fieldwork, flagging or staking, construction monitoring, mapping and data recovery, fossil preparation and collection, identification and inventory, preparation of final reports, and transmittal of materials for curation will be performed according to PRMMP procedures;

2. Identification of the person(s) expected to assist with each of the tasks identified within the PRMMP and the conditions of certification;

3. A thorough discussion of the anticipated geologic units expected to be encountered, the location and depth of the units relative to the project when known, and the known sensitivity of those units based on the occurrence of fossils either in that unit or in correlative units;

4. An explanation of why, how, and how much sampling is expected to take place and in what units. Include descriptions of different sampling procedures that shall be used for fine-grained and coarse-grained units;

5. A discussion of the locations of where the monitoring of project construction activities is deemed necessary, and a proposed plan for monitoring and sampling;

6. A discussion of procedures to be followed in the event of a fossil discovery, halting construction, resuming construction, and how notifications will be performed;

7. A discussion of equipment and supplies necessary for collection of fossil materials and any specialized equipment needed to prepare, remove, load, transport, and analyze large-sized fossils or extensive fossil deposits;

8. Procedures for inventory, preparation, and delivery for curation into a retrievable storage collection in a public repository or museum, which meet the Society of Vertebrate Paleontology's standards and requirements for the curation of paleontological resources;

9. Identification of the institution that has agreed to receive data and fossil materials collected, requirements or specifications for materials delivered for curation, and how they will be met, and the name and phone number of the contact person at the institution; and

10. A copy of the paleontological conditions of certification.

Verification: At least 30 days prior to ground disturbance, the project owner shall provide a copy of the PRMMP to BLM's Authorized Officer and the CPM. The PRMMP shall include an affidavit of authorship by the PRS, and acceptance of the PRMMP by the project owner evidenced by a signature.

PAL-4 If after review of the plans provided pursuant to **PAL-2**, the PRS determines that materials with moderate, high, or unknown paleontological sensitivity could be impacted then, prior to ground disturbance and for the duration of construction activities involving ground disturbance, the project owner and the PRS shall prepare and conduct weekly BLM Authorized Officer- and CPM-approved training for the following workers: project managers, construction supervisors, foremen and general workers involved with or who operate ground-disturbing equipment or tools. Workers shall not excavate in sensitive units prior to receiving BLM Authorized Officer- and CPM-approved worker training. Worker training shall consist of an initial in-person PRS training during the project kick-off, for those mentioned above. Following initial training, a CPM-approved video or in-person training may be used for new employees. The training program may be combined with other training programs prepared for cultural and biological resources, hazardous materials, or other areas of interest or concern. No ground disturbance shall occur prior to BLM's Authorized Officer and CPM approval of the Worker Environmental Awareness Program (WEAP), unless specifically approved by the CPM.

The WEAP shall address the possibility of encountering paleontological resources in the field, the sensitivity and importance of these resources, and legal obligations to preserve and protect those resources.

The training shall include:

1. A discussion of applicable laws and penalties under the law;

2. Good quality photographs or physical examples of vertebrate fossils for project sites containing units of high paleontological sensitivity;

3. Information that the PRS or PRM has the authority to halt or redirect construction in the event of a discovery or unanticipated impact to a paleontological resource;

4. Instruction that employees are to halt or redirect work in the vicinity of a find and to contact their supervisor and the PRS or PRM;

5. An informational brochure that identifies reporting procedures in the event of a discovery;

6. A WEAP certification of completion form signed by each worker indicating that he/she has received the training; and

7. A sticker that shall be placed on hard hats indicating that environmental training has been completed.

Verification: (1) At least 30 days prior to ground disturbance, the project owner shall submit the proposed WEAP, including the brochure, with the set of reporting procedures for workers to follow.

(2) At least 30 days prior to ground disturbance, the project owner shall submit the script and final video to BLM's Authorized Officer and the CPM for approval if the project owner is planning to use a video for interim training.

(3) If the owner requests an alternate paleontological trainer, the resume and qualifications of the trainer shall be submitted to BLM's Authorized Officer and the CPM for review and approval prior to installation of an alternate trainer. Alternate trainers shall not conduct training prior to BLM's Authorized Officer and CPM authorization.

(4) In the monthly compliance report (MCR, the project owner shall provide copies of the WEAP certification of completion forms with the names of those trained and the trainer or type of training (in-person or video) offered that month. The MCR shall also include a running total of all persons who have completed the training to date.

PAL-5 The project owner shall ensure that the PRS and PRM(s) monitor consistent with the PRMMP all construction-related grading, excavation, trenching, and augering in areas where potential fossil-bearing materials have been identified, both at the site and along any constructed linear facilities associated with the project. In the event that the PRS determines full-time monitoring is not necessary in locations that were identified as potentially fossil-bearing in the PRMMP, the project owner shall notify and seek the concurrence of BLM's Authorized Officer and the CPM.

The project owner shall ensure that the PRS and PRM(s) have the authority to halt or redirect construction if paleontological resources are encountered. The project owner shall ensure that there is no interference with monitoring activities unless directed by the PRS. Monitoring activities shall be conducted as follows:

1. Any change of monitoring from the accepted schedule in the PRMMP shall be proposed in a letter or email from the PRS and the project owner to BLM's Authorized Officer and the CPM prior to the change in monitoring and will be included in the monthly compliance report. The letter or email shall include the justification for the change in monitoring and be submitted to BLM's Authorized Officer and the CPM for review and approval.

2. The project owner shall ensure that the PRM(s) keep a daily monitoring log of paleontological resource activities. The PRS may informally discuss

paleontological resource monitoring and mitigation activities with BLM's Authorized Officer and the CPM at any time.

3. The project owner shall ensure that the PRS notifies BLM's Authorized Officer and the CPM within 24 hours of the occurrence of any incidents of non-compliance with any paleontological resources conditions of certification. The PRS shall recommend corrective action to resolve the issues or achieve compliance with the conditions of certification.

4. For any paleontological resources encountered, either the project owner or the PRS shall notify BLM's Authorized Officer and the CPM within 24 hours, or Monday morning in the case of a weekend event where construction has been halted because of a paleontological find.

The project owner shall ensure that the PRS prepares a summary of monitoring and other paleontological activities placed in the monthly compliance reports. The summary will include the name(s) of PRS or PRM(s) active during the month, general descriptions of training and monitored construction activities, and general locations of excavations, grading, and other activities. A section of the report shall include the geologic units or subunits encountered, descriptions of samplings within each unit, and a list of identified fossils. A final section of the report will address any issues or concerns about the project relating to paleontological resource monitoring, including any incidents of non-compliance or any changes to the monitoring plan that have been approved by BLM's Authorized Officer and the CPM. If no monitoring took place during the month, the report shall include an explanation in the summary as to why monitoring was not conducted.

Verification: The project owner shall ensure that the PRS submits the summary of monitoring and paleontological activities in the MCR. When feasible, BLM's Authorized Officer and the CPM shall be notified 10 days in advance of any proposed changes in monitoring different from the plan identified in the PRMMP. If there is any unforeseen change in monitoring, the notice shall be given as soon as possible prior to implementation of the change.

PAL-6 The project owner, through the designated PRS, shall ensure that all components of the PRMMP are adequately performed including collection of fossil materials, preparation of fossil materials for analysis, analysis of fossils, identification and inventory of fossils, the preparation of fossils for curation, and the delivery for curation of all paleontological resource materials encountered and collected during project construction.

Verification: The project owner shall maintain in his/her compliance file copies of signed contracts or agreements with the designated PRS and other qualified research specialists. The project owner shall maintain these files for a period of three years after project completion and approval of BLM Authorized Officer- and CPM-approved paleontological resource report (see **PAL-7**). The project owner shall be responsible for paying any curation fees charged by the museum for fossils collected and curated as a

result of paleontological mitigation. A copy of the letter of transmittal submitting the fossils to the curating institution shall be provided to BLM's Authorized Officer and the CPM.

PAL-7 The project owner shall ensure preparation of a Paleontological Resources Report (PRR) by the designated PRS. The PRR shall be prepared following completion of the ground-disturbing activities. The PRR shall include an analysis of the collected fossil materials and related information, and submit it to the CPM for review and approval.

The report shall include, but is not limited to, a description and inventory of recovered fossil materials; a map showing the location of paleontological resources encountered; determinations of sensitivity and significance; and a statement by the PRS that project impacts to paleontological resources have been mitigated below the level of significance.

Verification: Within 90 days after completion of ground-disturbing activities, including landscaping, the project owner shall submit the PRR under confidential cover to BLM's Authorized Officer and the CPM.

Certification of Completion
Worker Environmental Awareness Program
ISEGS (07-AFC-5)

This is to certify these individuals have completed a mandatory California Energy Commission-approved Worker Environmental Awareness Program (WEAP). The WEAP includes pertinent information on cultural, paleontological, and biological resources for all personnel (that is, construction supervisors, crews, and plant operators) working on site or at related facilities. By signing below, the participant indicates that he/she understands and shall abide by the guidelines set forth in the program materials. Include this completed form in the Monthly Compliance Report.

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Cultural Trainer: _____ Signature:_____ Date: ___/___/____

PaleoTrainer: _____ Signature:_____ Date: ___/___/____

Biological Trainer: _____Signature:_____ Date:___/___/____

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LIVESTOCK GRAZING

Prepared by Robert Dover

SUMMARY OF CONCLUSIONS

U.S. Bureau of Land Management (BLM) and Energy Commission staff (hereafter jointly referred to as staff) have analyzed the potential impact of the proposed Ivanpah Solar Electric Generating System Ivanpah (ISEGS) project on cattle grazing and grazing administration at the proposed project site. The staff concludes that the proposed project would not have any significant impacts, as defined by the California Environmental Quality Act (CEQA), on the Clark Mountain Allotment, upon which the proposed project would be located. Because the public land at the proposed project location has been used as a grazing allotment, approval of the proposed project would require a modification of the grazing lease and reduction of total permitted Animal Unit Months (AUMs) and acreage based upon forage found on the project footprint. BLM estimates that the total number of AUMs associated with the 4,073 acre project would be 70 AUMs. There are currently 1,428 AUMs leased on the entire Clark Mountain Allotment. Approval of the proposed project would involve fencing of the entire project footprint, thus eliminating any potential use of the 70 AUMs on the project site for grazing during the lifespan of the proposed facility. With respect to National Environmental Policy Act (NEPA) guidelines for significance, these impacts would be adverse in the proposed project area, but would be limited to that area, and would not affect grazing resources in the remainder of the allotment, and thus would not be a significant adverse impact. Speed limits of 10 miles per hour (mph) on unpaved roads and 25 mph on stabilized roads imposed for fugitive dust control as would be required under **Air Quality Conditions of Certification AC-SC3 and AQ-SC7** are expected to be effective in also protecting grazing livestock from vehicle strike. Fencing of project construction areas and of permanent facilities used during operations would also be required as a component of the Construction and Operation Site Security Plans as would be specified under **Hazardous Materials Conditions of Certification HAZ-4 and HAZ-5** respectively. The speed limit and fencing mitigation measures that would apply during construction and operation on the project site would minimize hazards to cattle when they are grazing near this portion of the allotment and result in a less than significant impact.

Selection of the No Action Alternative would result in no required changes to the allotment or grazing management operations.

Cumulative impacts on this allotment, as well as the overall availability of land for grazing, may result from the combination of this proposed project with other proposed land uses that would require reduction of total permitted AUMs, including other solar energy projects and the proposed DesertXpress rail line. With respect to NEPA, the overall impact of the proposed projects in the area on the Clark Mountain Allotment may be considerable if the proposed Desert Xpress line is constructed and the rail line cuts off livestock access to portions of the allotment. However, the contribution of the proposed ISEGS project to that cumulative impact is relatively small.

Conditions of Certification referred to herein serve the purpose of both the Energy Commission's Conditions of Certification for purposes of CEQA and BLM's Mitigation Measures for purposes of NEPA.

INTRODUCTION

The purpose of the **Livestock Grazing** section of this Final Staff Assessment/Draft Environmental Impact Statement (FSA/DEIS) is to determine if the proposed ISEGS could potentially cause significant impacts to livestock grazing and grazing administration. Livestock grazing has been and continues to be a use of renewable resources on public land in the California Desert. The Taylor Grazing Act of 1934, Federal Land Policy and Management Act of 1976 (FLPMA) and the Public Rangelands Improvement Act of 1978 (P.L. 95-514) recognize livestock grazing as a principal use of public land for the production of food and fibers. This section evaluates whether the proposed project and alternatives would comply with applicable state and local laws, ordinances, regulations and standards (LORS) pertaining to land use for grazing purposes. It also evaluates the scope of the potential impacts with respect to CEQA and the definitions of significance provided in NEPA implementing regulations found in 40 CFR 1508.27.

LAWS, ORDINANCES, REGULATION, AND STANDARDS

The following federal, state, and local laws and policies apply to the administration of livestock grazing. Staff's analysis examines the project's compliance with these requirements.

LIVESTOCK GRAZING Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Potentially Applicable Law	Description
Federal	
Taylor Grazing Act of June 28, 1934	Congress passed the Taylor Grazing Act in 1934 to direct occupancy and use of public rangelands, to preserve natural resources from destruction or unnecessary injury, provide for the orderly use, improvement, and development of rangelands.
Federal Land Policy and Management Act (FLPMA)	Section 202 of FLPMA requires BLM to develop and maintain land use plans for public lands, which in turn identify lands that are available for the issuance of permits or leases for grazing.
Public Rangelands Improvement Act (PRIA)	Defines rangeland, establishes a national policy to improve the condition of rangelands, requires a national inventory of rangelands, and authorizes funding for range improvement projects.
43 CFR Section 4100	Regulations under which BLM administers its grazing program.
California Desert Conservation Area (CDCA) Plan	Defines Multiple-Use Classes for BLM-managed lands in the CDCA, which includes the land area encompassing the proposed project location.
Northern and Eastern Mojave Desert Management Plan (NEMO)	An amendment to the CDCA Management Plan, the NEMO Plan establishes standards and guidelines for grazing activities in the NEMO

	Planning Area.

SETTING

Under the CDCA Plan, 4.5 million acres (36 percent of public lands in the CDCA) in 54 grazing allotments are available for grazing, of which the Clark Mountain Allotment is one. The CDCA Plan prescribes the area and the sustainable amount of forage in animal unit months (AUMs) for each allotment. An AUM is a measure of forage that sustains one cow/calf pair for one month. Allotments with perennial forage have an established limit of forage based on the quality and quantity of perennial plants and are permitted in AUMs for a defined period of grazing use. Perennial forage use is typically authorized to be consumed at the same level from year to year unless forage production does not meet seasonal norms.

BLM Clark Mountain Allotment Grazing Lease

The ISEGS site is located within the existing BLM Clark Mountain Allotment Grazing Lease, which is a perennial/ephemeral allotment (Allotment #09003). The allotment contains 97,560-acres of public lands. The approximate 4,073-acre ISEGS site boundary is approximately 4 percent of the area of the allotment.

Pursuant to 43 CFR 4100, Section 4110.4-2 (b) when grazed public lands within allotments, or smaller portions , are disposed of or devoted to a public purpose other than livestock grazing, adjustments to the grazing lease's active use AUMs are made to reflect the loss of available livestock forage from that area. The lessee shall be given two years prior notification before their grazing lease is modified and this time is to remove any range improvements that may be within the project footprint and for the livestock producer to make livestock management adjustments. Should the proposed project be approved, BLM would issue a decision to modify allotment boundaries and reduce the grazing permitted use as part of the ISEGS Record of Decision.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

Because the solar project would be located on federal land, California state regulations which protect and manage farmlands, including livestock grazing, are not applicable to the proposed project area. The impact of the proposed project and alternatives on livestock grazing would be considered significant under CEQA if the result of the ISEGS' displacement of grazing cattle were to cause a significant impact on the environment or to livestock.

Under NEPA, the impact of the proposed project and alternatives on the Clark Mountain Allotment would be considered significant if they would involve changes in the existing environment which, due to their nature or location, could result in a significant reduction in foraging opportunities to plant communities on the ISEGS site or to the safety of livestock.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Proposed Project

The ISEGS project area comprising Ivanpah 1, 2 and 3, located entirely within the Clark Mountain Allotment, would be completely fenced to exclude livestock. Livestock would no longer have access to graze the forage from plant communities associated with the site. Approval of the project would require a modification of the grazing lease, by reducing the total active AUMs as calculated from past range adjudication methods.

With respect to NEPA significance criteria, the vegetation communities within the 3,712 acre project site produce small amounts of livestock forage relative to more productive plant communities found on higher elevation areas elsewhere within the allotment. These higher elevations produce the majority of the forage. Below 3,500 feet in elevation, forage production is better described as ephemeral rangeland. Ephemeral rangelands means the Hot Desert Biome regions that do not consistently produce enough forage to sustain a livestock operation but may briefly produce unusual volumes of forage to accommodate livestock grazing.

This proposed project would cause a 70 AUM reduction to grazing preference on the Clark Mountain Allotment that has been grazed for many years and is expected to continue at the reduced level..

When livestock are present on the allotment, it is anticipated that they will not visit areas immediately around the project site for two reasons related to the availability of water: 1) there are no water sources in the immediate vicinity of the project; and 2) there are other locations within the allotment that offer more desirable forage and water to support livestock grazing.

This proposed project would result in minor impacts to the livestock operator, his livestock, and the quality of the remainder of the allotment as wildlife habitat, recreational use, or other multiple uses. The geographic scope of the impact would include three power plants comprising a relative small amount (4%) of the Clark Mountain Allotment. The impact would not affect public health or safety, and would not impact land with unique characteristics.

Mitigation

Staff believes that this project would pose no significant risk to grazing livestock if recommended mitigation measures are implemented. Speed limits of 10 miles per hour (mph) on unpaved roads and 25 mph on stabilized roads imposed for fugitive dust control as would be required under **Air Quality Conditions of Certification AC-SC3 and AQ-SC7** are expected to be effective in also protecting grazing livestock from vehicle strike. Fencing of project construction areas and of permanent facilities used during operations would also be required as a component of the Construction and Operation Site Security Plans as would be specified under **Hazardous Materials Conditions of Certification HAZ-4 and HAZ-5** respectively. The speed limit and fencing mitigation measures that would apply during construction and operation on the project site would minimize hazards to cattle when they roam the allotment in search of forage, and thus the project would result in a less than significant impact. With respect

to CEQA, there would not be a significant adverse impact because discontinuing livestock grazing at the ISEGS site would not result in damage to the desert environment or to livestock.

Project Closure and Decommissioning

Upon project closure and decommissioning, the land that comprises the project footprint would be rehabilitated to reestablish plant communities originally occurring on the site before the original grant was issued. Following the achievement of the objectives for rehabilitation, as outlined in the rehabilitation plan, the ROW grant would then be cancelled adding 3,712 acres of reclaimed land back to the land base of Clark Mountain Allotment. Any AUMs suspended during the life of this project would be removed from suspension, increasing total Active Use AUMs of the current grazing lease for the allotment.

Should relinquishment of the grazing lease for Clark Mountain Allotment and reallocation of forage to wildlife purposes occur in accordance with NEMO, then the land would be managed in the same way as the surrounding non-withdrawn areas.

No Project/No Action Alternative

The No Action alternative would leave the land area under existing management, and therefore available for grazing use. Livestock grazing would continue to be managed and authorized under the appropriate management plans, regulations, and other policies.

CUMULATIVE IMPACTS AND MITIGATION

In addition to the proposed Ivanpah SEGS facility, there are other reasonably foreseeable future actions that could contribute to impacts to the Clark Mountain Allotment. Regionally, impacts to livestock grazing in the planning area have been occurring for 100 years or more. Authorized and unauthorized vehicle use and maintenance and construction of utility rights of way can have an impact to livestock grazing by removal of vegetation utilized for forage, and there is always a danger of vehicle collisions with cattle. The impact of the proposed and probable development projects (mineral production, solar projects, rail lines, and airports) may be more substantial if they require significant reductions in the acreage of existing allotments.

Examples of recent and future development and land use changes in the Ivanpah area that may impact the allotment include:

- Other solar projects, including the proposed FirstSolar facility that would also be located within the Clark Mountain Allotment;
- The proposed Port-of-Entry to be constructed by the California Department of Transportation (CalTrans) near the Yates Well exit on Interstate 15; and
- Various proposed high-speed rail lines connecting Las Vegas to the Los Angeles area, including the Desert Xpress rail line, and proposed Maglev projects.

The proposed ISEGS project, by itself, would reduce the area of the Clark Mountain Allotment by approximately 4% and would reduce the AUMs permitted on the allotment

by 4.7%. This impact would occur on the lower elevations of the allotment, an area which provides lower quality forage than the higher elevation areas. Although the exact size and footprint of the proposed FirstSolar facility has not been finalized, it is likely to be of the same or smaller size than ISEGS, and is also located on the lower slopes of the alluvial fan. The Port-of-Entry would comprise an area of less than 150 acres, and also would occur on the lower elevations. Therefore, the combination of these three items would constitute a reduction of approximately 8% of the lower quality portion of the allotment.

The future route of the proposed high-speed rail lines, especially the proposed Desert Xpress, is not known to the extent necessary to evaluate its contribution to the cumulative impact on the Clark Mountain Allotment. One proposed alignment of the Desert Xpress would be located to the north and west of ISEGS and the proposed FirstSolar project. Because the route would need to be fenced to keep cattle away from the rail system, the proposed rail line would remove a much greater percentage of the land area available within the Clark Mountain Allotment. In addition, this proposed alignment would be located at a higher elevation on the alluvial fan, so the eliminated acreage would be of higher quality than that affected by ISEGS.

Overall, the impact on the grazing allotment is not significant with respect to CEQA because the discontinuance of livestock grazing at the ISEGS site would not contribute to cumulatively considerable damage to the desert environment or to livestock. With respect to NEPA, the overall impact of the proposed projects in the area may be considerable if the proposed Desert Xpress line is constructed. However, the contribution of the proposed ISEGS project to that cumulative impact is relatively small.

COMPLIANCE WITH LORS

In general, the Federal LORS related to grazing have to do with the classification of land suitability for grazing, establishment of administrative requirements for the leasing of grazing on public lands, and standards to be followed by lessees in order to protect the environment. Although the land of the proposed project is currently part of an allotment, administrative means for modifying the acreage within an allotment are available. Therefore, approval of the proposed project would comply with the applicable federal regulations and laws.

The state LORS associated with the California Department of Conservation and the Williamson Act are not applicable to the proposed project, because federal lands are not subject to state classification or contract. Therefore, approval of the proposed project would comply with applicable state regulations and laws.

NOTEWORTHY PUBLIC BENEFITS

Approval of this proposed project would not have any impacts on grazing which could be considered to provide a public benefit. The proposed project would not increase the availability or quality of grazing lands in other locations, nor would it mitigate environmental impacts to grazing lands in other areas.

PUBLIC AND AGENCY COMMENTS ON THE PSA

Livestock Grazing was not included as a section within the PSA.

CONCLUSIONS

The issue of cattle grazing and grazing administration is directly applicable to the proposed project because the public lands associated with the proposed project are within an active grazing allotment. Because the proposed project would involve removal of vegetation and fencing off of the entire property, approval of the proposed project would require modifying the allotment boundaries, resulting in a minor reduction in allotment size of 4%. Administratively, this modification can be accomplished through BLM administrative procedures. In addition, increased traffic associated with construction and operation of the proposed project could potentially but are not expected to cause injury of death to individual cattle through vehicle strikes because the livestock may well avoid the area in its entirety because of the human activities that would occur on the site which livestock would avoid. Under NEPA, the impact would be modification of the allotment boundaries, resulting in a minor 4% reduction in allotment acreage which is not considered a significant adverse impact to foraging opportunities or to the safety of livestock. With respect to CEQA, there would not be a significant adverse impact because discontinuing livestock grazing at the ISEGS site would not result in damage to the desert environment or affect the safety of livestock.

The No Action Alternative would not have any impact on the characteristics or administration of the allotment.

With respect to NEPA, the cumulative impact of the proposed project, in combination with other proposed projects (FirstSolar, DesertXpress, and the Port-of-Entry) in the area may be considerable if the proposed Desert Xpress line is constructed to eliminate livestock access to portions of the allotment. However, the contribution of the proposed ISEGS project to the overall cumulative impact is relatively minor and is not considered a significant cumulative impact.

MITIGATION MEASURES/PROPOSED CONDITIONS OF CERTIFICATION

No additional Conditions of Certification are necessary to address protection of grazing cattle as those determined necessary by staff are already included in other sections of the FSA/DEIS as summarized in this **Livestock Grazing** section under **Mitigation**.

REFERENCES

BSE2007a – Bright Source Energy/ Solar Partners I, LLC/ J. Woolard (tn: 42174). Application for Certification, Volumes I and II, for the Ivanpah Solar Electric Generating System. Submitted to CEC/Docket Unit on 8/31/2007.

WILD HORSES AND BURROS

Prepared by Robert Dover

SUMMARY OF CONCLUSIONS

U.S. Bureau of Land Management (BLM) and Energy Commission staff (hereafter jointly referred to as staff) have analyzed the potential impact of the proposed Ivanpah Solar Electric Generating System (ISEGS) project on wild horses and burros at the proposed project site. Staff concludes that the proposed project would have no significant impact, as defined either by the California Environmental Quality Act (CEQA) or by National Environmental Policy Act (NEPA), on wild horses and burros at the proposed project location. The proposed project location was formerly included within a Herd Management Area (HMA) established by the California Desert Conservation Area Management Plan (CDCA Plan). Although no wild horses are present in this area, burros are present. In the NEMO Plan Amendments, the Appropriate Management Level (AML) for burros in the Clark Mountain HMA was reduced from 44 to 0, and approximately 100 burros were removed from the area in January 2007.

Although burros are known to still exist in the area, BLM plans to remove the remaining individuals.. Until that gather is accomplished, the remaining individuals are to be protected from harassment or injury by the provisions of the Wild and Free-Roaming Horses and Burros Act. Increased traffic associated with construction and operation of the proposed project could potentially cause injury or death to individual burros through vehicle strikes. Speed limits of 10 miles per hour (mph) on unpaved roads and 25 mph on stabilized roads imposed for fugitive dust control as would be required under **Air Quality Conditions of Certification AC-SC3 and AQ-SC7** are expected to be effective in protecting the remaining burros from vehicle strike. Individual burros could also be injured or killed if they were to fall into excavations associated with project construction activities. Fencing of project construction areas and of permanent facilities used during operations would also be required as a component of the Construction and Operation Site Security Plans as would be specified under **Hazardous Materials Conditions of Certification HAZ-4 and HAZ-5** respectively. Project construction and operations workers shall be notified of the protection requirements of the Wild and Free-Roaming Horses and Burros Act through training and/or the placement of signs as would be required under the Worker Environmental Awareness Program specified in **Biological Resources Condition of Certification BIO-6**. Staff believes these recommended mitigation measures would ensure protection of the remaining burro individuals until they are completely removed by BLM.

Selection of the No Action Alternative would have no effect on wild horses and burros.

Cumulative impacts on burros may result from the combination of this proposed project with other current and reasonably foreseeable future land uses, including other solar energy projects. These impacts would result from the reduction of area of the HMAs in which they are managed, as well as potential hazards due to increased traffic. Under NEPA, the cumulative impact would be considered minor because the Northern and Eastern Mojave Desert Management Plan (NEMO Plan) Amendments have established the AML in the vicinity of the proposed project area at zero, meaning BLM is actively

involved in removing all burros within the HMA and the area within this project site is a minor forage producing area relative to other locations elsewhere within the HMA Conditions of Certification referred to herein serve the purpose of both the Energy Commission's Conditions of Certification for purposes of the California Environmental Quality Act (CEQA) and BLM's Mitigation Measures for purposes of the National Environmental Policy Act (NEPA).

INTRODUCTION

The purpose of the **Wild Horses and Burros** section of this Final Staff Assessment/Draft Environmental Impact Assessment (FSA/DEIS) is to determine if the proposed ISEGS could potentially cause significant impacts to wild horses or burros. This section provides the staff's analysis of the impact of the proposed project and alternatives on wild horses and burros. Wild horses and burros are protected by the Wild and Free-Roaming Horse and Burro Act of 1971 (P.L. 92-195), as amended by the FLPMA and the Public Rangelands Improvement Act of 1978 (P.L. 95-514), that declares these animals an integral part of the public land resources. Through the Act, Congress declared that: "It is the policy of Congress that wild free-roaming horses and burros shall be protected from capture, branding, harassment, or death; and to accomplish this they are to be considered in the area where presently found, as an integral part of the natural system of the public lands" and are to be managed "in a thriving natural ecological balance." Proper management is required to achieve and maintain population levels to ensure healthy herds and animals and to maintain a thriving natural ecological balance through reduction or eliminating of conflicts now creating severe adverse impacts on other highly valued natural resources, especially wildlife. BLM regulations pertaining to wild horses and burros are specified in 43 CFR Part 4700, and the 4700 BLM Manual Series prescribes the authorities, objectives, and policies that guide the protection, management, control, and disposition of wild horses and burros.

The CDCA Plan included a Wild Horse and Burro Element which contained the following goals:

- provide year-long food requirements of wild horses and burros;,
- provide adequate cover for wild horses and burros;
- provide adequate living space for wild horses and burros; and
- protect wild horses and burros on public lands.

The CDCA Plan established 17 Herd Management Areas (HMAs) where populations of wild horses and burros would be managed and protected. Components of some of the HMAs, including boundaries and Appropriate Management Levels (AMLs) were revised through the NEMO Plan amendments to the CDCA Plan.

This section evaluates the proposed project and alternatives with respect to the definitions of significance provided in NEPA implementing regulations found in 40 CFR 1508.27.

LAWS, ORDINANCES, REGULATION, AND STANDARDS

The following federal laws and policies apply to the administration of wild horses and burros. Staff's analysis examines the project's compliance with these requirements.

WILD HORSES AND BURROS Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
Wild and Free-Roaming Horse and Burro Act (1971)	Requires the inventorying of populations to establish Appropriate Management Levels (AMLs), and defines procedures to be used for the management and adoption of individuals in order to maintain AMLs. Prohibits harassment or injury to individuals.
Federal Land Policy and Management Act (FLPMA)	Modifies the Wild and Free-Roaming Horse and Burro Act to allow the use of helicopters in herd management.
Public Rangelands Improvement Act (PRIA)	Modifies the Wild and Free-Roaming Horse and Burros Act by defining "excess animals", and by modifying inventory procedures and adoption standards.
California Desert Conservation Area (CDCA) Management Plan	Establishes 17 Herd Management Areas (HMAs), including the Clark Mountain HMA in the proposed project area.
Northern and Eastern Mojave Desert Management Plan (NEMO)	The NEMO Plan amends the CDCA Plan by reducing the Appropriate Management Level (AML) for burros in this area from 44 to 0.

SETTING

Wild burros inhabiting the United States are descendents of the Nubian and Somali wild ass (*Equus asinus*) of northeastern Africa. The burro was domesticated over 5,000 years ago in Africa and used as a beast of burden. Spanish explorers introduced the burro as a domesticated animal to North America in the 16th century. Wild burro populations became established in the arid southwest as a result of domestic escapees and from burros being intentionally turned loose when they were no longer needed.

The CDCA Plan established 17 HMAs, including the Clark Mountain HMA, which includes the proposed project location. The Clark Mountain HMA, which encompasses 233,407 acres in the northern and eastern portions of the Clark Mountain Range, is managed by the BLM, and is covered under BLM's East Mojave Herd Management Area Plan. No wild horses have been documented in the Clark Mountain HMA, but burros have been observed near the proposed project location as recently as May 2008.

Historically, BLM management of this herd has included the removal of burros to maintain population levels at the established AML of 44 burros. There was a burro gather conducted in April 2001, where 79 burros were removed from the east side of Clark Mountain. The gathered burros were placed in the BLM's National Wild Horse and Burro Adoption Program.

A component of the NEMO Plan Amendment is the reduction of the AML for burros in this area of the HMA from 44 to 0. The purpose of this amendment was to reduce grazing and therefore assist the recovery of desert tortoise. In implementation of the NEMO Plan Amendment, nearly 100 burros were removed by BLM in January 2007. Burros are still known to exist in this area, with burros observed a few miles to the west in Wheaton Wash in May 2008. Although BLM plans to remove the remaining burros, the remaining burros are still protected by the provisions of the Wild and Free-Roaming Horses and Burros Act.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

The impact of the proposed project and alternatives on wild horses and burros would be considered significant under NEPA if they would involve changes in the existing environment which, due to their nature or location, could result in interference with BLM's management of HMAs. The staff's evaluation of the significance of the impact of the proposed project on wild horses and burros includes an assessment of the context and intensity of the impacts, as defined in the NEPA implementing regulations 40 CFR Part 1508.27. The impact of the proposed project and alternatives on wild horses and burros would be considered significant under CEQA if the result of the ISEGS' displacement of wild horses and burros were to cause a significant impact on the environment.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Proposed Project

The proposed project location is included within the Clark Mountain HMA, which has historically been managed to protect burro populations. No wild horses have been documented in the Clark Mountain HMA. Although burros are still know to be present in the area, the AML for burros in this area of the HMA was reduced from 44 to 0 through the NEMO Plan Amendment, and BLM implemented burro removal in 2007. All remaining burros are expected to be removed.

The proposed project would include the removal of vegetation and installation of fencing of the entire 3,712-acre project area comprising those facilities that would cause permanent disturbance including Ivanpah 1, 2 and 3 power plants, Ivanpah substation, the administration area and some features of linear facilities. The proposed project would make the project area inaccessible for grazing of individual burros. Construction and operation of the proposed project is expected to involve increased traffic use of the existing roads from the Yates Well Road exit on Interstate 15 to the proposed project location. Increased traffic levels could impact burros by causing vehicle strikes. Additionally, burros could be injured or killed by falling into trenches or stormwater management systems during construction of the proposed project. Following construction, fencing is expected to keep burros outside of the proposed project location.

With respect to NEPA, the proposed project would have a direct, adverse impact on 3,712 acres of land area that is currently used for grazing by existing burro populations.

Because the AML for burros in the HMA is zero, and BLM has been actively removing burros from the HMA, the impact of the proposed project on burros would not be considered to be significant under NEPA. The impact on the existing burros would not affect public health or safety, would not impact land with unique characteristics (such as HMAs), and is not likely to have uncertain risks associated with it. With respect to CEQA, there would not be a significant adverse impact because removing burros from the ISEGS site would not result in damage to the desert environment including the burros.

Mitigation

Staff believes that this project would pose no significant risk to wild horses and burros, if recommended mitigation measures are implemented. Prior to commencement of proposed project activity, project personnel shall be briefed regarding the potential presence of burros within the project area as would be included in the Worker Environmental Awareness Program specified in **Biological Resources Condition of Certification BIO-6**. Speed limits of 10 mph on unpaved roads and 25 mph on stabilized roads established for fugitive dust control during construction and operations in accordance with **Air Quality Conditions of Certification AC-SC3 and AQ-SC7** are expected to be sufficient to reduce risk of injury or death to burros by vehicle strike. In order to protect burros against other construction-related injury, all project construction areas should be fenced to eliminate access by burros to any excavations developed during construction. Fencing is a component of the Construction and Operation Site Security Plans specified in **Hazardous Materials Conditions of Certification HAZ-4 and HAZ-5** respectively**.** These conditions would also protect burros in portions of the project area where maintenance is taking place outside of fenced boundaries during project operations.

Project Closure and Decommissioning

Upon project closure and decommissioning, the land that comprises the project footprint would be rehabilitated to reestablish plant communities originally occurring on the site before the original grant was issued. Following the achievement of the objectives for rehabilitation, as outlined in the rehabilitation plan, the ROW grant would then be cancelled adding 3,712 acres of reclaimed land back to the land base of Clark Mountain Allotment and the HMA that may very well be free of burros.

No Project/No Action Alternative

The No Action alternative would not affect BLM's current plans with respect to management of the remaining burros.

CUMULATIVE IMPACTS AND MITIGATION

The cumulative impact analysis area for burros is their range within the Clark Mountain HMA boundary. The time frame for the analysis is long term. In addition to the proposed ISEGS facility, there are many other past, present, or reasonably foreseeable future actions that contribute to impacts to burros on the Clark Mountain HMA, or on

other HMAs within the Mojave Desert as listed in the **Cumulative Scenario** section of the FSA/DEIS. Examples of recent and future development and land use changes in the Ivanpah area that may impact burros include:

- Authorized and unauthorized vehicle use.
- Maintenance and construction of utility rights of way.
- Mineral exploration and production.
- Other solar projects, including the proposed FirstSolar facility that would also be located within the Clark Mountain Allotment.
- The proposed Desert Xpress rail line.
- The proposed Southern Nevada Supplemental Airport facility at Jean, Nevada.

Regionally, impacts to burros in the CDCA planning area have been occurring for 100 years or more. Authorized and unauthorized vehicle use and maintenance and construction of utility rights-of-way can have a slight impact to burros by removal of vegetation utilized for forage, and there is always a danger of vehicles colliding with burros. The impact of the proposed and probable development projects (mineral production, solar projects, rail lines, and airports) would cumulatively remove and isolate potential grazing sites for burros. However, with implementation of the mitigation measures identified by staff and noted above, the ISEGS contribution to cumulative impacts would not be considered significant.

COMPLIANCE WITH LORS

In general, the Federal LORS related to grazing have to do with the establishment of HMAs, definition of the AMLs within each HMA, and the administrative procedures for removing excess animals. Because AML for the Clark Mountain HMA is zero, impacts of the proposed project on burros would not be out of compliance with any of the federal LORS associated with wild horses and burros. Therefore, approval of the proposed project would comply with the grazing and rangeland components of these regulations and plans.

NOTEWORTHY PUBLIC BENEFITS

Approval of the proposed project would not have any effects on burros which could be considered to provide a public benefit. The loss of marginal quality forage base associated with the project footprint should not impact burros as other areas within Clark Mountain Allotment provide more abundant and better quality forage for burros when in the Clark Mountain HMA. Full performance from the project may not be realized until after burros have been removed in accordance with the NEMO Plan Amendment.

PUBLIC AND AGENCY COMMENTS ON THE PRELIMINARY STAFF ASSESSMENT (PSA)

Wild Horses and Burros was not included as a section within the PSA.

CONCLUSIONS

The issue of burros is directly applicable to the proposed project because the public lands associated with the proposed project coincides with a designated HMA, and because burros are known to exist in the vicinity of the proposed project location. Because the proposed project would involve removal of vegetation and fencing of the entire 3,712 acre property that would be permanently disturbed, approval of the proposed project would eliminate a small portion of the land area available for the existing burros. In addition, increased traffic associated with construction and operation of the proposed project could potentially cause injury or death to individual burros through vehicle strikes. Individual burros could also be injured or killed if they were to fall into excavations associated with project construction activities or fed and watered by humans in the immediate vicinity of the project footprint.

These impacts are not significant under NEPA, as the impact to burrows will be minor. The NEMO Plan Amendments have established the AML in the vicinity of the proposed project area at zero, meaning BLM is actively involved in removing all burros within the area. In addition, the proposed mitigation measures would avoid injury to burros while they may still be present in the project area or vicinity. With respect to CEQA, there would not be a significant adverse impact because removing burros from the ISEGS site would not result in damage to the desert environment including the burros.

The No Action Alternative would not have any impact on the characteristics or administration of the burros.

The proposed project would contribute incrementally to the long-term reduction of public lands available for burros in the California Desert due to the cumulative effects of development. The effect of development on burros within the local area (Clark Mountain Allotment and Ivanpah Valley area) may become pronounced due to the proximity of the area to Las Vegas, easy public access by the use of Interstate 15, increasing tourist and recreational use of the area, and planned development projects (FirstSolar, Desert Xpress, and the Southern Nevada Supplemental Airport). However, it is already the policy of BLM, under the NEMO Plan Amendments, to remove all burros from the proposed project area. Therefore, the cumulative effect of these development projects is not expected to be significant.

MITIGATION MEASURES/PROPOSED CONDITIONS OF CERTIFICATION

No additional Conditions of Certification are necessary to address protection of wild horses and burros as those determined necessary by staff are already included in other sections of the FSA/DEIS as summarized in this **Wild Horses and Burros** section under **Mitigation**.

REFERENCES

BSE2007a – Bright Source Energy/ Solar Partners I, LLC/ J. Woolard (tn: 42174). Application for Certification, Volumes I and II, for the Ivanpah Solar Electric Generating System. Submitted to CEC/Docket Unit on 8/31/2007.

RECREATION

Prepared by Robert Dover, William Walters, P.E. and John Kessler, P.E.

SUMMARY OF CONCLUSIONS

BLM and Energy Commission staff (hereafter jointly referred to as staff) have analyzed the potential impact of the proposed Ivanpah Solar Electric Generating System (ISEGS) project on recreational resources at the proposed project site. The staff concludes that the proposed project would not have any direct or indirect significant impacts to recreational resources, as considered under the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA).

Recreation affected by the proposed action can be grouped into three categories; wind-powered sports located on the Ivanpah Dry Lake, recreationists that travel through the area to adjacent recreation opportunities, and to a small degree, dispersed recreation in the valley itself.

Wind-powered Sports

The project could impact land sailing on the Ivanpah Dry Lake surface if it were to modify stormwater and sedimentation characteristics or result in hazardous materials, waste or debris being transported to the Dry Lake. However, staff has proposed mitigation measures in the **Soil and Water, Hazardous Material and Waste Management** sections that would mitigate these impacts to less than significant. Staff concludes that the project would not modify wind characteristics, or impose a visual glare hazard that could appreciably distract land sailors.

Adjacent Recreation Opportunities

Through its visibility, the proposed project may affect the quality of recreational experiences in a large area outside of the proposed project boundaries by transforming the Ivanpah Valley area from a mostly natural setting to a more industrial setting. This might result in some recreational users choosing to move to other locations away from the more industrial setting. When the project is decommissioned, reclamation efforts would return the area to a more natural but still very noticeable setting, considering the extensive time needed for native vegetation to re-establish after long-term project disturbance.

Dispersed Recreation

Opportunities for this type of recreation have been mostly lost due to previous development of the area including Interstate 15, utility transmission lines, Primm Casino, and Primm Golf Course. Approval of the proposed project would require elimination or redirection of any existing access roads traversing through the proposed project area. Except for the realignment of Colosseum Road, any use of the land for recreational uses during the lifespan of the proposed facility would be precluded.

Selection of the No Action Alternative would result in no impacts to recreational resources. Existing roads and trails through the proposed project site would not be affected. There would be no visual changes that may impact recreation use in the vicinity.

The proposed project would contribute incrementally to the long-term reduction of outdoor recreation quality available in the Ivanpah Valley area of the California Desert due to the cumulative effects of development leading to a transformation from a natural setting to a more industrial setting. The adverse effect of development on recreational resources within the Ivanpah Valley area may become pronounced due to the proximity of the area to Las Vegas, ease of public access from Interstate 15, increasing tourist use of the Primm area, and planned development projects including FirstSolar, Desert Xpress, and the Southern Nevada Supplemental Airport. Staff concludes that the proposed project would contribute to diminishing the quality of outdoor recreation experiences in the Ivanpah Valley area, but even when considered with other existing and foreseeable projects, ISEGS would not contribute to a cumulatively considerable impact to recreation in the Ivanpah Valley and surrounding area.

Staff has proposed Condition of Certification **REC-1** to conform with Public Resources Code §25529 that would require the applicant to establish an area for public use by the development of a Solar / Ecological Interpretive Center within the Construction Logistics Area.

INTRODUCTION

The purpose of the **Recreation** section of this Final Staff Assessment/Draft Environmental Impact Assessment (FSA/DEIS) is to analyze the possible effects the proposed action and alternatives would have on recreation resources and determine if those impacts could be significant. Recreation has been and continues to be an important use of public land in the California Desert, including the Clark Mountain and Ivanpah Valley areas. The Federal Land Policy and Management Act of 1976 (FLPMA) recognizes recreation as a principal or major use of public land, and in its Declaration of Policy (Title I) states that it is the policy of the United States that the public lands be managed in a manner that will provide for outdoor recreation. Recreational uses of public lands may either be informal, casual uses which are managed by BLM through the land use planning process, or formally-approved uses managed through a BLM permitting process.

This section evaluates the proposed project and alternatives using the Recreational Resources section in the CEQA guidelines to determine if they would result in significant impacts under CEQA, and whether the proposed project and alternatives would comply with applicable state and local LORS pertaining to recreation. It also evaluates the scope of the potential impacts with respect to the definitions of significance provided in 40 CFR 1508.27.

LAWS, ORDINANCES, REGULATION, AND STANDARDS

The following federal, state, and local laws and policies apply to the administration of recreation. Staff's analysis examines the project's compliance with these requirements.

RECREATION Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
Federal Land Policy and Management Act (FLPMA)	Recognizes that it is the policy of the United States that the public lands be managed in a manner which will provide for outdoor recreation.
California Desert Conservation Area (CDCA) Plan	Defines Multiple-Use Classes for BLM-managed lands in the CDCA, which includes the land area encompassing the proposed project location.
Northern and Eastern Mojave Desert Management Plan (NEMO) Amendment	The purpose of this amendment to the CDCA Plan was to evaluate land use changes necessary to protect threatened and endangered species. This included changes in permitted recreational uses and designated routes of travel.
State	
Warren-Alquist Act	§25529 requires that when a facility is proposed to be located in the coastal zone or any other area with recreational, scenic, or historic value, the commission will require, as a condition of certification that an area be established for public use.

SETTING

The Mojave Desert is a popular recreation destination, with people drawn to its open spaces, diverse landscapes, unique geography, and freedom from the restrictions of more urban areas. The desert provides resources that are necessary for a variety of recreational experiences. These resources include unique geography such as dry lakes and sand dunes, scenic values, solitude, and freedom from the structure and regulations of urban areas. In general, all recreational activities in the desert are dependent upon vehicle access to some degree, with visitors directed to travel on previously designated and marked motorized vehicle routes. Most public recreation use of BLM-administered lands is casual, and unsupervised. BLM management of some recreational activities occurs in relation to off-highway vehicle (OHV) events, permitted commercial and organized activities (bighorn sheep hunts, trail rides, and vision quests), and within specific local wildlife conservation sites. These activities are formally authorized through the Special Recreation Permit process.

A variety of recreational activities occur on public lands in the proposed project area. These include auto touring, backpacking, biking, camping, climbing, hiking, horseback riding, nature walks, star gazing, wilderness areas, and wildlife viewing. In addition, sightseers, painters, and photographers are drawn by spring wildflower displays, and year-round bird-watching. Clark Mountain, managed by the Mojave National Preserve (MNP) located within a few miles to the west of the proposed project location provides rock climbing, hiking, hunting, and wildlife viewing.

The proposed project would be located within Ivanpah Valley, which comprises approximately 37,280 acres. A prominent feature of Ivanpah Valley is the Ivanpah Dry Lake, located less than two miles to the east, and down gradient, of the proposed project location. Due to the unique character of its extensive flat surface, the Ivanpah Dry Lake has been designated by BLM for non-motorized, open-space recreational activities, and BLM issues both Special Recreation Permits and casual use permits for recreational use of the Dry Lake for land sailing and kite buggy use. The Dry Lake is the location of National and International Land Sailing Regattas. Additionally, world speed trials in which land sailing speed records have been set on Ivanpah Dry Lake. The Dry Lake is also used for photograph and film projects, for both recreational and commercial purposes. Additional recreational activities include long distance bow and arrow target shooting, hang gliding, and model rocket and airplane flying. BLM issues approximately 250 permits per year for recreational activities on the Dry Lake.

The area at the northern end of Ivanpah Dry Lake, where Interstate 15 (I-15) crosses the Nevada border, has undergone substantial development as a tourist destination. This development includes casinos and associated hotels and restaurants located 4.5 miles to the northeast of the proposed project location. The Primm Valley Golf Course is located within 0.5 miles of the proposed project location.

The property at the proposed project location is currently accessible to the public, on designated roads, used by recreationalists to access hiking, hunting, and/or viewing areas in the Clark Mountains, the Stateline, and Mesquite Wilderness, the Primm Valley Golf Course, the Primm Casinos, or the Ivanpah Valley and Playa. Roads within and adjacent to the proposed project site are used annually for the Los Angeles, Barstow to Las Vegas Dual Sport Motorcycle Tour.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

To evaluate whether the proposed project and alternatives would generate a potentially significant impact as defined by CEQA on recreational resources, the staff evaluated them against checklist questions posed in the 2006 CEQA Guidelines, Appendix G, Environmental Checklist established for Recreational Resources. These questions are:

A. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

B. Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?

The staff's evaluation of the significance of the impact of the proposed project on recreational resources includes an assessment of the context and intensity of the impacts, as defined in the NEPA implementing regulations 40 CFR Part 1508.27.

DIRECT/INDIRECT IMPACTS AND MITIGATION

CEQA CRITERIA

With respect to the CEQA significance criteria, the evaluation is as follows:

A. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

The proposed project would not increase the use of parks or recreational facilities to the extent that physical deterioration of such facilities would occur. The primary recreational facilities in the area are the Primm Casinos, Primm Valley Golf Course, Ivanpah Dry Lake, and local roads and trails. The proposed project is not expected to increase the use of any of these resources, and may ultimately contribute to a decrease in their use due to increased industrialization of the desert in this area. Therefore, the proposed project would not have a significant impact based on this criterion.

B. Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?

The proposed project does not include the construction or expansion of recreational facilities. Therefore, the proposed project would not have a significant impact based on this criterion.

The proposed project would indirectly impact recreational uses by imposing a visual viewscape which may reduce the desert experience for some recreational users, and by re-directing traffic that currently uses existing roads within the proposed project area to access their recreation destination. However, these impacts are not considered to be significant under the CEQA evaluation criteria.

NEPA CRITERIA

RECREATIONAL RESOURCES WITHIN PROPOSED PROJECT BOUNDARIES

Approval of the proposed project would directly remove approximately 3,712 acres associated with ISEGS permanent disturbance from potential use for recreational opportunities such as camping, hiking, hunting, and wildlife viewing. This comprises approximately 10% of the land area available for recreation within the Ivanpah Valley, but is a small fraction of the overall land area available in the eastern Mojave Desert. Tthe proposed project would not have a direct impact on recreational resources within the proposed right-of-way grant boundaries, because it is unlikely that the proposed project area is substantially used for recreation except for providing traffic access to other locations. Any impacts on traffic access to these other areas would be readily mitigated by the re-direction of roads around the facility and realignment of Colosseum Road through the logistics area between Ivanpah 1 and 2. The re-direction of roads is expected to be minor; however, the development of the power generation plant will change the experience from that of a primitive driving experience to the experience of driving around a commercially developed urban area. Therefore, no mitigation measures are recommended to address the re-direction of roads.

REGIONAL RECREATIONAL RESOURCES

The geographic scope of the impact would not be limited to the proposed land area of the project, but could potentially include the entire Ivanpah Valley from which the project site is visible. Recreational visitors in the Ivanpah Valley are attracted to the combination of desert scenery, close proximity to a major population center (Las Vegas), proximity to tourist destinations (Primm casinos and Primm Valley Golf Course), proximity to organized recreational events (the Los Angeles, Barstow-to-Vegas Dual Sport Event and land sailing events), designated wilderness (Clark Mountain, Stateline, Mesquite) and easy access by I-15.

The proposed project would have an indirect impact on recreational users in the region due to its diminishing of the quality of the outdoor setting. The project would transform the Ivanpah Valley area from a mostly natural setting to a more industrial setting. The sight of a large-scale solar power facility may attract some recreational users, so the impact would be beneficial to some users, and adverse to others. However, based on scoping comments and other communications with the public, the number of recreationists that will consider the impact of the proposed action adverse will far exceed those that consider it a benefit.

Staff has determined that recreationists to the region primarily come to experience one of the outstanding recreational experiences in the Ivanpah region, such as land sailing at Ivanpah Dry Lake, hiking and camping in nearby BLM wilderness, or rock climbing on Clark Mountain. While the outdoor setting will be diminished, staff does not anticipate that this will cause these recreationists to forgo the enjoyment of these recreational opportunities.

Scoping comments identified specific concerns with the potential affects to the Ivanpah Dry Lake, specifically the potential effects of a change in sedimentation and wind patterns. These concerns are specifically analyzed below.

POTENTIAL IMPACTS TO IVANPAH DRY LAKE

Recreational land sailing occurs at Ivanpah Dry Lake, and this lakebed is a regionally and globally important land sailing site where world speed records are established. The world record was most recently established on the Ivanpah Dry Lake in March, 2009, at 126.2 miles per hour (mph). The proposed project could have a direct impact on recreational use of Ivanpah Dry Lake for land sailing events if the construction or operation of the facility had any of the following effects:

- Modification of water flow and sedimentation rates onto the Dry Lake surface;
- Introduction of foreign materials (garbage, debris, or hazardous materials) to the Dry Lake surface;
- Modification of wind characteristics; or
- If the visual character of the facility were to present a distraction that could cause either a nuisance or a safety hazard to wind sailors.

Modified Sedimentation Characteristics

The Dry Lake surface is unique in not only being very flat, but also in having a hard surface that can support wheeled vehicles. The proposed project is located on the active alluvial fan between the mountains to the west which are a source of stormwater runoff and sediment, and the Dry Lake surface to the east which is the ultimate depositional destination of the stormwater flow and sediment. Construction of the 3,712-acre facility would potentially modify the existing hydrologic flow conditions that provide both water flow and sediment to the Dry Lake surface. Hydrologic flow modification could cause changes in the Dry Lake surface by a variety of methods, including promoting erosion of the surface, increasing or decreasing current sedimentation rates to the surface, or providing sediment of a different grain size and composition. To address this possibility, as well as to protect biological resources downstream of the facility, the staff has evaluated the effect of the proposed project development on stormwater runoff and sedimentation in the FSA/DEIS section on **Soil and Water Resources**. The analysis presented in that section concluded that proposed project would not significantly modify stormwater flow or sedimentation characteristics downstream of the proposed facility. However, that section also noted that this conclusion is based on computer modeling assumptions that are approximate, and that there is little operational experience with developments of this magnitude in the Mojave Desert. To address this uncertainty, that section proposed Condition of Certification **Soil&Water-6**, which specified stormwater monitoring and response measures to evaluate the effect of the proposed project on downstream runoff and sedimentation characteristics.

Introduction of Foreign Materials

In addition to modified stormwater and sediment, the proposed project could affect the Dry Lake surface if garbage, hazardous materials, or debris were to be released from the project area and move downstream during storm events. Management of garbage and hazardous materials on the proposed project property is addressed in the FSA/DEIS sections on **Waste Management** and **Hazardous Materials**. Those sections concluded that the proposed management and disposal procedures for these materials would be adequate to protect against their release. The potential for debris is related to the potential for stormwater events to cause flood damage to project structures including heliostats, heliostat wiring, fencing, buildings, and stormwater management structures. The potential for these items to be damaged and transported during storm events was also evaluated in the FSA/DEIS section on **Soil and Water Resources**. Similar to the analysis of sedimentation, that analysis concluded that the proposed low-impact development method and evaluation of flood impacts on heliostats and other structures was likely to be adequate to avoid downstream transport of debris. In addition, proposed Condition of Certification **Soil&Water-5** is designed to monitor the potential for stormwater damage to site structures, and would require a response should debris be transported downstream.

Modification of Wind Characteristics

Land sailing occurs throughout the year, with major racing events occurring in late March and other racing events occurring around Thanksgiving and at other times during the year (Hatch 2009). Most of the dry lake bed, on both sides of the I-15, is used for

land sailing. In general, the most desirable wind speeds for land sailing are between 12 mph up to 30 mph; however, land sailing can occur during lower wind speeds down to 6 mph, and world record runs will occur at higher wind speeds over 30 mph gusting to 40 mph. Land sailing does not occur when the lake bed is wet, when wind speeds are too low, and when wind speeds are too high.

The potential for the project to impact to the wind patterns at Ivanpah Dry Lake are expected to be limited to when winds cross the project site towards the lake bed (when the project is upwind of the lake bed). The project site ranges from just less than two miles to the lake bed (Ivanpah 1) to just less than three miles to the lake bed (Ivanpah 3). The project site is very large so it can be upwind of some portion of the active land sailing area of the lake bed, using the extreme corners of the site border and lake bed border, when winds are from 200 degrees to 320 degrees, or a full one third arc of the compass. However, a 90 degree wind arc of concern (215 degrees to 305 degrees) is where the potential for maximum downwind impacts would occur as winds travel through longer cross-sections of the project site and through longer cross sections of the lake bed. Winds statistics (percent of annual) for these two arcs determined through two years of meteorological data from Jean, Nevada, are as follows:

RECREATION Table 2
Percent of Total Annual Winds Occurring From a Direction in Which ISEGS is Up-Wind of Ivanpah Dry Lake Bed and Could Have an Effect on Land Sailing for Various Wind Speeds

Average Hourly Wind Speed	Wind From 200° to 320° Where ISEGS Could Have Some Effect	Wind From 215° to 305° Where ISEGS Could Have Its Maximum Effect
< 6 mph	5.8%	4.5%
> 6 mph	44.1%	33.4%
> 12 mph	21.3%	16.7%
> 18 mph	7.4%	6.7%
> 24 mph	2.4%	2.3%
> 30 mph	0.6%	0.6%
All Winds Within Arc	49.8%	38.0%

Winds between 12 mph and 30 mph (most desirable to land sailing) will cross any part of the project site and the lake bed more than 20 percent of the time, and for marginal winds that frequency increases to more than 40 percent of the time. Wind between 12 mph and 30 mph will go through deep cross sections of the project site and deep cross sections of the lake bed more than 16 percent of the time, and for marginal winds that frequency increases to more than 30 percent of the time. Therefore, the location of the site, based on its size and direction from the lake is a concern, and there is a potential impact to winds at the lake bed.

It can be seen from the wind statistics that winds higher than desired for land sailing occur very infrequently, so anything that would decrease wind speeds would not be beneficial, and anything that would increase wind speeds should be considered potentially beneficial to land sailing.

The ISEGS project will be comprised of low-lying heliostat mirrors that focus onto one solar power tower each at Ivanpah 1 and 2, and five solar power towers at Ivanpah 3. Additionally, larger buildings/structures will exist near the central power tower within the power block at each of the power plants, including an air cooled condenser that will have large, vertical, hot air exhaust streams. The specific components of the project that could impact local wind patterns are as follows:

Structural Components Impacting Wind Flow

1. The mirrors will to some degree block wind flow through the site at low heights.

2. The larger central area buildings will cause localized wind turbulence.

Energy Components Impacting Wind Flow

1. Project will cause a reduction in the natural heating of the soils and reduce temperature convection from the soils to the atmosphere (thermals)

2. There will be an increase in localized thermal effects at the power towers and the air cooled condensers

In general, any new structural components will increase drag and turbulence in the area and will take some energy out of the winds, reducing their average velocity. The extent of this energy loss is unknown; however, most of the turbulence, or downwash, from the buildings and mirror fields should dissipate within the two or more miles from the site to the lake bed.

The ISEGS project, as a solar energy project, works to take energy out of the natural system (approximately 1,000 MW with 400 MW made into useful electrical energy) and the mirrors would shade the ground and reduce ground heating and related convection from the hot ground into the atmosphere. Besides the convective heat reduction in the mirror fields, there will be concentrated heat rejection from the air cooled condensers and radiated and convective heat loss around the power towers. The bulk of the heat rejection will come from the air cooled condensers (ACCs), the three of which will reject more than 500 MW into the air under maximum operating conditions. The localized impact on wind flows around the ACCs will be more dramatic than at any other location within each of the power units, but this will generally impact winds aloft more than at ground level. However, there will be a suction effect below the ACCs that will create turbulence and modify the localized wind fields.

Staff believes that the project's total cumulative impact to ground level winds will be to cause a slight overall average decrease in ground level wind speeds and a slight increase in ground level wind turbulence. Staff believes that this will not cause a significant adverse impact to land sailing on Ivanpah Dry Lake.

Glare Impacts to Land Sailing

The proposed project would be visible to land sailors from the Dry Lake surface. The potential for this visibility to provide a nuisance to the land sailors, and potentially modify their use of the Dry Lake for their events, is evaluated in the subsection on Regional Recreational Resources above. In addition to this nuisance effect, the safety of land

sailors could potentially be impacted by the bright glare that would result from the sun reflections to the receivers at the top of the seven power towers associated with the proposed project. The potential impact of this glare on drivers on I-15 is evaluated within this FSA/DEIS in the section on **Traffic and Transportation** which concludes there would not be a health and safety impact associated with reflected solar radiation or glare. However, the concern in that section is that the distraction caused by the brightness of the power towers could increase the potential for accidents on the highway. This potential effect could also apply to land sailors traveling at high speeds (more than 100 mph) on the Dry Lake surface. Staff has concluded in the **Traffic and Transportation** section that with staff's recommended mitigation, there would not be an appreciable adverse impact to motorists on I-15 and other local roads associated with glare. Therefore, considering land sailors would be at a greater distance from the power towers than motorists on I-15, staff concludes that there would not be an appreciable impact to land sailors associated with glare.

IMPACT CONCLUSIONS

The proposed project is not expected to have significant impacts on recreational resources within the proposed project boundaries. There will be no direct impacts because rerouting affected routes of travel would accommodate the limited amount of recreational use in the project location.

Staff believes that ISEGS would have adverse impacts to recreational resources outside of the project boundaries attributable to the project diminishing the quality of the outdoor setting. These adverse impacts are not considered intense enough to cause visitation to decrease, because the recreationists are generally focused on a particular recreational experience, e.g. land sailing on Ivanpah Dry Lake, rock climbing on Clark Mountain, or hiking and camping in BLM wilderness, which will continue to be provided.

The proposed project is unlikely to notably impact the characteristics of wind or the Dry Lake surface that affects use for land sailing, if recommended mitigation measures are implemented as described in the Mitigation section below.

Mitigation

The proposed project is unlikely to notably impact the characteristics of the Dry Lake surface that affects use for land sailing, but only if mitigation measures are implemented. Staff recommends the mitigation measures identified under Conditions of Certification for Hazardous Materials Management **HAZ-1 through HAZ-6**, Waste Management **WASTE-1 through WASTE-7**, and **SOIL&WATER-5**, which would address the potential for stormwater modification of the Dry Lake surface, as well as transport of hazardous materials, waste or debris to the Dry Lake surface.

DECOMMISSIONING AND CLOSURE

Once operations of the generation plant have ceased, all generation facilities and equipment would be removed from the site, and the site would be recontoured and reclaimed to mimic the natural setting. Roads that would not be needed for public access through the area would be reclaimed during this process. Roads that would be used by the public would not be reclaimed and would remain open to vehicular use.

While reclamation would result in removing the attraction for those users who enjoyed the sight of the facility, it would restore the desert experience for those users who prefer to visit a more natural setting. Once the reclamation effort is complete, the lands would become available for the same types of dispersed recreational use as were available prior to construction. Therefore, the commitment of the project site for ISEGS is not permanent, although it is long-term. The viewscape would return to a more natural setting, once reclamation efforts were complete, although recovery of the site with native vegetation would likely take many years.

No Project/No Action Alternative

The No Project/No Action alternative would leave the land area undisturbed, and would therefore allow current recreational uses in the area to continue without interruption. The No Project/No Action alternative would also avoid diminishing the quality of outdoor recreational experiences in the Ivanpah Valley area by not contributing to a transformation from a mostly natural to a more industrial setting. Therefore, the No Project/No Action alternative would not affect recreational resources.

CUMULATIVE IMPACTS AND MITIGATION

The cumulative impact analysis area for recreation includes the Ivanpah Valley region including the surrounding mountain ranges. The period for the analysis is long term. In addition to the proposed ISEGS facility, there are many other past, present, or reasonably foreseeable future actions that contribute to both positive and negative impacts to recreational use of the Ivanpah Valley area as listed in the **Cumulative Scenario** section of the FSA/DEIS. Examples of recent and future development and land use changes in the Ivanpah area that may impact recreational use of the area include:

- Authorized and unauthorized vehicle use.
- Maintenance and construction of utility rights of way.
- Mineral exploration and production.
- Other solar projects, including the proposed FirstSolar facility that would also be located within Ivanpah Valley.
- Various proposed high-speed rail lines connecting Las Vegas to the Los Angeles area, including the Desert XPress rail line, and proposed Maglev projects.
- The proposed Southern Nevada Supplemental Airport facility at Jean, Nevada.

Regionally, there have been both positive and negative impacts to recreational resources as a result of development projects within Ivanpah Valley. Improvement of highway access to the Valley, through the construction of I-15, provided direct vehicular access to open desert scenery for residents throughout southern California and Las Vegas. This increased access certainly improved the recreational experience for some users by making the area more accessible, and detracted from the recreational experience for other users who preferred remote camping, hiking, and hunting away from populated areas. Some industrial and commercial development projects, including the proposed project, would remove some lands from potential recreational use, and would provide an impact on the viewscape that would diminish the recreational

experience to some degree. Other development projects, including the Primm casinos and Primm Valley Golf Course, have been successful in drawing people to the area for different recreational activities.

Overall, the impact to recreationists from these projects is subjective, because some may be drawn to the development, while others would seek to avoid it. Recreational use of the Primm Casinos and Primm Valley Golf Course is likely to be unaffected, or possibly increase, due to increased ease of access and development of other similar attractions. Conversely, visitors looking to enjoy quality hiking, camping, and other outdoor activities in the surrounding area will be impacted by the diminished natural setting during their drive to those locations, but will be able to continue to enjoy those opportunities recognizing a degraded visual background in some settings.

Recreational use of Ivanpah Dry Lake for land sailing and related events may be impacted if the unique character of the Dry Lake surface is modified through these developments, although staff cannot conclude that this would occur based on information currently available. Staff's recommended mitigation measures identified under Conditions of Certification for Hazardous Materials Management **HAZ-1 through HAZ-6**, Waste Management **WASTE-1 through WASTE-7**, and **SOIL&WATER-5** would address the potential for stormwater modification of the Dry Lake surface, as well as transport of hazardous materials, waste or debris to the Dry Lake surface as attributable to the ISEGS project. Staff concludes that ISEGS would not contribute to an effect that would be cumulatively considerable.

COMPLIANCE WITH LORS

In general, the Federal LORS (FLPMA and CDCA Management Plan) encourage multiple land uses, which recognize and protect the values associated with outdoor recreation. None of these LORS prescribe the use of this or any property for recreational use only, so approval of the proposed project would not result in noncompliance.

Warren-Alquist Act (Pub. Resources Code § 25500 et seq.)

Pursuant to § 25529 of the Warren-Alquist Act, the Energy Commission shall require the establishment of an area for public use as a condition of certification of a facility proposed in an area of recreational and scenic value as follows:

"When a facility is proposed to be located in the Coastal Zone or any other area with recreational, scenic, or historic value, the [Energy] Commission shall require, as a condition of certification of any facility contained in the application, that an area be established for public use, as determined by the Commission. Lands within such area shall be acquired and maintained by the Applicant and shall be available for public access and use, subject to restrictions required for security and public safety. The Applicant may dedicate such public use zone to any local agency agreeing to operate or maintain it for the benefit of the public. If no local agency agrees to operate or maintain the public use zone for the benefit of the public, the Applicant may dedicate such zone to the state. The [Energy] Commission shall also require that any facility to be located

along the coast or shoreline of any major body of water be set back from the shoreline to permit reasonable public use and to protect scenic and aesthetic values."

Staff concludes that § 25529 of the Warren-Alquist Act is applicable on the basis that the project area has both recreation and scenic values. Recreation value is recognized on BLM's land within the project area and greater Ivanpah Valley under FLPMA and the CDCA Management Plan. Scenic value is also recognized under these plans and as determined under the Visual Resources analysis of this document. Energy Commission staff have discussed with BLM how the applicant can best meet the statutory requirement for public use for this project based on the following analysis.

Selection Criteria

Staff used the following criteria as guidance for selecting an appropriate public use area:

- Would the public use area provide a specific and tangible benefit to the community?
- Are the public use area plans prepared or can they be readily prepared within the time frame of other plan preparations for the proposed ISEGS project?
- Is the public use area environmental review and permitting underway or completed, or can it be integrated with the ISEGS project?
- Would the public use area cause a public nuisance?
- Would the public use area be properly operated and maintained?
- Can the public use area that would be funded by the applicant be developed without dependency on additional funding sources?

Based on the above criteria, staff determined that a Solar / Ecological Interpretive Center developed within the Construction Logistics Area would best meet the needs of the public, as well as the statutory requirement for a public use area. The concept for the Solar / Ecological Interpretive Center would include the following elements: surfaced public parking for 12 vehicles (4 of which would allow vehicles with trailers), information kiosks describing ISEGS solar energy technology, picnic area with 8 shaded tables, garbage cans, interpretive signs identifying local landmarks and ecological features, two stall contained restroom facility (or a facility with flush toilets and sinks), drinking fountain, and native plant landscaping with plant identification labels.

Cost Assessment

In addition to the site selection criteria, staff looked at the cost of the public use area under consideration for ISEGS and compared it to the costs for public use areas on past siting cases. The following is a list of several recent siting cases and an estimate of what was spent by project developers for public use areas pursuant to § 25529 of the Warren-Alquist Act (adjusted for 2009 dollars using an inflation factor of 3.5 percent per year):

- El Segundo – Bike trail widening and park benches - $100,000 in 2005, or 1.14 x $100,000 = $114,000 in 2009 dollars;

- Moss Landing – Easements and Trails - $410,000 in costs in 2000, or 1.315 x $410,000 = $539,000 in 2009 dollars; and
- Morro Bay – A purchase of seven acres for $1,400,000 was used to satisfy both § 25529 of the Warren-Alquist Act and the City of Morro Bay requirements for a public use area/coastal access. Therefore, the estimated cost in 2009 dollars (for the Energy Commission requirement only) would be 1.175 x $700,000 = $823,000.
- Humboldt Bay – Hiking Trail - $230,000 in costs in 2009.

The above information provided staff with some guidelines to assess an appropriate dollar amount for public use associated with ISEGS.

Other Considerations

Staff notes that if the Energy Commission certifies ISEGS and BLM issues a ROW grant, the applicant would receive the right for dedicated use of lands currently available to the public, and that by development of the ISEGS project, would preclude public use for approximately 30 to 50 years. Should the applicant fund a public use area as a requirement of licensing, the ongoing use of the ISEGS site, while predominantly industrial, would not preclude the public's use and enjoyment of a small portion of the project area.

Applicant's Cost

Staff estimates that the capital cost of the Solar Ecological Interpretive Center located within the ISEGS Construction Logistics Area would be approximately $300,000 - $400,000. This cost estimate is provided as a ballpark indicator of financial liability to the applicant for decision purposes, and is not intended as an upper limit. Ongoing operation and maintenance (O&M) that would be conducted by the applicant would include trash removal, restroom cleaning and pumping, and other related activities. Staff expects that ongoing operation and maintenance could be accomplished primarily with ISEGS staff with little incremental increase in ISEGS overall O&M costs.

Staff's Recommendation

Staff proposes that the applicant conform with § 25529 of the Warren-Alquist Act by constructing, operating and maintaining a public use area consisting of a Solar / Ecological Interpretive Center within the ISEGS Construction Logistics Area in accordance with Condition of Certification **REC-1**.

NOTEWORTHY PUBLIC BENEFITS

Approval of the proposed project would likely result in the attraction of a small number of visitors to the area who are interested in large-scale power and solar facilities.

PUBLIC AND AGENCY COMMENTS ON THE PRELIMINARY STAFF ASSESSMENT (PSA)

Recreation was not included as a section within the PSA.

CONCLUSIONS

The proposed project location itself is not specifically permitted, used, or designated for any recreational activity. The proposed location represents a small portion of the overall area available for recreation in the Mojave Desert, and although the proposed project would require re-direction of access roads to recreation areas, the magnitude of this re-direction is expected to be small. However, the issue of recreational resources is still directly applicable to the proposed project because part of the attraction of the area, historically, has been driven by easy vehicular access to an unspoiled desert viewscape. While the presence of the proposed facility would likely attract some tourists who are interested in unusual and large-scale industrial operations, the impact on the quality of outdoor recreational experience would diminish the experience of campers, hikers, hunters, and other recreational users. These impacts are not expected to be significant as a recreation impact under the primary CEQA thresholds of significance because they do not increase the level of use which could damage recreational facilities, and do not require the construction or expansion of recreational facilities which could impact the environment. Under NEPA and CEQA, the project's direct impacts are not considered significant because ISEGS would not disrupt recreation opportunities, and the project's indirect impacts by itself would not substantially diminish the quality of outdoor recreation experiences. Development of a public use area as specified in Condition of Certification REC-1 in conformance with § 25529 of the Warren-Alquist Act would be constructed in the Construction Logistics Area within the boundaries of the proposed ROW, and would not impact the environment beyond considerations already analyzed in this document.
The impacts related to changes in the viewscape, contributing to the transformation of a mostly natural to a more industrial setting, would be long-term, even though the land could be potentially restored and the associated viewscape as affected by the project could be repaired following facility decommissioning.

The project could potentially impact land sailing on the Ivanpah Dry Lake surface if it were to modify stormwater and sedimentation characteristics or result in hazardous materials, waste or debris being transported to the Dry Lake. However, staff has proposed mitigation measures in the **Soil and Water, Hazardous Materials Management and Waste Management** sections that would mitigate these impacts to less than significant. Staff concludes that the project would not notably modify wind characteristics, or impose a visual glare hazard that would affect the health and safety of land sailors.

The No Action Alternative would not have any impact on the characteristics or administration of recreational resources.

The proposed project would contribute incrementally to diminishing the quality of the outdoor recreation experience over a long term in the California Desert due to the cumulative effects of development. The impacts to recreational resources caused by approval of the proposed project would include the overall adverse visual impact of the facility on campers, hikers, and other outdoor recreational users whose interest in the area is based on an unspoiled, primarily natural setting of the desert. The adverse effect of development on recreational resources within the Ivanpah Valley area may become pronounced due to the proximity of the area to Las Vegas, ease of public access from

Interstate 15, increasing tourist use of the Primm area, and planned development projects including FirstSolar, Desert Xpress, and the Southern Nevada Supplemental Airport. Staff concludes that the proposed project would contribute to diminishing the quality of outdoor recreational experiences in the Ivanpah Valley area, but even when considered with other existing and foreseeable projects, ISEGS would not contribute to a cumulatively considerable impact to recreation in the Ivanpah Valley and surrounding area.

MITIGATION MEASURES/PROPOSED CONDITIONS OF CERTIFICATION

The proposed project is unlikely to notably impact the characteristics of wind or the Dry Lake surface that affects use for land sailing, but only if mitigation measures are implemented. Staff recommends the mitigation measures identified under Conditions of Certification Hazardous Materials Management **HAZ-1 through HAZ-6**, Waste Management **WASTE-1 through WASTE-7**, and **SOIL&WATER-5**, which would address the potential for stormwater modification of the Dry Lake surface, as well as reduce the potential for transport of hazardous materials, waste or debris to the Dry Lake surface.

Additionally, staff proposes Condition of Certification **REC-1** to conform with Public Resources Code §25529 that would require the applicant to establish an area for public use by the development of a Solar / Ecological Interpretive Center.

REC-1: Prior to the start of construction and in conformance with § 25529 of the Warren-Alquist Act, the project owner shall prepare plans for a Solar / Ecological Interpretive Center to be developed in the ISEGS Construction Logistics Area and submit them to BLM's Authorized Officer and the CPM for review and approval. The plans shall propose a location that if possible provides a vantage point to observe as many features as is possible of the ISEGS project without compromising ISEGS security requirements. The Solar / Ecological Interpretive Center shall include the following features:

1. surfaced public parking for 12 vehicles (4 of which would allow vehicles with trailers);
2. information kiosks describing ISEGS solar energy technology;
3. picnic area with 8 shaded tables;
4. garbage cans;
5. interpretive signs identifying local landmarks and ecological features;
6. a two stall contained restroom facility (or a facility with flush toilets and sinks);
7. a drinking fountain; and
8. native plant landscaping with plant identification labels.

Prior to commercial operation of the first constructed power plant of the ISEGS development, the project owner shall complete construction of the Solar / Ecological Interpretive Center and request final approval by both BLM's Authorized Officer and the CPM. The project owner shall operate and maintain the Solar / Ecological Interpretive Center for the life of the ISEGS project.

Verification: At least 30 days prior to construction of the first power plant of the ISEGS development, the project owner shall submit plans for a Solar / Ecological Interpretive Center to be developed in the ISEGS Construction Logistics Area and submit them to BLM's Authorized Officer and the CPM for review and approval.

Prior to commercial operation, the project owner shall submit notice to BLM and the Energy Commission that it has completed construction of the Solar / Ecological Interpretive Center and shall request final approval by both BLM's Authorized Officer and the CPM.

After commercial operation and in each Annual Compliance Report for the life of the ISEGS project, the project owner shall provide a summary of estimated public utilization of the Solar / Ecological Interpretive Center and summarize any issues associated with operating and maintenance activities.

REFERENCES

BSE2007a – Bright Source Energy/ Solar Partners I, LLC/ J. Woolard (tn: 42174). Application for Certification, Volumes I and II, for the Ivanpah Solar Electric Generating System. Submitted to CEC/Docket Unit on 8/31/2007.

Hatch 2009 - Telephone conversation between Kent Hatch, former president of the North American Land Sailing Association, and William Walters, Aspen Environmental Group. August 14, 2009.

ENGINEERING ASSESSMENT

FACILITY DESIGN

Prepared by Shahab Khoshmashrab

SUMMARY OF CONCLUSIONS

U.S. Bureau of Land Management (BLM) and California Energy Commission staff (hereafter jointly referred to as staff) conclude that the design, construction, and eventual closure of the Ivanpah Solar Electric Generating System (ISEGS) project and its linear facilities would likely comply with applicable engineering laws, ordinances, regulations, and standards. The proposed conditions of certification, below, would ensure compliance with these laws, ordinances, regulations, and standards. Conditions of Certification referred to herein serve the purpose of both the Energy Commission's Conditions of Certification for purposes of the California Environmental Quality Act (CEQA) and BLM's Mitigation Measures for purposes of the National Environmental Policy Act (NEPA).

INTRODUCTION

Facility design encompasses the civil, structural, mechanical, and electrical engineering design of the project. The purpose of this analysis is to:

- verify that the laws, ordinances, regulations, and standards (LORS) that apply to the engineering design and construction of the project have been identified;
- verify that both the project and its ancillary facilities are sufficiently described, including proposed design criteria and analysis methods, in order to provide reasonable assurance that the project will be designed and constructed in accordance with all applicable engineering LORS, in a manner that also ensures the public health and safety;
- determine whether special design features should be considered during final design to address conditions unique to the site that could influence public health and safety; and
- describe the design review and construction inspection process and establish the conditions of certification used to monitor and ensure compliance with the engineering LORS, in addition to any special design requirements.

Subjects discussed in this analysis include:

- identification of the engineering LORS that apply to facility design;
- evaluation of the applicant's proposed design criteria, including identification of criteria essential to public health and safety;
- proposed modifications and additions to the application for certification (AFC) necessary for compliance with applicable engineering LORS; and
- conditions of certification proposed by staff to ensure that the project will be designed and constructed to assure public health and safety and comply with all applicable engineering LORS.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

Lists of LORS applicable to each engineering discipline (civil, structural, mechanical, and electrical) are described in the AFC (BSE 2007a, Appendix 2.0). Key LORS are listed in **Facility Design Table 1** below.

Facility Design Table 1
Key Engineering Laws, Ordinances, Regulations, and Standards (LORS)

Applicable LORS	Description
Federal	Title 29 Code of Federal Regulations (CFR), Part 1910, Occupational Safety and Health standards
State	2007 California Building Standards Code (CBSC) (also known as Title 24, California Code of Regulations)
Local	San Bernardino County regulations and ordinances
General	American National Standards Institute (ANSI) American Society of Mechanical Engineers (ASME) American Welding Society (AWS) American Society for Testing and Materials (ASTM)

SETTING

The ISEGS would be built on 4,073 acres located in Southern California's Mojave Desert, in San Bernardino County, approximately 3.1 miles west of the California/Nevada border. The site lies in seismic zone 3. For more information on the site and related project description, please see the **Project Description** section of this document. Additional engineering design details are contained in the AFC, Appendix 2.0 (BSE 2007a; CH2ML2008g) and in the applicant's updated Project Description (CH2ML2009f).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The purpose of this analysis is to ensure that the project would be built to applicable engineering codes and assure public health and life safety. This analysis verifies that applicable engineering LORS have been identified and that the project and its ancillary facilities have been described in adequate detail. It also evaluates the applicant's proposed design criteria, describes the design review and construction inspection process, and establishes conditions of certification that would monitor and ensure compliance with engineering LORS and any other special design requirements. These conditions allow both the California Energy Commission (Energy Commission) compliance project manager (CPM) and the applicant to adopt a compliance monitoring scheme that will verify compliance with these LORS.

PROPOSED PROJECT

SITE PREPARATION AND DEVELOPMENT

Staff has evaluated the proposed design criteria for grading, flood protection, erosion control, site drainage, and site access, in addition to the criteria for designing and constructing linear support facilities such as natural gas and electric transmission interconnections. The applicant proposes the use of accepted industry standards (see BSE 2007a, Appendix 2.0, for a representative list of applicable industry standards), design practices, and construction methods in preparing and developing the site. Staff concludes that this project, including its linear facilities, would most likely comply with all applicable site preparation LORS, and proposes conditions of certification (see below and the **Geology and Paleontology** section of this document) to ensure that compliance.

MAJOR STRUCTURES, SYSTEMS, AND EQUIPMENT

Major structures, systems, and equipment are defined as structures and their associated components or equipment that are necessary for power production; are costly or time consuming to repair or replace; are used for the storage, containment, or handling of hazardous or toxic materials; or could become potential health and safety hazards if not constructed according to applicable engineering LORS. Major structures and equipment are identified in the proposed Condition of Certification **GEN-2,** below. Typically, **Facility Design Table 2** in Condition of Certification **GEN-2** lists the major structures and equipment identified in the AFC and other project related information available before project licensing; this list is based on the preliminary design of the project. The master drawing and master specifications lists described in Condition of Certification **GEN-2**, however, include the project-related documents based on the project's detailed design and may include additional documents for structures and equipment not identified in **Facility Design Table 2**. (Detailed project design typically occurs after project licensing and is not available at this time.)

ISEGS would be designed and constructed to the 2007 California Building Standards Code (CBSC), also known as Title 24, California Code of Regulations, which encompasses the California Building Code (CBC), California Building Standards Administrative Code, California Electrical Code, California Mechanical Code, California Plumbing Code, California Energy Code, California Fire Code, California Code for Building Conservation, California Reference Standards Code, and other applicable codes and standards in effect when the design and construction of the project actually begin. If the initial designs are submitted to the chief building official (CBO) for review and approval after the update to the 2007 CBSC takes effect, the 2007 CBSC provisions would be replaced with the updated provisions.

Certain structures in a power plant may be required, under the CBC, to undergo dynamic lateral force (structural) analysis; others may be designed using the simpler static analysis procedure. In order to ensure that structures are analyzed according to their appropriate lateral force procedure, staff has included Condition of Certification **STRUC-1**, below, which, in part, requires the project CBO's review and approval of the owner's proposed lateral force procedures before construction begins.

PROJECT QUALITY PROCEDURES

The project's AFC (BSE 2007a, § 2.3.2.5) describes a quality program intended to inspire confidence that its systems and components will be designed, fabricated, stored, transported, installed, and tested in accordance with all appropriate power plant technical codes and standards. Compliance with design requirements would be verified through specific inspections and audits. Implementation of this quality assurance/quality control (QA/QC) program would ensure that ISEGS is actually designed, procured, fabricated, and installed as described in this analysis.

COMPLIANCE MONITORING

Under section 104.1 in Appendix Chapter 1 of the CBC, the CBO is authorized and directed to enforce all provisions of the CBC. The Energy Commission itself serves as the building official and has the responsibility to enforce the code for all of the energy facilities it certifies. In addition, the Energy Commission has the power to interpret the CBC and adopt and enforce both rules and supplemental regulations that clarify application of the CBC's provisions.

The Energy Commission's design review and construction inspection process conforms to CBC requirements and ensures that all facility design conditions of certification are met. As provided by section 103.3 in Appendix Chapter 1 of the CBC, the Energy Commission appoints experts to perform design review and construction inspections and act as delegate CBOs on behalf of the Energy Commission. These delegates typically include the local building official and/or independent consultants hired to provide technical expertise that is not provided by the local official alone. The applicant, through permit fees provided by the CBC, section 108 in Appendix Chapter 1, pays the cost of these reviews and inspections. While building permits in addition to Energy Commission certification are not required for this project, the applicant, consistent with CBC section 108, would pay in lieu of CBC permit fees to cover the costs of these reviews and inspections.

Engineering and compliance staff would invite San Bernardino County or a third-party engineering consultant to act as CBO for this project. When an entity has been assigned CBO duties, Energy Commission staff would complete a memorandum of understanding (MOU) with that entity to outline both its roles and responsibilities and those of its subcontractors and delegates.

Staff has developed proposed conditions of certification to ensure public health and safety and compliance with engineering design LORS. Some of these conditions address the roles, responsibilities, and qualifications of the engineers who would design and build the proposed project (Conditions of Certification **GEN-1** through **GEN-8**). These engineers must be registered in California and sign and stamp every submittal of design plans, calculations, and specifications submitted to the CBO. These conditions require that every element of the project's construction (subject to CBO review and approval) be approved by the CBO before it is performed. They also require that qualified special inspectors perform or oversee special inspections required by all applicable LORS.

While the Energy Commission and delegate CBO have the authority to allow some flexibility in scheduling construction activities, these conditions are written so that no element of construction (of permanent facilities subject to CBO review and approval) which could be difficult to reverse or correct could proceed without prior CBO approval. Elements of construction that are not difficult to reverse would be able to proceed without approval of the plans. The applicant would bear the responsibility to fully modify construction elements in order to comply with all design changes resulting from the CBO's subsequent plan review and approval process.
Closure and Decommissioning Impacts and Mitigation The removal of a facility from service (decommissioning) when it reaches the end of its useful life ranges from mothballing, to the removal of all equipment and appurtenant facilities and subsequent restoration of the site. Future conditions that could affect decommissioning are largely unknown at this time.

In order to ensure that decommissioning would be completed in a manner that is environmentally sound and safe and would protect the public health and safety, the applicant would submit a decommissioning plan to the Energy Commission for review and approval before the project's decommissioning begins. The plan would include a discussion of:

- proposed decommissioning activities for the project and all appurtenant facilities that were constructed as part of the project;
- all applicable LORS, local/regional plans, and proof of adherence to those applicable LORS and local/regional plans;
- the activities necessary to restore the site if the plan requires removal of all equipment and appurtenant facilities; and
- decommissioning alternatives other than complete site restoration.

Satisfying the above requirements should serve as adequate protection, even in the unlikely event that the project is abandoned. Staff has proposed general conditions (see **General Conditions**) to ensure that these measures are included in the Facility Closure Plan.

NO PROJECT / NO ACTION ALTERNATIVE

In the No Project / No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan.

The results of the No Project / No Action Alternative would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project.
- The benefits of the proposed project in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

If this project is not approved, renewable projects would likely be developed on other sites in the Mojave Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are three large solar projects proposed on BLM land in Nevada within a few miles of the Ivanpah site. In addition, there are currently 66 applications for solar projects covering 611,692 acres pending with BLM in the California Desert District. The No Project / No Action Alternative would not cause any impacts associated with Facility Design.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

No comments have been received from agencies or the public.

CONCLUSIONS AND RECOMMENDATIONS

The laws, ordinances, regulations, and standards (LORS) identified in the AFC and supporting documents directly apply to the project.

Staff has evaluated the proposed engineering LORS, design criteria, and design methods in the record, and concludes that the design, construction, and eventual closure of the project will likely comply with applicable engineering LORS.

The proposed conditions of certification will ensure that ISEGS is designed and constructed in accordance with applicable engineering LORS. This would be accomplished through design review, plan checking, and field inspections that would be performed by the CBO or other Energy Commission delegate. Staff would audit the CBO to ensure satisfactory performance.

Though future conditions that could affect decommissioning are largely unknown at this time, it can reasonably be concluded that if the project owner submits a decommissioning plan as required in the **General Conditions** portion of this document prior to decommissioning, decommissioning procedures would comply with all applicable engineering LORS.

Energy Commission staff recommends that:

1. the proposed conditions of certification be adopted to ensure that the project is designed and constructed in a manner that protects the public health and safety and complies with all applicable engineering LORS;

2. the project be designed and built to the 2007 CBSC (or successor standards, if in effect when initial project engineering designs are submitted for review); and

3. the CBO reviews the final designs, checks plans, and performs field inspections during construction and that BLM's Authorized Officer and Energy Commission staff audit and monitor the CBO to ensure satisfactory performance.

MITIGATION MEASURES/PROPOSED CONDITIONS OF CERTIFICATION

GEN-1 The project owner shall design, construct, and inspect the project in accordance with the 2007 California Building Standards Code (CBSC), also known as Title 24, California Code of Regulations, which encompasses the California Building Code (CBC), California Administrative Code, California Electrical Code, California Mechanical Code, California Plumbing Code, California Energy Code, California Fire Code, California Code for Building Conservation, California Reference Standards Code, and all other applicable engineering LORS in effect at the time initial design plans are submitted to the chief building official (CBO) for review and approval (the CBSC in effect is the edition that has been adopted by the California Building Standards Commission and published at least 180 days previously). The project owner shall ensure that all the provisions of the above applicable codes are enforced during the construction, addition, alteration, moving, demolition, repair, or maintenance of the completed facility (2007 CBC, Appendix Chapter 1, section 101.2, Scope). All transmission facilities (lines, switchyards, switching stations, and substations) are covered in the conditions of certification in the **Transmission System Engineering** section of this document.

In the event that the initial engineering designs are submitted to the CBO when the successor to the 2007 CBSC is in effect, the 2007 CBSC provisions shall be replaced with the applicable successor provisions. Where, in any specific case, different sections of the code specify different materials, methods of construction, or other requirements, the most restrictive shall govern. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern.

The project owner shall ensure that all contracts with contractors, subcontractors, and suppliers clearly specify that all work performed and materials supplied comply with the codes listed above.

Verification: Within 30 days following receipt of the certificate of occupancy, the project owner shall submit to BLM's Authorized Officer and the Compliance Project Manager (CPM) a statement of verification, signed by the responsible design engineer, attesting that all designs, construction, installation, and inspection requirements of the applicable LORS and the Energy Commission's decision have been met in the area of facility design. The project owner shall provide BLM's Authorized Officer and the CPM a copy of the certificate of occupancy within 30 days of receipt from the CBO (2007 CBC, Appendix Chapter 1, section 110, Certificate of Occupancy).

Once the certificate of occupancy has been issued, the project owner shall inform BLM's Authorized Officer and the CPM at least 30 days prior to any construction, addition, alteration, moving, demolition, repair, or maintenance to be performed on any portion(s) of the completed facility that requires CBO approval for compliance with the above codes. BLM's Authorized Officer and the CPM will then determine if the CBO needs to approve the work.

GEN-2 Before submitting the initial engineering designs for CBO review, the project owner shall furnish BLM's Authorized Officer, the CPM and the CBO with a schedule of facility design submittals and master drawing and master specifications lists. The schedule shall contain a list of proposed submittal packages of designs, calculations, and specifications for major structures and equipment. To facilitate audits by BLM's Authorized Officer and/or Energy Commission staff, the project owner shall provide specific packages to BLM's Authorized Officer and/or the CPM upon request.

Verification: At least 60 days (or within a project owner- and CBO-approved alternative time frame) prior to the start of rough grading, the project owner shall submit to the CBO, BLM's Authorized Officer and to the CPM the schedule, the master drawing and master specifications lists of documents to be submitted to the CBO for review and approval. These documents shall be the pertinent design documents for the major structures and equipment listed in **Facility Design Table 2,** below. Major structures and equipment shall be added to or deleted from the table only with BLM's Authorized Officer and CPM approval. The project owner shall provide schedule updates in the monthly compliance report.

Facility Design Table 2
Major Structures and Equipment List

Equipment/System	Quantity (Plant)
Turbine Generator Foundation and Connections	3
Boiler Structure, Foundation and Connections	10
Air Cooled Condenser Structure, Foundation and Connections	3
Feed Water Preheater Structure, Foundation and Connections	3
Deaerator Structure, Foundation and Connections	3
Steam Distributor Structure, Foundation and Connections	3
Water Treatment Plant, Administration and Electrical Building Structure, Foundation and Connections	4
Water Storage Tanks Structure, Foundation and Connections	3
Maintenance Wing Structure, Foundation and Connections	3
Turbine Lubrication System Foundation and Connections	3
Emergency Generator Foundation and Connections	3
Diesel Fire Pump Foundation and Connections	3
Reheat Tower Structure, Foundation and Connections	3
Emergency Generator Exhaust Structure, Foundation and Connections	3
Pipe Bridge Structure, Foundation and Connections	3
Solar Fields and Towers Structures, Foundations and Connections	3 Lots
Evaporation Pits	3 Lots
Drainage Systems (including sanitary drain and waste)	3 Lots
High Pressure and Large Diameter Piping and Pipe Racks	3 Lots
HVAC and Refrigeration Systems	3 Lots
Temperature Control and Ventilation Systems (including water and sewer connections)	3 Lots
Building Energy Conservation Systems	3 Lots
Switchyard, Buses, and Towers	3 Lots
Substation	1 Lot
Electrical Duct Banks	3 Lots

GEN-3 The project owner shall make payments to the CBO for design review, plan checks, and construction inspections, based upon a reasonable fee schedule to be negotiated between the project owner and the CBO. These fees may be consistent with the fees listed in the 2007 CBC (2007 CBC, Appendix Chapter 1, section 108, Fees; Chapter 1, section 108.4, Permits, Fees, Applications and Inspections), adjusted for inflation and other appropriate adjustments; may be based on the value of the facilities reviewed; may be based on hourly rates; or may be otherwise agreed upon by the project owner and the CBO.

Verification: The project owner shall make the required payments to the CBO in accordance with the agreement between the project owner and the CBO. The project

owner shall send a copy of the CBO's receipt of payment to BLM's Authorized Officer and the CPM in the next monthly compliance report indicating that applicable fees have been paid.

GEN-4 Prior to the start of rough grading, the project owner shall assign a California-registered architect, structural engineer, or civil engineer, as the resident engineer (RE) in charge of the project (2007 California Administrative Code, section 4-209, Designation of Responsibilities). All transmission facilities (lines, switchyards, switching stations, and substations) are addressed in the conditions of certification in the **Transmission System Engineering** section of this document.

The RE may delegate responsibility for portions of the project to other registered engineers. Registered mechanical and electrical engineers may be delegated responsibility for mechanical and electrical portions of the project, respectively. A project may be divided into parts, provided that each part is clearly defined as a distinct unit. Separate assignments of general responsibility may be made for each designated part.

The RE shall:

1. Monitor progress of construction work requiring CBO design review and inspection to ensure compliance with LORS;

2. Ensure that construction of all facilities subject to CBO design review and inspection conforms in every material respect to applicable LORS, these conditions of certification, approved plans, and specifications;

3. Prepare documents to initiate changes in approved drawings and specifications when either directed by the project owner or as required by the conditions of the project;

4. Be responsible for providing project inspectors and testing agencies with complete and up-to-date sets of stamped drawings, plans, specifications, and any other required documents;

5. Be responsible for the timely submittal of construction progress reports to the CBO from the project inspectors, the contractor, and other engineers who have been delegated responsibility for portions of the project; and

6. Be responsible for notifying the CBO of corrective action or the disposition of items noted on laboratory reports or other tests when they do not conform to approved plans and specifications.

The RE shall have the authority to halt construction and to require changes or remedial work if the work does not meet requirements.

If the RE or the delegated engineers are reassigned or replaced, the project owner shall submit the name, qualifications, and registration number of the

newly assigned engineer to the CBO for review and approval. The project owner shall notify BLM's Authorized Officer and the CPM of the CBO's approval of the new engineer.

Verification: At least 30 days (or within a project owner- and CBO-approved alternative time frame) prior to the start of rough grading, the project owner shall submit to the CBO for review and approval, the resume and registration number of the RE and any other delegated engineers assigned to the project. The project owner shall notify BLM's Authorized Officer and the CPM of the CBO's approvals of the RE and other delegated engineer(s) within 5 days of the approval.

If the RE or the delegated engineer(s) is subsequently reassigned or replaced, the project owner has 5 days to submit the resume and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify BLM's Authorized Officer and the CPM of the CBO's approval of the new engineer within 5 days of the approval.

GEN-5 Prior to the start of rough grading, the project owner shall assign at least one of each of the following California registered engineers to the project: a civil engineer; a soils, geotechnical, or civil engineer experienced and knowledgeable in the practice of soils engineering; and an engineering geologist. Prior to the start of construction, the project owner shall assign at least one of each of the following California registered engineers to the project: a design engineer who is either a structural engineer or a civil engineer fully competent and proficient in the design of power plant structures and equipment supports; a mechanical engineer; and an electrical engineer. (California Business and Professions Code section 6704 et seq., and sections 6730, 6731, and 6736 require state registration to practice as a civil engineer or structural engineer in California.) All transmission facilities (lines, switchyards, switching stations, and substations) are handled in "Conditions of Certification" in the **Transmission System Engineering** section of this document.

The tasks performed by the civil, mechanical, electrical, or design engineers may be divided between two or more engineers, as long as each engineer is responsible for a particular segment of the project (for example, proposed earthwork, civil structures, power plant structures, equipment support). No segment of the project shall have more than one responsible engineer. The transmission line may be the responsibility of a separate California registered electrical engineer.

The project owner shall submit, to the CBO for review and approval, the names, qualifications, and registration numbers of all responsible engineers assigned to the project (2007 CBC, Appendix Chapter 1, section 104, Duties and Powers of Building Official).

If any one of the designated responsible engineers is subsequently reassigned or replaced, the project owner shall submit the name, qualifications and registration number of the newly assigned responsible

engineer to the CBO for review and approval. The project owner shall notify BLM's Authorized Officer and the CPM of the CBO's approval of the new engineer.

A. The civil engineer shall:

1. Review the foundation investigations, geotechnical, or soils reports prepared by the soils engineer, the geotechnical engineer, or by a civil engineer experienced and knowledgeable in the practice of soils engineering;

2. Design (or be responsible for the design of), stamp, and sign all plans, calculations, and specifications for proposed site work, civil works, and related facilities requiring design review and inspection by the CBO. At a minimum, these include: grading, site preparation, excavation, compaction, construction of secondary containment, foundations, erosion and sedimentation control structures, drainage facilities, underground utilities, culverts, site access roads and sanitary sewer systems; and

3. Provide consultation to the RE during the construction phase of the project and recommend changes in the design of the civil works facilities and changes to the construction procedures.

B. The soils engineer, geotechnical engineer, or civil engineer experienced and knowledgeable in the practice of soils engineering, shall:

1. Review all the engineering geology reports;

2. Prepare the foundation investigations, geotechnical, or soils reports containing field exploration reports, laboratory tests, and engineering analysis detailing the nature and extent of the soils that could be susceptible to liquefaction, rapid settlement, or collapse when saturated under load (2007 CBC, Appendix J, section J104.3, Soils Report; Chapter 18, section 1802.2, Foundation and Soils Investigations);

3. Be present, as required, during site grading and earthwork to provide consultation and monitor compliance with requirements set forth in the 2007 CBC, Appendix J, section J105, Inspections, and the 2007 California Administrative Code, section 4-211, Observation and Inspection of Construction (depending on the site conditions, this may be the responsibility of either the soils engineer, the engineering geologist, or both); and

4. Recommend field changes to the civil engineer and RE.

This engineer shall be authorized to halt earthwork and to require changes if site conditions are unsafe or do not conform to the predicted conditions used as the basis for design of earthwork or foundations (2007 CBC, Appendix Chapter 1, section 114, Stop Orders).

C. The engineering geologist shall:

1. Review all the engineering geology reports and prepare a final soils grading report; and

2. Be present, as required, during site grading and earthwork to provide consultation and monitor compliance with the requirements set forth in the 2007 California Administrative Code, section 4-211, Observation and Inspection of Construction (depending on the site conditions, this may be the responsibility of either the soils engineer, the engineering geologist, or both).

D. The design engineer shall:

1. Be directly responsible for the design of the proposed structures and equipment supports;

2. Provide consultation to the RE during design and construction of the project;

3. Monitor construction progress to ensure compliance with engineering LORS;

4. Evaluate and recommend necessary changes in design; and

5. Prepare and sign all major building plans, specifications, and calculations.

E. The mechanical engineer shall be responsible for, and sign and stamp a statement with, each mechanical submittal to the CBO, stating that the proposed final design plans, specifications, and calculations conform to all of the mechanical engineering design requirements set forth in BLM's Right-of-Way Decision and the Energy Commission's decision.

F. The electrical engineer shall:

1. Be responsible for the electrical design of the project; and

2. Sign and stamp electrical design drawings, plans, specifications, and calculations.

Verification: At least 30 days (or within a project owner- and CBO-approved alternative time frame) prior to the start of rough grading, the project owner shall submit to the CBO for review and approval, resumes and registration numbers of the responsible civil engineer, soils (geotechnical) engineer, and engineering geologist assigned to the project.

At least 30 days (or within a project owner- and CBO-approved alternative time frame) prior to the start of construction, the project owner shall submit to the CBO for review and approval, resumes and registration numbers of the responsible design engineer, mechanical engineer, and electrical engineer assigned to the project.

The project owner shall notify BLM's Authorized Officer and the CPM of the CBO's approvals of the responsible engineers within 5 days of the approval.

If the designated responsible engineer is subsequently reassigned or replaced, the project owner has 5 days in which to submit the resume and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify BLM's Authorized Officer and the CPM of the CBO's approval of the new engineer within 5 days of the approval.

GEN-6 Prior to the start of an activity requiring special inspection, the project owner shall assign to the project a qualified and certified special inspector(s) who shall be responsible for the special inspections required by the 2007 CBC, Chapter 17, section 1704, Special Inspections; Chapter 17A, section 1704A, Special Inspections; and Appendix Chapter 1, Section 109, Inspections. All transmission facilities (lines, switchyards, switching stations, and substations) are handled in "Conditions of Certification" in the **Transmission System Engineering** section of this document.

A certified weld inspector, certified by the American Welding Society (AWS), and/or American Society of Mechanical Engineers (ASME) as applicable, shall inspect welding performed on site requiring special inspection (including structural, piping, tanks, and pressure vessels).

The special inspector shall:

1. Be a qualified person who shall demonstrate competence, to the satisfaction of the CBO, for inspection of the particular type of construction requiring special or continuous inspection;

2. Observe the work assigned for conformance with the approved design drawings and specifications;

3. Furnish inspection reports to the CBO and RE. All discrepancies shall be brought to the immediate attention of the RE for correction, then, if uncorrected, to the CBO, BLM's Authorized Officer and the CPM for corrective action (2007 CBC, Chapter 17, section 1704.1.2, Report Requirements); and

4. Submit a final signed report to the RE, CBO, BLM's Authorized Officer and CPM, stating whether the work requiring special inspection was, to the best of the inspector's knowledge, in conformance with the approved plans, specifications, and other provisions of the applicable edition of the CBC.

Verification: At least 15 days (or within a project owner- and CBO-approved alternative time frame) prior to the start of an activity requiring special inspection, the project owner shall submit to the CBO for review and approval, with a copy to BLM's Authorized Officer and the CPM, the name(s) and qualifications of the certified weld inspector(s) or other certified special inspector(s) assigned to the project to perform one

or more of the duties set forth above. The project owner shall also submit to BLM's Authorized Officer and the CPM a copy of the CBO's approval of the qualifications of all special inspectors in the next monthly compliance report.

If the special inspector is subsequently reassigned or replaced, the project owner has 5 days in which to submit the name and qualifications of the newly assigned special inspector to the CBO for approval. The project owner shall notify BLM's Authorized Officer and the CPM of the CBO's approval of the newly assigned inspector within 5 days of the approval.

GEN-7 If any discrepancy in design and/or construction is discovered in any engineering work that has undergone CBO design review and approval, the project owner shall document the discrepancy and recommend required corrective actions (2007 CBC, Appendix Chapter 1, section 109.6, Approval Required; Chapter 17, section 1704.1.2, Report Requirements). The discrepancy documentation shall be submitted to the CBO for review and approval. The discrepancy documentation shall reference this condition of certification and, if appropriate, applicable sections of the CBC and/or other LORS.

Verification: The project owner shall transmit a copy of the CBO's approval of any corrective action taken to resolve a discrepancy to BLM's Authorized Officer and the CPM in the next monthly compliance report. If any corrective action is disapproved, the project owner shall advise BLM's Authorized Officer and the CPM, within 5 days, of the reason for disapproval and the revised corrective action to obtain CBO's approval.

GEN-8 The project owner shall obtain the CBO's final approval of all completed work that has undergone CBO design review and approval. The project owner shall request the CBO to inspect the completed structure and review the submitted documents. The project owner shall notify BLM's Authorized Officer and the CPM after obtaining the CBO's final approval. The project owner shall retain one set of approved engineering plans, specifications, and calculations (including all approved changes) at the project site or at an alternative site approved by BLM's Authorized Officer and the CPM during the operating life of the project (2007 CBC, Appendix Chapter 1, section 106.3.1, Approval of Construction Documents). Electronic copies of the approved plans, specifications, calculations, and marked-up as-builts shall be provided to the CBO for retention by BLM's Authorized Officer and the CPM.

Verification: Within 15 days of the completion of any work, the project owner shall submit to the CBO, with a copy to BLM's Authorized Officer and the CPM, in the next monthly compliance report, (a) a written notice that the completed work is ready for final inspection, and (b) a signed statement that the work conforms to the final approved plans. After storing the final approved engineering plans, specifications, and calculations described above, the project owner shall submit to BLM's Authorized Officer and the CPM a letter stating both that the above documents have been stored and the storage location of those documents.

Within 90 days of the completion of construction, the project owner shall provide to the CBO three sets of electronic copies of the above documents at the project owner's

expense. These are to be provided in the form of "read only" (Adobe .pdf 6.0) files, with restricted (password-protected) printing privileges, on archive quality compact discs.

CIVIL-1 The project owner shall submit to the CBO for review and approval the following:

1. Design of the proposed drainage structures and the grading plan;

2. An erosion and sedimentation control plan;

3. Related calculations and specifications, signed and stamped by the responsible civil engineer; and

4. Soils, geotechnical, or foundation investigations reports required by the 2007 CBC, Appendix J, section J104.3, Soils Report, and Chapter 18, section 1802.2, Foundation and Soils Investigation.

Verification: At least 15 days (or within a project owner- and CBO-approved alternative time frame) prior to the start of site grading, the project owner shall submit the documents described above to the CBO for design review and approval. In the next monthly compliance report following the CBO's approval, the project owner shall submit a written statement certifying that the documents have been approved by the CBO.

CIVIL-2 The resident engineer shall, if appropriate, stop all earthwork and construction in the affected areas when the responsible soils engineer, geotechnical engineer, or the civil engineer experienced and knowledgeable in the practice of soils engineering identifies unforeseen adverse soil or geologic conditions. The project owner shall submit modified plans, specifications, and calculations to the CBO based on these new conditions. The project owner shall obtain approval from the CBO before resuming earthwork and construction in the affected area (2007 CBC, Appendix Chapter 1, section 114, Stop Work Orders).

Verification: The project owner shall notify BLM's Authorized Officer and the CPM within 24 hours, when earthwork and construction is stopped as a result of unforeseen adverse geologic/soil conditions. Within 24 hours of the CBO's approval to resume earthwork and construction in the affected areas, the project owner shall provide to BLM's Authorized Officer and the CPM a copy of the CBO's approval.

CIVIL-3 The project owner shall perform inspections in accordance with the 2007 CBC, Appendix Chapter 1, section 109, Inspections, and Chapter 17, section 1704, Special Inspections. All plant site-grading operations, for which a grading permit is required, shall be subject to inspection by the CBO.

If, in the course of inspection, it is discovered that the work is not being performed in accordance with the approved plans, the discrepancies shall be reported immediately to the resident engineer, the CBO, BLM's Authorized Officer and the CPM (2007 CBC, Chapter 17, section 1704.1.2, Report Requirements). The project owner shall prepare a written report, with copies to the CBO, BLM's Authorized Officer and the CPM, detailing all discrepancies, non-compliance items, and the proposed corrective action.

Verification: Within 5 days of the discovery of any discrepancies, the resident engineer shall transmit to the CBO, BLM's Authorized Officer and the CPM a non-conformance report (NCR) and the proposed corrective action for review and approval. Within 5 days of resolution of the NCR, the project owner shall submit the details of the corrective action to the CBO, BLM's Authorized Officer and the CPM. A list of NCRs for the reporting month shall also be included in the following monthly compliance report.

CIVIL-4 After completion of finished grading and erosion and sedimentation control and drainage work, the project owner shall obtain the CBO's approval of the final grading plans (including final changes) for the erosion and sedimentation control work. The civil engineer shall state that the work within his/her area of responsibility was done in accordance with the final approved plans (2007 CBC, Chapter 17, section 1703.2, Written Approval).

Verification: Within 30 days (or a project owner- and CBO-approved alternative time frame) of the completion of the erosion and sediment control mitigation and drainage work, the project owner shall submit to the CBO, for review and approval, the final grading plans (including final changes) and the responsible civil engineer's signed statement that the installation of the facilities and all erosion control measures were completed in accordance with the final approved combined grading plans and that the facilities are adequate for their intended purposes, along with a copy of the transmittal letter to BLM's Authorized Officer and the CPM. The project owner shall submit a copy of the CBO's approval to BLM's Authorized Officer and the CPM in the next monthly compliance report.

STRUC-1 Prior to the start of any increment of construction of any major structure or component listed in **Facility Design Table 2** of Condition of Certification **GEN-2**, above, the project owner shall submit to the CBO for design review and approval the proposed lateral force procedures for project structures and the applicable designs, plans, and drawings for project structures. Proposed lateral force procedures, designs, plans, and drawings shall be those for the following items (from **Table 2**, above):

1. Major project structures;

2. Major foundations, equipment supports, and anchorage; and

3. Large field-fabricated tanks.

Construction of any structure or component shall not begin until the CBO has approved the lateral force procedures to be employed in designing that structure or component.

The project owner shall:

1. Obtain approval from the CBO of lateral force procedures proposed for project structures;

2. Obtain approval from the CBO for the final design plans, specifications, calculations, soils reports, and applicable quality control procedures. If there are conflicting requirements, the more stringent shall govern (for

example, highest loads, or lowest allowable stresses shall govern). All plans, calculations, and specifications for foundations that support structures shall be filed concurrently with the structure plans, calculations, and specifications (2007 CBC, Appendix Chapter 1, section 109.6, Approval Required);

3. Submit to the CBO the required number of copies of the structural plans, specifications, calculations, and other required documents of the designated major structures prior to the start of on-site fabrication and installation of each structure, equipment support, or foundation (2007 California Administrative Code, section 4-210, Plans, Specifications, Computations and Other Data);

4. Ensure that the final plans, calculations, and specifications clearly reflect the inclusion of approved criteria, assumptions, and methods used to develop the design. The final designs, plans, calculations, and specifications shall be signed and stamped by the responsible design engineer (2007 CBC, Appendix Chapter 1, section 106.3.4, Design Professional in Responsible Charge); and

5. Submit to the CBO the responsible design engineer's signed statement that the final design plans conform to applicable LORS (2007 CBC, Appendix Chapter 1, section 106.3.4, Design Professional in Responsible Charge).

Verification: At least 60 days (or within a project owner- and CBO-approved alternative time frame) prior to the start of any increment of construction of any structure or component listed in **Facility Design Table 2** of Condition of Certification **GEN-2**, above, the project owner shall submit to the CBO the above final design plans, specifications, and calculations, with a copy of the transmittal letter to BLM's Authorized Officer and the CPM.

The project owner shall submit to BLM's Authorized Officer and the CPM, in the next monthly compliance report, a copy of a statement from the CBO that the proposed structural plans, specifications, and calculations have been approved and comply with the requirements set forth in applicable engineering LORS.

STRUC-2 The project owner shall submit to the CBO the required number of sets of the following documents related to work that has undergone CBO design review and approval:

1. Concrete cylinder strength test reports (including date of testing, date sample taken, design concrete strength, tested cylinder strength, age of test, type and size of sample, location and quantity of concrete placement from which sample was taken, and mix design designation and parameters);

2. Concrete pour sign-off sheets;

3. Bolt torque inspection reports (including location of test, date, bolt size, and recorded torques);

4. Field weld inspection reports (including type of weld, location of weld, inspection of non-destructive testing [NDT] procedure and results, welder qualifications, certifications, qualified procedure description or number [ref: AWS}); and

5. Reports covering other structural activities requiring special inspections shall be in accordance with the 2007 CBC, Chapter 17, section 1704, Special Inspections, and Section 1709.1, Structural Observations.

Verification: If a discrepancy is discovered in any of the above data, the project owner shall, within 5 days, prepare and submit an NCR describing the nature of the discrepancies and the proposed corrective action to the CBO, with a copy of the transmittal letter to BLM's Authorized Officer and the CPM (2007 CBC, Chapter 17, section 1704.1.2, Report Requirements). The NCR shall reference the condition(s) of certification and the applicable CBC chapter and section. Within 5 days of resolution of the NCR, the project owner shall submit a copy of the corrective action to the CBO and the CPM.

The project owner shall transmit a copy of the CBO's approval or disapproval of the corrective action to BLM's Authorized Officer and the CPM within 15 days. If disapproved, the project owner shall advise BLM's Authorized Officer and the CPM, within 5 days, the reason for disapproval, and the revised corrective action to obtain CBO's approval.

STRUC-3 The project owner shall submit to the CBO design changes to the final plans required by the 2007 CBC, including the revised drawings, specifications, calculations, and a complete description of, and supporting rationale for, the proposed changes and shall give to the CBO prior notice of the intended filing (2007 CBC, Appendix Chapter 1, section 106.1, Submittal Documents; section 106.4, Amended Construction Documents; 2007 California Administrative Code, section 4-215, Changes in Approved Drawings and Specifications).

Verification: On a schedule suitable to the CBO, the project owner shall notify the CBO of the intended filing of design changes and shall submit the required number of sets of revised drawings and the required number of copies of the other above-mentioned documents to the CBO, with a copy of the transmittal letter to BLM's Authorized Officer and the CPM. The project owner shall notify BLM's Authorized Officer and the CPM, via the monthly compliance report, when the CBO has approved the revised plans.

STRUC-4 Tanks and vessels containing quantities of toxic or hazardous materials exceeding amounts specified in the 2007 CBC, Chapter 3, Table 307.1(2), shall, at a minimum, be designed to comply with the requirements of that chapter.

Verification: At least 30 days (or within a project owner- and CBO-approved alternate time frame) prior to the start of installation of the tanks or vessels containing the above-specified quantities of toxic or hazardous materials, the project owner shall submit to the CBO for design review and approval final design plans, specifications, and calculations, including a copy of the signed and stamped engineer's certification.

The project owner shall send copies of the CBO approvals of plan checks to BLM's Authorized Officer and the CPM in the following monthly compliance report. The project owner shall also transmit a copy of the CBO's inspection approvals to BLM's Authorized Officer and the CPM in the monthly compliance report following completion of any inspection.

MECH-1 The project owner shall submit, for CBO design review and approval, the proposed final design, specifications, and calculations for each plant major piping and plumbing system listed in **Facility Design Table 2**, Condition of Certification **GEN-2**, above. Physical layout drawings and drawings not related to code compliance and life safety need not be submitted. The submittal shall also include the applicable QA/QC procedures. Upon completion of construction of any such major piping or plumbing system, the project owner shall request the CBO's inspection approval of that construction (2007 CBC, Appendix Chapter 1, section 106.1, Submittal Documents; section 109.5, Inspection Requests; section 109.6, Approval Required; 2007 California Plumbing Code, section 301.1.1, Approvals).

The responsible mechanical engineer shall stamp and sign all plans, drawings, and calculations for the major piping and plumbing systems, subject to CBO design review and approval, and submit a signed statement to the CBO when the proposed piping and plumbing systems have been designed, fabricated, and installed in accordance with all of the applicable laws, ordinances, regulations and industry standards (2007 CBC, Appendix Chapter 1, section 106.3.4, Design Professional in Responsible Charge), which may include, but are not limited to:

- American National Standards Institute (ANSI) B31.1 (Power Piping Code);
- ANSI B31.2 (Fuel Gas Piping Code);
- ANSI B31.3 (Chemical Plant and Petroleum Refinery Piping Code);
- ANSI B31.8 (Gas Transmission and Distribution Piping Code);
- Title 24, California Code of Regulations, Part 5 (California Plumbing Code);
- Title 24, California Code of Regulations, Part 6 (California Energy Code, for building energy conservation systems and temperature control and ventilation systems);
- Title 24, California Code of Regulations, Part 2 (California Building Code); and
- San Bernardino County codes.

The CBO may deputize inspectors to carry out the functions of the code enforcement agency (2007 CBC, Appendix Chapter 1, section 103.3, Deputies).

Verification: At least 30 days (or within a project owner- and CBO-approved alternative time frame) prior to the start of any increment of major piping or plumbing construction listed in **Facility Design Table 2**, Condition of Certification **GEN-2,** above,

the project owner shall submit to the CBO for design review and approval the final plans, specifications, and calculations, including a copy of the signed and stamped statement from the responsible mechanical engineer certifying compliance with applicable LORS, and shall send BLM's Authorized Officer and the CPM a copy of the transmittal letter in the next monthly compliance report.

The project owner shall transmit to BLM's Authorized Officer and the CPM, in the monthly compliance report following completion of any inspection, a copy of the transmittal letter conveying the CBO's inspection approvals.

MECH-2 For all pressure vessels installed in the plant, the project owner shall submit to the CBO and California Occupational Safety and Health Administration (Cal/OSHA), prior to operation, the code certification papers and other documents required by applicable LORS. Upon completion of the installation of any pressure vessel, the project owner shall request the appropriate CBO and/or Cal/OSHA inspection of that installation (2007 CBC, Appendix Chapter 1, section 109.5, Inspection Requests).

The project owner shall:

1. Ensure that all boilers and fired and unfired pressure vessels are designed, fabricated, and installed in accordance with the appropriate section of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, or other applicable code. Vendor certification, with identification of applicable code, shall be submitted for prefabricated vessels and tanks; and

2. Have the responsible design engineer submit a statement to the CBO that the proposed final design plans, specifications, and calculations conform to all of the requirements set forth in the appropriate ASME Boiler and Pressure Vessel Code or other applicable codes.

Verification: At least 30 days (or within a project owner- and CBO-approved alternative time frame) prior to the start of on-site fabrication or installation of any pressure vessel, the project owner shall submit to the CBO for design review and approval the above-listed documents, including a copy of the signed and stamped engineer's certification, with a copy of the transmittal letter to BLM's Authorized Officer and the CPM.

The project owner shall transmit to BLM's Authorized Officer and the CPM, in the monthly compliance report following completion of any inspection, a copy of the transmittal letter conveying the CBO's and/or Cal/OSHA inspection approvals.

MECH-3 The project owner shall submit to the CBO for design review and approval the design plans, specifications, calculations, and quality control procedures for any heating, ventilating, air conditioning (HVAC), or refrigeration system. Packaged HVAC systems, where used, shall be identified with the appropriate manufacturer's data sheets.

The project owner shall design and install all HVAC and refrigeration systems within buildings and related structures in accordance with the CBC and other

applicable codes. Upon completion of any increment of construction, the project owner shall request the CBO's inspection and approval of that construction. The final plans, specifications, and calculations shall include approved criteria, assumptions, and methods used to develop the design. In addition, the responsible mechanical engineer shall sign and stamp all plans, drawings, and calculations and submit a signed statement to the CBO that the proposed final design plans, specifications, and calculations conform with the applicable LORS (2007 CBC, Appendix Chapter 1, section 109.3.7, Energy Efficiency Inspections; section 106.3.4, Design Professionals in Responsible Charge).

Verification: At least 30 days (or within a project owner- and CBO-approved alternative time frame) prior to the start of construction of any HVAC or refrigeration system, the project owner shall submit to the CBO the required HVAC and refrigeration calculations, plans, and specifications, including a copy of the signed and stamped statement from the responsible mechanical engineer certifying compliance with the CBC and other applicable codes, with a copy of the transmittal letter to BLM's Authorized Officer and the CPM.

ELEC-1 Prior to the start of any increment of electrical construction for all electrical equipment and systems 480 volts or higher (see a representative list, below), with the exception of underground duct work and any physical layout drawings and drawings not related to code compliance and life safety, the project owner shall submit, for CBO design review and approval, the proposed final design, specifications, and calculations (2007 CBC, Appendix Chapter 1, section 106.1, Submittal Documents). Upon approval, the above-listed plans, together with design changes and design change notices, shall remain on the site or at another accessible location for the operating life of the project. The project owner shall request that the CBO inspect the installation to ensure compliance with the requirements of applicable LORS (2007 CBC, Appendix Chapter 1, section 109.6, Approval Required; section 109.5, Inspection Requests). All transmission facilities (lines, switchyards, switching stations, and substations) are handled in "Conditions of Certification" in the **Transmission System Engineering** section of this document.

A. Final plant design plans shall include:

   1. One-line diagrams for the 13.8-kV, 4.16-kV, and 480-volt systems; and

   2. System grounding drawings.

B. Final plant calculations must establish:

   1. Short-circuit ratings of plant equipment;

   2. Ampacity of feeder cables;

   3. Voltage drop in feeder cables;

   4. System grounding requirements;

5. Coordination study calculations for fuses, circuit breakers and protective relay settings for the 13.8-kV, 4.16-kV, and 480-volt systems;

6. System grounding requirements; and

7. Lighting energy calculations.

C. The following activities shall be reported to BLM's Authorized Officer and the CPM in the monthly compliance report:

1. Receipt or delay of major electrical equipment;

2. Testing or energization of major electrical equipment; and

3. A signed statement by the registered electrical engineer certifying that the proposed final design plans and specifications conform to requirements set forth in the Energy Commission decision.

Verification: At least 30 days (or within a project owner- and CBO-approved alternative time frame) prior to the start of each increment of electrical construction, the project owner shall submit to the CBO for design review and approval the above-listed documents. The project owner shall include in this submittal a copy of the signed and stamped statement from the responsible electrical engineer attesting compliance with the applicable LORS and shall send BLM's Authorized Officer and the CPM a copy of the transmittal letter in the next monthly compliance report.

REFERENCES

BSE 2007a – Bright Source Energy/ Solar Partners I, LLC/ J. Woolard (tn: 42174). Application for Certification, Volumes I and II, for the Ivanpah Solar Electric Generating System. Submitted to CEC/Docket Unit on 8/31/2007.

CH2ML2008g – CH2ML HILL/ J. Carrier (tn: 46239). Data Responses Set 1D. Dated on 5/09/2008. Submitted to CEC / Docket Unit on 5/09/2008.

CH2ML2009f – CH2M Hill/J. Carrier (tn: 51597). Data Responses Set 2I. Dated 05/18/2009.

POWER PLANT EFFICIENCY

Prepared by Shahab Khoshmashrab and Steve Baker

SUMMARY OF CONCLUSIONS

The Ivanpah Solar Electric Generating System (ISEGS), if constructed and operated as proposed, would generate 400 megawatts (MW) (maximum net output) of electricity. This project would consist of two 100 MW plants (Ivanpah 1 and Ivanpah 2) and one 200 MW plant (Ivanpah 3), employing advanced solar power and modern steam turbine technologies. The ISEGS would use solar energy to generate up to 95 percent of its capacity, and natural gas to generate up to five percent of its capacity.

The project would decrease reliance on fossil fuel, and would increase reliance on renewable energy resources. It would not create significant adverse effects on fossil fuel energy supplies or resources, would not require additional sources of energy supply, and would not consume fossil fuel energy in a wasteful or inefficient manner. No efficiency standards apply to this project. U.S. Bureau of Land Management (BLM) and Energy Commission staff (hereafter jointly referred to as staff) therefore conclude that this project would present no significant adverse impacts on fossil fuel energy resources.

The ISEGS, if constructed and operated as proposed would occupy over nine acres per MW of power output, a figure about double that of some other solar power technologies. Employing a less land-intensive solar technology, such as the Compact Linear Fresnel Reflector technology or linear parabolic trough technology, would potentially reduce land-related impacts by approximately 50 percent. However, staff recognizes there is a wide range of environmental issues to analyze to compare the merits and impacts of one technology compared to another. This is done in more detail in the **Alternatives** section of this document. In conclusion, ISEGS would utilize solar energy potential from a site that is currently not being harnessed for power production. Thus from an efficiency perspective, ISEGS would not result in a less efficient utilization of the site's solar energy potential than is occurring currently.

Conditions of Certification referred to herein serve the purpose of both the Energy Commission's Conditions of Certification for purposes of the California Environmental Quality Act (CEQA) and BLM's Mitigation Measures for purposes of the National Environmental Policy Act (NEPA).

INTRODUCTION

FOSSIL FUEL USE EFFICIENCY

One of the responsibilities of the California Energy Commission (Energy Commission) is to make findings on whether the energy use by a power plant, including the proposed ISEGS power plant, would result in significant adverse impacts on the environment, as defined in CEQA. If the Energy Commission finds that the ISEGS' energy consumption creates a significant adverse impact, it must further determine if feasible mitigation

measures could eliminate or minimize that impact. In this analysis, staff addresses the inefficient and unnecessary consumption of energy. Power plant efficiency is not normally considered under NEPA.

In order to support the Energy Commission's findings, this analysis will:

- examine whether the facility would likely present any adverse impacts upon energy resources;
- examine whether these adverse impacts are significant; and if so,
- examine whether feasible mitigation measures or alternatives could eliminate those adverse impacts or reduce them to a level of insignificance.

SOLAR LAND USE EFFICIENCY

Solar thermal power plants typically consume much less fossil fuel (usually in the form of natural gas) than other types of thermal power plants. Therefore, common measures of power plant efficiency such as those described above are less meaningful. So far as staff can determine, methods for determining the efficiency of a solar power plant have yet to be standardized; research has uncovered no meaningful attempt to quantify efficiency. The solar power industry appears to have begun discussing the issue, but a consensus is forthcoming (CEC 2008n). In the absence of accepted standards, staff proposes the following approach.

Solar thermal power plants convert the sun's energy into electricity in three basic steps:

- Mirrors and/or collectors capture the sun's rays.
- This solar energy is converted into heat.
- This heat is converted into electricity, typically in a heat engine such as a steam turbine generator or a Stirling Engine-powered generator.

The effectiveness of each of these steps depends on the specific technology employed; the product of these three steps determines the power plant's overall solar efficiency. The greater the project's solar efficiency, the less land the plant must occupy to produce a given power output.

The most significant environmental impacts caused by solar power plants result from occupying large expanses of land. Even in a desert environment, disturbing and shading hundreds or thousands of acres of land can impact biological, cultural and paleontological resources, and can affect drainage, runoff and percolation of rainfall. The extent of these impacts is likely in direct proportion to the number of acres affected. For this reason, staff will evaluate the land use efficiency of proposed solar power plant projects. This efficiency will be expressed in terms of power produced, or MW per acre, and in terms of energy produced, or MW-hours per acre-year. Specifically:

- Power-based solar land use efficiency is calculated by dividing the maximum net power output in MW by the total number of acres impacted by the power plant, including roads and electrical switchyards and substations.

- Energy-based solar land use efficiency is calculated by dividing the annual net electrical energy production in MW-hours per year by the total number of acres impacted by the power plant. Since different solar technologies consume differing quantities of natural gas for morning warm-up, cloudy weather output leveling and heat transfer fluid freeze protection (and some consume no gas at all), this effect will be accounted for. Specifically, gas consumption will be backed out by reducing the plant's net energy output by the amount of energy that could have been produced by consuming the project's annual gas consumption in a modern combined cycle power plant. (See **EFFICIENCY Appendix A**, immediately following.) This reduced energy output will then be divided by acres impacted.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

No federal, state, or local/county laws, ordinances, regulations, and standards (LORS) apply to the efficiency of this project.

SETTING

The applicant proposes to build and operate the ISEGS, a solar thermal power plant facility, comprised of Ivanpah 1, Ivanpah 2, and Ivanpah 3, producing a total of 400 MW (maximum net output), and employing BrightSource's Distributed Power Tower (DPT) advanced solar power technology (BSE 2007a, AFC §§1.1, 1.2, 2.1). Ivanpah 1 and Ivanpah 2 would each consist of a heliostat solar field, a solar receiver boiler, a reheat steam turbine generator, an air-cooled condenser, and associated equipment. Ivanpah 3 would consist of a heliostat solar field, five solar receiver boilers, a reheat steam turbine generator, a solar reheater boiler, an air-cooled condenser, and associated equipment (**CH2ML2009f**).

The project's power cycle would be based on a steam cycle (also known as the Rankine cycle) with three pressure stages. Each plant would include a small package natural gas-fired start-up boiler to provide heat for plant start-up and during temporary cloud cover. The heliostat mirrors are arranged around each solar receiver boiler. Each mirror tracks the sun throughout the day and reflects the solar energy to the receiver boiler. Steam is generated in the boilers and is expanded through the steam turbine to generate electricity. No intermediate fluid is used.

The solar field and power generation equipment are started each morning after sunrise once solar radiation builds up, and are shut down in the evening when solar radiation drops below the level required for keeping the steam turbines online. As explained above, natural gas-fired boilers would be used to bring the system up to operating temperature in the morning and periodically to keep system temperatures up when clouds briefly block sunlight. Natural gas would be delivered to the ISEGS via a new 6-mile-long, 4- to 6-inch diameter natural gas distribution pipeline that would provide natural gas from the Kern River Gas Transmission (KRGT) line to the project (BSE 2007a, AFC §§1.2, 2.1, 2.2.6).

ASSESSMENT OF IMPACTS — FOSSIL FUEL ENERGY USE

METHOD AND THRESHOLD FOR DETERMINING THE SIGNIFICANCE OF FOSSIL FUEL ENERGY RESOURCES

CEQA guidelines state that the environmental analysis "…shall describe feasible measures which could minimize significant adverse impacts, including where relevant, inefficient and unnecessary consumption of energy" (Title 14 CCR §15126.4[a][1]). Appendix F of the guidelines further suggests consideration of such factors as the project's energy requirements and energy use efficiency; its effects on local and regional energy supplies and energy resources; its requirements for additional energy supply capacity; its compliance with existing energy standards; and any alternatives that could reduce the wasteful, inefficient, and unnecessary consumption of energy (Title 14, CCR §15000 et seq., Appendix F).

The inefficient and unnecessary consumption of energy, in the form of non-renewable fuels such as natural gas and oil, constitutes an adverse environmental impact. An adverse impact can be considered significant if it results in:

- adverse effects on local and regional energy supplies and energy resources;
- a requirement for additional energy supply capacity;
- noncompliance with existing energy standards; or
- the wasteful, inefficient, and unnecessary consumption of fuel or energy.

PROJECT ENERGY REQUIREMENTS AND ENERGY USE EFFICIENCY

The ISEGS would burn natural gas at a nominal rate of approximately 833 million British thermal units (MMBtu) per hour, LHV, during maximum load operation, for a total annual consumption of 432,432 MMBtu LHV (BSE 2007a, AFC Tables 5.1-13, 5.1-15). Compared to a typical natural gas-fired power plant of equal capacity, this rate is very low. Further, average daily operation of the natural gas boilers would be limited to one hour. Therefore, staff considers the impact of the project's fuel consumption on energy supplies and energy efficiency to be less than significant.

ADVERSE EFFECTS ON ENERGY SUPPLIES AND RESOURCES

The applicant has described its sources of natural gas for the project (BSE 2007a, AFC §§1.2, 2.1, 2.2.6). Natural gas would be delivered to the ISEGS via a new 6-mile-long, 4- to 6-inch diameter natural gas distribution pipeline that would provide natural gas from the Kern River Gas Transmission (KRGT) line to the project site. Natural gas would be used to generate only up to five percent of the project's capacity. The KRGT system is capable of delivering the gas that the ISEGS would require; this natural gas supply constitutes a reliable source of natural gas for this project. Therefore, it appears highly unlikely that the project would create a substantial increase in natural gas demand.

ADDITIONAL ENERGY SUPPLY REQUIREMENTS

Natural gas fuel would be supplied to the project by the KRGT via a new pipeline connection (BSE 2007a, AFC §§1.2, 2.1, 2.2.6)). There appears to be little likelihood that the ISEGS would require additional supply.

COMPLIANCE WITH ENERGY STANDARDS

No standards apply to the efficiency of the ISEGS or other non-cogeneration projects.

ALTERNATIVES TO REDUCE WASTEFUL, INEFFICIENT, AND UNNECESSARY ENERGY CONSUMPTION

The ISEGS could create significant adverse impacts on energy resources if alternatives reduced the project's fuel use. The evaluation of alternatives to the project (that could reduce wasteful, inefficient, or unnecessary energy consumption) requires the examination of the project's energy consumption. Even though staff does not believe the project's fuel consumption would be significant, staff evaluates alternatives that could reduce or eliminate the use of natural gas.

Efficiency of Alternatives to the Project

The Ivanpah SEGS' objectives include the generation of electricity using BrightSource's DPT solar power technology (BSE, 2007a, AFC §6.6).

Alternative Generating Technologies

Alternative generating technologies for the ISEGS are considered in the AFC (BSE 2007a, AFC §6.6). For purposes of this analysis, natural gas, oil, coal, nuclear, biomass, hydroelectric, and wind technologies are all considered. Given the project objectives, location, air pollution control requirements, and the commercial availability of the above technologies, staff agrees with the applicant that the selected solar thermal technology is a feasible selection.

Alternative Heat Rejection System

The applicant proposes to employ a dry cooling system (air-cooled condensers) as the means for rejecting power cycle heat from the steam turbines (BSE 2007a, AFC §§1.2, 2.1). An alternative heat rejection system would utilize evaporative cooling towers.

The local climate in the project area is characterized by high temperatures and low relative humidity (low wet-bulb temperature). In low temperatures and high relative humidity (low dry-bulb temperature), the air-cooled condenser performs relatively efficiently compared to the evaporative tower. However, at the project area (low wet-bulb temperature and high dry-bulb temperature) the air-cooled condenser performance is relatively poor compared to that of an evaporative cooling tower. Furthermore, the performance of the heat rejection system affects the performance of the steam turbine, impacting turbine efficiency. However, to conserve water in the project site's desert environment, the applicant proposes to employ dry cooling. Even though evaporative cooling can offer a higher efficiency rating for this project, staff believes the applicant's selection of dry cooling is a reasonable tradeoff as it would prevent potentially significant environmental impacts that could result from consumption of the large quantities of water required by wet cooling.

Staff, therefore, believes that the ISEGS would not constitute a significant adverse impact on fossil fuel energy resources compared to feasible alternatives.

ASSESSMENT OF IMPACTS — SOLAR LAND USE

The solar insolation falling on the earth's surface can be regarded as an energy resource. Since this energy is inexhaustible, its consumption does not present the concerns inherent in fossil fuel consumption. What is of concern, however, is the extent of land area required to capture this solar energy and convert it to electricity. Setting aside hundreds or thousands of acres of land for solar power generation removes it from alternative uses. Constructing buildings, solar collector foundations and roads can disturb and destroy cultural and paleontological resources. Shading large tracts of land can destroy its use as habitat for flora and fauna. Finally, the earthwork involved in leveling large areas for optimum solar energy collection can disturb the drainage, runoff and percolation of rainfall.

As discussed above, staff is unaware of any accepted standard for evaluating the efficiency of a solar power plant such as ISEGS. Accordingly, staff proposes to tabulate the land use efficiency of the project (described above) and compare it to similar measures for other solar power plant projects that have passed through, or are passing through, the Energy Commission's siting process.

METHOD AND THRESHOLD FOR DETERMINING THE SIGNIFICANCE OF SOLAR LAND USE ENERGY RESOURCES

Staff proposes to compare the land use of a solar power plant project to that of other solar projects in the Energy Commission's siting process. It has not been determined how great a difference in land use would constitute a significant difference; staff proposes to compare the five solar projects currently in the process.

As this is written, there are currently five solar power plant projects in the Energy Commission siting process. These projects' power and energy output, and the extent of the land occupied by them, are summarized in **EFFICIENCY Table 1**, below. The solar land use efficiency for a typical natural gas-fired combined cycle power plant is shown only for comparison.

Adverse Effects on Land Use

While the Energy Commission customarily requires full mitigation for such impacts, such mitigation is generally regarded as less effective in protecting resources than avoiding the impact entirely. A solar power project that occupies twice as much land as another project holds the potential to produce twice the environmental impacts.

PROPOSED PROJECT – LAND USE

The ISEGS would produce power at the rate of 400 MW net, and would generate energy at the rate of 960,000 MW-hours net per year, while occupying 3,744 acres (CH2ML2008g, pp. 2-3). It would consume 432,432 MMBtu LHV of natural gas annually. Staff calculates power-based land use efficiency thus:

Power-based efficiency: 400 MW ÷ 3,744 acres = **0.11 MW/acre** or **9.4 acres/MW**

Staff calculates energy-based land use efficiency thus:

Energy-based efficiency: 960,000 MWh/year ÷ 3,744 acres = **256 MWh/acre-year**

Natural gas proxy: 432,432 MMBtu/year ÷ 3,413 Btu/kWh = 126,701 MWh/year
126,701 MWh/year x 53.7%[1] = 68,039 MWh/year
960,000 MWh/year – 68,039 MWh/year = 891,961 MWh/year

Energy-based efficiency (net of natural gas use):
891,961 MWh/year ÷ 3,744 acres = **238 MWh/acre-year**

[1] See EFFICIENCY Appendix A, immediately following

EFFICIENCY Table 1 — Solar Land Use Efficiency

Project	Generating Capacity (MW net)	Annual Energy Production (MWh net)	Annual Fuel Consumption (MMBtu LHV)	Footprint (Acres)	Land Use Efficiency (Power-Based) (MW/acre)	Land Use Efficiency (Energy – Based) (MWh/acre-year)	
						Total	Solar Only[1]
Ivanpah SEGS (07-AFC-5)	400	960,000	432,432	3,744	0.11	256	238
Carrizo Energy (07-AFC-8)	177	375,000	0	640	0.28	586	586
Beacon Solar (08-AFC-2)	250	600,000	36,000	1,321	0.19	454	450
SES Solar Two (08-AFC-5)	750	1,620,000	0	6,500	0.12	249	249
SES Solar One (08-AFC-13)	850	1,840,000	0	8,200	0.11	224	224
Avenal Energy (08-AFC-1)[2]	600	3,023,388	24,792,786	25	24.0	120,936	N/A

[1] Net energy output is reduced by natural gas-fired combined cycle proxy energy output; see **EFFICIENCY Appendix A**.

[2] Example natural gas-fired combined cycle plant.

As seen in **EFFICIENCY Table 1**, ISEGS, employing solar power tower technology, is roughly half as efficient in use of land as the Compact Linear Fresnel Reflector technology and the linear parabolic trough technology. The Stirling Energy Systems Solar One and Two projects match Ivanpah SEGS in solar land use efficiency.

Proposed Project – Closure and Decommissioning and Mitigation

The closure or decommissioning of the ISEGS project would not maintain utilization of a solar renewable energy resource and could cause an increase in the reliance on fossil fuel. While this would not be the case if another solar power generation project were to follow in the place of ISEGS, this potential outcome is not assured at this time. Therefore, the closure and decommissioning of ISEGS could result in a potentially negative impact in discontinuing to utilize renewable solar resources for power production. However, this impact would not be the responsibility of the project owner to mitigate.

TECHNOLOGIES THAT WOULD REDUCE SOLAR LAND USE IMPACTS

While building and operating a natural gas-fired combined cycle power plant would yield a much higher land use efficiency than any solar power plant (see **EFFICIENCY Table 1**), it would not achieve the basic project objective, to generate electricity from the renewable energy of the sun. While building a solar power plant employing a different technology, such as the Compact Linear Fresnel Reflector technology or the linear parabolic trough technology, would appear to nearly double the solar land use efficiency of the ISEGS site or approximately halve the land use to accomplish the same generation capacity, there is a wide range of environmental issues to analyze to compare the merits and impacts of one technology compared to another. This is done in more detail in the **Alternatives** section of this document.

The applicant expressed concern in its Preliminary Staff Assessment (PSA) comments that staff presented a comparative measure of land use efficiency with other representative generation technologies as shown in **EFFICIENCY Table 1.** The applicant expressed that a comparison of efficiency based solely on capacity is misleading as it ignores energy production and site-specific conditions that affect the capacity factor of a project and thus the potential energy production potential (CH2ML2009a, Page 6.3-2 and 6.3-99, Solar Land Use Efficiency).

Staff has presented the relative comparison of land use efficiency from the perspective of both capacity and annual energy production, and believes that while this is a gross indicator, it is still a telling one. Staff has also explained that so far as staff can determine, methods for determining the efficiency of a solar power plant have yet to be standardized; research has uncovered no meaningful attempt to quantify efficiency. The solar power industry appears to have begun discussing the issue, but a consensus is forthcoming. In the absence of accepted standards, staff has proposed an approach it believes is reasonable and necessary for its Efficiency analysis. ISEGS would utilize solar energy potential from a site that is currently not being harnessed for power production. Thus from an efficiency perspective, ISEGS would not result in a less efficient utilization of the site's solar energy potential than is occurring currently.

No Project / No Action Alternative

In the No Project / No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan.

The results of the No Project / No Action Alternative would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project.
- The benefits of the proposed project in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

If this project is not approved, renewable projects would likely be developed on other sites in the Mojave Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are three large solar projects proposed on BLM land in Nevada within a few miles of the Ivanpah site. In addition, there are currently 66 applications for solar projects covering 611,692 acres pending with BLM in the California Desert District.

CUMULATIVE IMPACTS

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (California Code Regulation, Title 14, section 15130). NEPA states that cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR §1508.7).

There is the potential for substantial future development in the Ivanpah Valley area and throughout the southern California desert region. Analysis of cumulative impacts is based on data provided in the following maps and tables (see **Cumulative Scenario** section of this document):

- Cumulative Impacts Figure 1, Regional Renewable Applications;
- Cumulative Impacts Figure 2, Regional Renewable Applications (Detail);
- Cumulative Impacts Figure 3, Ivanpah Valley Existing and Future/Foreseeable Projects;
- Cumulative Impacts Table 1, Regional Renewable Energy Projects;
- Cumulative Impacts Table 2, Existing Development in the Ivanpah Valley; and
- Cumulative Impacts Table 3, Future Foreseeable Projects in the Ivanpah Valley Area.

Nearby power plant projects include the existing gas-fired, combined cycle Big Horn Generating Station near Primm, and the foreseeable potential for four proposed power plants consisting of the 300 MW GEN-3 photovoltaic (PV) solar energy project that would be immediately east of ISEGS on 4,160 acres, the 500 MW gas-fired combined cycle Ivanpah Energy Center near Primm, and two wind energy projects on Mountain Pass.

Staff believes that the construction and operation of ISEGS would not create indirect impacts (in the form of additional fuel consumption) that would not have otherwise occurred without this project. Because the ISEGS would consume significantly less natural gas than a typical natural gas-fired power plant, it should compete favorably in the California power market and replace fossil fuel burning power plants. The project would therefore not impact the cumulative amount of natural gas consumed for power generation. ISEGS would also utilize solar energy from a site that is currently not being harnessed for power production, as would the proposed GEN-3 PV project. Thus from an efficiency perspective, ISEGS would not contribute to a cumulatively considerable impact resulting in a less efficient utilization of the site's solar energy potential than is occurring currently.

NOTEWORTHY PUBLIC BENEFITS

The ISEGS would employ an advanced solar thermal technology. Solar energy is renewable and unlimited. The project would have less than significant adverse impact on nonrenewable energy resources (natural gas). Consequently, the project would help in reducing California's dependence on fossil fuel-fired power plants.

RESPONSES TO AGENCY AND PUBLIC COMMENTS

Staff has received the following agency and public comments regarding power plant efficiency.

Comments from Jenny Wilder (letter dated January 14, 2009): Where is the demand/need for the power to be produced by this project? How much electrical power is 400 megawatts? How many homes would that serve and where are those homes/businesses located? Can that amount of electric power (which requires water and natural gas) be produced more efficiently and without destroying habitat in some other way such as at the place of demand (houses or businesses)?

Staff's Response: One of the project objectives is to assist in increasing electrical generation from renewable energy in conformance with the state's policy. 400 MW of electricity can serve approximately 320,000 homes. Approximately five percent would be produced from natural gas. The quantities of natural gas used to generate this capacity would be insignificant compared to a typical natural gas plant of 400 MW. A solar power plant uses the renewable energy of sun. For the most part (95 percent of its capacity), ISEGS would use the sun's energy. Therefore, from an energy resources perspective, ISEGS would offer one the most efficient power plant technologies

available. Placing the plant near the demand center may mean placing it in populated areas, where the large open lands necessary for a solar power plant may not be available.

Comment from Basin Range and Watch (letter dated January 31, 2009): For the natural gas-fired start-up boiler- What percentage of the megawatts would be from natural gas?

Staff's Response: Approximately five percent of ISEGS annual generation would be produced from natural gas.

CONCLUSIONS AND RECOMMENDATIONS

FOSSIL FUEL ENERGY USE

The Ivanpah SEGS, if constructed and operated as proposed, would use solar energy to generate up to 95 percent of its capacity, and natural gas to generate up to five percent of its capacity. The project would decrease reliance on fossil fuel, and would increase reliance on renewable energy resources. It would not create significant adverse effects on energy supplies or resources, would not require additional sources of energy supply, and would not consume energy in a wasteful or inefficient manner. No energy standards apply to this project. Staff therefore concludes that this project would present no significant adverse impacts on energy resources.

No cumulative impacts on energy resources are likely. Facility closure would not likely present significant impacts on electric system efficiency.

LAND USE AND SOLAR RESOURCE UTILIZATION

The ISEGS, if constructed and operated as proposed, would occupy over nine acres per MW of power output, a figure about double that of some other solar power technologies. Employing a less land-intensive solar technology, such as the Compact Linear Fresnel Reflector technology or linear parabolic trough technology, would potentially reduce land-related impacts by approximately 50 percent. However, staff recognizes there is a wide range of environmental issues to analyze to compare the merits and impacts of one technology compared to another. This is done in more detail in the **Alternatives** section of this document. In conclusion, ISEGS would utilize solar energy potential from a site that is currently not being harnessed for power production. Thus from an efficiency perspective, ISEGS would not result in a less efficient utilization of the site's solar energy potential than is occurring currently.

MITIGATION MEASURES/PROPOSED CONDITIONS OF CERTIFICATION

No conditions of certification are proposed.

REFERENCES

BSE 2007a – Bright Source Energy/ Solar Partners I, LLC/ J. Woolard (tn: 42174). Application for Certification, Volumes I and II, for the Ivanpah Solar Electric Generating System. Submitted to CEC/Docket Unit on 8/31/2007.

CH2ML2008g – CH2ML HILL/ J. Carrier (tn: 46239). Data Responses Set 1D. Submitted to CEC / Docket Unit on 5/9/2008.

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CH2ML2009f – CH2M HILL / J. Carrier (tn 51597). Data Response Set 2I – Project Description and Stormwater Plans. Dated on 05/18/2009. Submitted to CEC / J. Kessler on 05/18/2009.

CEC2008n – CEC / S. Baker (tn: 47155). Record of Conversation Re: Efficiency Measurement of Solar Power Plants. Dated on 2/22/2008. Submitted to CEC / Docket Unit on 7/21/2008.

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EFFICIENCY Appendix A

Solar Power Plant Efficiency Calculation
Gas-Fired Proxy

In calculating the efficiency of a solar power plant, it is desired to subtract the effect of natural gas burned for morning startup, cloudy weather augmentation and Therminol freeze protection. As a proxy, we will use an average efficiency based on several recent baseload combined cycle power plant projects in the Energy Commission siting process. Baseload combined cycles were chosen because their intended dispatch most nearly mirrors the intended dispatch of solar plants, that is, operate at full load in a position high on the dispatch authority's loading order.

The most recent such projects are:

Colusa Generating Station (06-AFC-9)
- Nominal 660 MW 2-on-1 Combined Cycle with GE Frame 7FA CGTs
- Air cooled condenser, evaporative inlet air cooling
- Efficiency with duct burners on: 666.3 MW @ 52.5% LHV
- Efficiency with duct burners off: 519.4 MW @ 55.3% LHV
- Efficiency (average of these two): **53.9% LHV**

San Gabriel Generating Station (07-AFC-2)
- Nominal 696 MW 2-on-1 Combined Cycle with Siemens 5000F CGTs
- Air cooled condenser, evaporative inlet air cooling
- Efficiency with duct burners on: 695.8 MW @ 52.1% LHV
- Efficiency with duct burners off: 556.9 MW @ 55.1% LHV
- Efficiency (average of these two): **53.6% LHV**

KRCD Community Power Plant (07-AFC-7)
- Nominal 565 MW 2-on-1 Combined Cycle with GE or Siemens F-class CGTs
- Evaporative cooling, evaporative or fogging inlet air cooling
- Efficiency with GE CGTs: 497 MW @ 54.6% LHV
- Efficiency with Siemens CGTs: 565 MW @ 56.1% LHV
- Efficiency (average of these two): **55.4% LHV**

Avenal Energy (08-AFC-1)
- Nominal 600 MW 2-on-1 Combined Cycle with GE Frame 7FA CGTs
- Air cooled condenser, inlet air chillers
- Efficiency with duct burners on: 600.0 MW @ 50.5% LHV
- Efficiency with duct burners off: 506.5 MW @ 53.4% LHV
- Efficiency (average of these two): **52.0% LHV**

Average of these four power plants: **53.7% LHV**

POWER PLANT RELIABILITY

Prepared by Shahab Khoshmashrab

SUMMARY OF CONCLUSIONS

The applicant predicts an equivalent availability factor of 92 to 98 percent, which U.S. Bureau of Land Management (BLM) and California Energy Commission staff (hereafter jointly referred to as staff) believe is achievable. (The availability factor of a power plant is the percentage of time it is available to generate power; both planned and unplanned outages subtract from this availability.) Based on a review of the proposal, staff concludes that the Ivanpah Solar Electric Generating System (ISEGS) would be built and would operate in a manner consistent with industry norms for reliable operation. This should provide an adequate level of reliability. Conditions of Certification referred to herein serve the purpose of both the Energy Commission's Conditions of Certification for purposes of the California Environmental Quality Act and BLM's Mitigation Measures for purposes of the National Environmental Policy Act (NEPA).

INTRODUCTION

In this analysis, staff addresses the reliability issues of the ISEGS project to determine if the power plant is likely to be built in accordance with typical industry norms for reliable power generation. Staff uses this norm as a benchmark because it ensures that the resulting project would not be likely to degrade the overall reliability of the electric system it serves (see the "Setting" subsection, below).

The scope of this power plant reliability analysis covers:

- equipment availability;
- plant maintainability;
- fuel and water availability; and
- power plant reliability in relation to natural hazards.

Staff examined the project design criteria to determine if the project is likely to be built in accordance with typical industry norms for reliable power generation. While the applicant has predicted an equivalent availability factor of 92 to 98 percent for the ISEGS (see below), staff uses typical industry norms as the benchmark, rather than the applicant's projection, to evaluate the project's reliability.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

No federal, state, or local/county laws, ordinances, regulations, or standards (LORS) apply to the reliability of this project. Power plant reliability is not normally considered under NEPA.

SETTING

In the restructured competitive electric power industry, the responsibility for maintaining system reliability falls largely to the state's control area operators, such as the California Independent System Operator (California ISO), that purchase, dispatch, and sell electric power throughout the state. Determining how the California ISO and other control area operators would ensure system reliability has been an ongoing effort. Protocols have been developed and put in place that allow sufficient reliability to be maintained under the competitive market system. "Must-run" power purchase agreements and "participating generator" agreements are two mechanisms that have been employed to ensure an adequate supply of reliable power.

In September 2005, California AB 380 (Núñez, Chapter 367, Statutes of 2005) became law. This modification to the Public Utilities Code requires the California Public Utilities Commission to consult with the California ISO to establish resource adequacy requirements for all load-serving entities (basically, publicly and privately owned utility companies). These requirements include maintaining a minimum reserve margin (extra generating capacity to serve in times of equipment failure or unexpected demand) and maintaining sufficient local generating resources to satisfy the load-serving entity's peak demand and operating reserve requirements.

In order to fulfill this mandate, the California ISO has begun to establish specific criteria for each load-serving entity under its jurisdiction. These criteria guide each load-serving entity in deciding how much generating capacity and ancillary services to build or purchase, after which the load-serving entity issues power purchase agreements to satisfy these needs. According to the applicant, the ISEGS is currently in negotiation with Southern California Edison to secure a power purchase agreement.

The California ISO's mechanisms to ensure adequate power plant reliability apparently were devised under the assumption that the individual power plants that compete to sell power into the system will each exhibit a level of reliability similar to that of power plants of past decades. However, there has been valid cause to believe that, under free market competition, financial pressures on power plant owners to minimize capital outlays and maintenance expenditures may act to reduce the reliability of many power plants, both existing and newly constructed (McGraw-Hill 1994). It is possible that, if significant numbers of power plants were to exhibit individual reliability sufficiently lower than this historical level, the assumptions used by California ISO to ensure system reliability would prove invalid, with potentially disappointing results. Accordingly, staff has recommended that power plant owners continue to build and operate their projects to the level of reliability to which all in the industry are accustomed.

As part of its plan to provide needed reliability, the applicant proposes to operate the 400-megawatt (MW) (net power output) ISEGS, a solar thermal power plant facility, comprised of two 100-MW plants (Ivanpah 1 and Ivanpah 2) and one 200-MW plant (Ivanpah 3), employing advanced solar power technology. This project, using renewable solar energy, would provide dependable power to the grid, generally during the hours of peak power consumption by the interconnecting utility(s) (BSE 2007a, AFC §§1.1, 1.2, 2.1, 2.2). This project would help serve the need for renewable energy in California, as 95 percent of the generated electricity would be produced by solar energy, a reliable

source of energy that is available during the hot summer afternoons, when power is needed most. Small natural gas-fired boilers would be used to bring the system up to operating temperature in the morning and periodically to keep system temperatures up when clouds briefly block the sunlight. These boilers are expected to be in use to produce only 5 percent of the average annual energy.

The project is expected to achieve an equivalent availability factor in the range of 92 to 98 percent (BSE 2007a, AFC §2.3.2.1). The project is anticipated to normally operate at high average annual capacity factors during periods of sunlight (BSE 2007a, AFC §2.3.21).

ASSESSMENT OF IMPACTS

METHOD FOR DETERMINING RELIABILITY

The Energy Commission must make findings as to how a project is designed, sited, and operated in order to ensure its safe and reliable operation (Title 20, CCR §1752[c]). Staff takes the approach that a project is acceptable if it does not degrade the reliability of the utility system to which it is connected. This is likely the case if a project is at least as reliable as other power plants on that system.

The availability factor of a power plant is the percentage of time it is available to generate power; both planned and unplanned outages subtract from this availability. Measures of power plant reliability are based upon both the plant's actual ability to generate power when it is considered to be available and upon starting failures and unplanned (or forced) outages. For practical purposes, reliability can be considered a combination of these two industry measures, making a reliable power plant one that is available when called upon to operate. Throughout its intended 50-year life, the ISEGS is expected to operate reliably. Power plant systems must be able to operate for extended periods without shutting down for maintenance or repairs. Achieving this reliability requires adequate levels of equipment availability, plant maintainability with scheduled maintenance outages, fuel and water availability, and resistance to natural hazards. Staff examines these factors for a project and compares them to industry norms. If the factors compare favorably for this project, staff will then conclude that the ISEGS would be as reliable as other power plants on the electric system and would not degrade system reliability.

PROPOSED PROJECT

Equipment Availability

Equipment availability would be ensured by adoption of appropriate quality assurance/quality control (QA/QC) programs during the design, procurement, construction, and operation of the plant and by providing for the adequate maintenance and repair of the equipment and systems discussed below.

Quality Control Program

The applicant describes a QA/QC program (BSE 2007a, AFC §2.3.2.5) that is typical of the power industry. Equipment would be purchased from qualified suppliers based on

technical and commercial evaluations. Suppliers' personnel, production capability, past performance, QA programs, and quality history would be evaluated. The project owner would perform receipt inspections, test components, and administer independent testing contracts. Staff expects that implementation of this program would result in standard reliability of design and construction. To ensure this implementation, staff has proposed appropriate conditions of certification in the section of this document entitled **Facility Design**.

Plant Maintainability

Equipment Redundancy

The project, as proposed in the AFC, would be able to operate only when the sun is shining. Maintenance or repairs could be done when the plant is shut down at night. This would help to enhance the project's reliability. Also, the applicant proposes to provide redundant pieces of equipment for those that are most likely to require service or repair. This redundancy would allow service or repair to be done during sunny days when the plant is in operation, if required.

The applicant plans to provide an appropriate redundancy of function for the project (BSE 2007a, AFC §2.3.2.2, Table 2.3-1). Because the project consists of three independent steam turbine generators, it is inherently reliable. A single equipment failure could not disable more than one plant, which would allow the other two plants to continue to generate at their full output. All other major plant systems are also designed with adequate redundancy to ensure their continued operation if equipment fails. Staff believes that this project's proposed equipment redundancy would be sufficient for its reliable operation.

Maintenance Program

Equipment manufacturers provide maintenance recommendations for their products, and the applicant is expected to base the project's maintenance program on those recommendations. The program would encompass both preventive and predictive maintenance techniques. Maintenance outages would probably be planned for periods of low electricity demand. Staff expects that the project would be adequately maintained to ensure an acceptable level of reliability.

Fuel and Water Availability

The long-term availability of fuel and of water for cooling or process use is necessary to ensure the reliability of any power plant. The need for reliable sources of fuel and water is obvious; lacking long-term availability of either source, the service life of the plant could be curtailed, threatening both the power supply and the economic viability of the plant.

Fuel Availability

Natural gas would be delivered to the project site through a new 6-mile, 4- to 6-inch diameter gas pipeline connected to the existing Kern River Gas Transmission Pipeline owned by Kern River Gas Transmission Company (KRGT). The natural gas service would be provided to ISEGS by Southwest Gas Company. The ISEGS would connect to

the KRGT pipeline 0.5 miles north of Ivanpah 3 (BSE 2007a, AFC §§1.2, 4.1). The KRGT pipeline system is a vital artery bringing natural gas into Utah, Nevada, and California. This system extends from the oil and gas producing fields of southwestern Wyoming through Utah and Nevada to the San Joaquin Valley near Bakersfield, California. According to KRGT, the pipeline currently has a design capacity of more than 1.7 billion cubic feet per day (KRGT 2007). The ISEGS would be a solar thermal power plant and the use of natural gas would be limited to unit warm up and brief periods of cloud cover. The use of natural gas is not anticipated to exceed 4 hours per day maximum and an average of 1 hour per day on average, and would not contribute to more than 5 percent of the average annual energy. The very limited use of fuel would have minimal impact on gas supplies. Staff believes that there will be adequate natural gas supply and pipeline capacity to meet the project's needs.

Water Supply Reliability

The ISEGS would use well water for domestic and industrial water needs. Two 100-percent capacity wells would be located at the northwest corner of Ivanpah 1, just outside the perimeter fence but within the construction logistics area and would supply water to all three plants. The wells would be connected to the project via a 570-foot water line to Ivanpah 2, from which the line would be extended to each plant (BSE 2007a, AFC §§1.2, 2.1, 2.2.7, 2.3.2.4). To minimize process water use associated with cooling, air-cooled condensers would be used. Package treatment plants would be used to provide potable water for drinking and sanitary uses. Staff believes these sources represent a reliable supply of water for the project. For further discussion of water supply, see the **Soil and Water Resources** section of this document.

Power Plant Reliability In Relation To Natural Hazards

Natural forces can threaten the reliable operation of a power plant. High winds, tsunamis (tidal waves), and seiches (waves in inland bodies of water) are not likely to present hazards for this project, but seismic shaking (earthquakes) and flooding could present credible threats to the project's reliable operation.

Seismic Shaking

The site lies within Seismic Zone 3 (BSE 2007a, AFC §2.3.1.1.1); see the "Faulting and Seismicity" portion of the **Geology, Paleontology & Minerals** section of this document. The project will be designed and constructed to the latest appropriate LORS (BSE 2007a, AFC Appendix 2). Compliance with current seismic design LORS represents an upgrading of performance during seismic shaking compared to older facilities since these LORS have been continually upgraded. Because it would be built to the latest seismic design LORS, this project would likely perform at least as well as, and perhaps better than, existing plants in the electric power system. Staff has proposed conditions of certification to ensure this; see the section of this document entitled **Facility Design**. In light of the general historical performance of California power plants and the electrical system in seismic events, staff has no special concerns with the power plant's functional reliability during seismic events.

Flooding

The project site elevation is approximately 2,765 feet above mean sea level (BSE 2007a, AFC §5.8.3.1). According to the Federal Emergency Management Agency, the site is not within either the 100- or 500-year flood plain (BSE 2007a, AFC §§2.3.1.1.1, 5.15.3.1.3). Staff believes there are no special concerns with power plant functional reliability due to flooding. For further discussion, see **Soil and Water Resources** and **Geology, Paleontology & Minerals**.

Comparison with Existing Facilities

The North American Electric Reliability Corporation (NERC) maintains industry statistics for availability factors (as well as other related reliability data). The NERC regularly polls North American utility companies on their project reliability through its Generating Availability Data System and periodically summarizes and publishes those statistics on the Internet <http://www.nerc.com>. Because solar technology is relatively new, no statistics are available for solar power plants. The project's power cycle is based on steam cycle. Because natural gas is the primary type of fossil fuel used in California, staff finds it reasonable to compare the project's availability factor to the average availability factor of natural gas-fired fossil fuel units. Also, because the project's total net power output would be 400 MW, staff uses the NERC statistics for 400–599 MW units. The NERC reported an availability factor of 85.07 percent as the generating unit average for the years 2002 through 2006 for natural gas units of 400–599 MW (NERC 2007).

The project would use triple-pressure, condensing steam turbine technology. Steam turbines incorporating this technology have been on the market for many years now and are expected to exhibit typically high availability. Also, because solar-generated steam is cleaner than burnt fossil fuel (i.e., natural gas), the ISEGS steam cycle units would likely require less frequent maintenance than units that burn fossil fuel. Therefore, the applicant's expectation of an annual availability factor of 92 to 98 percent (BSE 2007a, AFC §2.3.2.1) appears reasonable when compared with the NERC figures throughout North America (see above). In fact, these machines can well be expected to outperform the fleet of various turbines (mostly older and smaller) that make up NERC statistics. Additionally, because the plant would consist of three independent steam turbine generators, maintenance could be scheduled during times of the year when the full power output is not required to meet market demand, which is typical of industry standard maintenance procedures. The applicant's estimate of plant availability, therefore, appears to be realistic. Stated procedures for assuring the design, procurement, and construction of a reliable power plant appear to be consistent with industry norms, and staff believes they are likely to ultimately produce an adequately reliable plant.

CLOSURE AND DECOMMISSIONING AND MITIGATION

The closure or decommissioning of the ISEGS project would not maintain utilization of a solar renewable energy resource and could cause an increase in the reliance on fossil fuel. While this would not be the case if another solar power generation project were to follow in the place of ISEGS, this potential outcome is not assured at this time.

Therefore, the closure and decommissioning of ISEGS could result in a potentially negative impact in discontinuing to utilize renewable solar resources for power production compared to when ISEGS would be operating. However, this impact would not be the responsibility of the project owner to mitigate.

NO PROJECT / NO ACTION ALTERNATIVE

In the No Project / No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan.

The results of the No Project / No Action Alternative would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project.
- The benefits of the proposed project in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

If this project is not approved, renewable projects would likely be developed on other sites in the Mojave Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are three large solar projects proposed on BLM land in Nevada within a few miles of the Ivanpah site. In addition, there are currently 66 applications for solar projects covering 611,692 acres pending with BLM in the California Desert District.

NOTEWORTHY PROJECT BENEFITS

This project would help serve the need for renewable energy in California, as 95 percent of the generated electricity would be produced by a reliable source of solar energy that is available during the hot summer afternoons, when power is needed most. Small natural gas-fired boilers would be used to bring the system up to operating temperature in the morning and periodically to keep system temperatures up when clouds briefly block the sunlight. These boilers are expected to contribute to no more than 5 percent of ISEGS' average annual energy.

CONCLUSION

The applicant predicts an equivalent availability factor of 92 to 98 percent, which staff believes is achievable. Based on a review of the proposal, staff concludes that the plant would be built and operated in a manner consistent with industry norms for reliable operation. This should provide an adequate level of reliability. No conditions of certification are proposed.

RESPONSES TO AGENCY AND PUBLIC COMMENTS

Staff has not received any agency or public comments regarding power plant reliability.

MITIGATION MEASURES/PROPOSED CONDITIONS OF CERTIFICATION

No conditions of certification are proposed.

REFERENCES

BSE 2007a—Bright Source Energy/ Solar Partners I, LLC/ J. Woolard (tn: 42174). Application for Certification, Volumes I and II, for the Ivanpah Solar Electric Generating System. Submitted to CEC/Docket Unit on 8/31/2007.

KRGT 2007—Kern River Gas Transmission Company. 2007. Company information at http://www.kernrivergas.com.

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TRANSMISSION SYSTEM ENGINEERING

Prepared by Sudath Arachchige and Mark Hesters

SUMMARY OF CONCLUSIONS

The proposed Ivanpah Solar Electric Generating System (ISEGS or "Project") outlet lines and termination are acceptable and would comply with all applicable laws, ordinances, regulations, and standards (LORS). The analysis of project transmission lines and equipment, both from the three power plants up to the point of interconnection with the existing transmission network as well as upgrades beyond the interconnection that are attributable to the project, have been evaluated by U.S. Bureau of Land Management (BLM) and California Energy Commission staff (hereafter jointly referred to as staff) and are included in the environmental sections of this Final Staff Assessment/Draft Environmental Impact Statement (FSA/DEIS). Staff's conclusions with respect to Transmission System Engineering result in the need for Ivanpah to provide the following mitigation measures:

- Mitigation of base case thermal overloads caused by Ivanpah #1 and #2 power plants, would require the replacement of the existing 115/220 kV transformer bank at the Eldorado substation and the upgrade from 115 to 220 kV of a 36 mile long segment of Eldorado-Baker-Cool Water-Dunn Siding-Mountain Pass transmission line between the new Ivanpah and existing Eldorado Substations. Ivanpah #3 would require the addition of a 115/220 kV transformer at the new Ivanpah substation.
- itigation of thermal overloads caused by the Ivanpah #3 under N-1 contingency analysis, would require modification of the existing Special Protection System (SPS) to reflect the topology change associated with the additional facility upgrades triggered by the Ivanpah #3 power plant.

Conditions of Certification referred to herein serve the purpose of both the Energy Commission's Conditions of Certification for purposes of the California Environmental Quality Act (CEQA) and BLM's Mitigation Measures for purposes of the National Environmental Policy Act (NEPA).

INTRODUCTION

STAFF ANALYSIS

This transmission system engineering (TSE) analysis examines whether this project's proposed interconnection conforms to all LORS required for safe and reliable electric power transmission. Additionally, under CEQA, the Energy Commission must conduct an environmental review of the "whole of the action," which may include facilities not licensed by the Energy Commission (Title 14, California Code of Regulations §15378). The BLM and California Energy Commission must therefore identify the system impacts and necessary new or modified transmission facilities downstream of the proposed interconnection that are required for interconnection and that represent the whole of the action.

Staff relies upon the responsible interconnecting authority for analysis of impacts on the transmission grid, as well as for the identification and approval of new or modified facilities required downstream from the proposed interconnection for mitigation purposes. The proposed project would connect to SCE's 115-kV transmission network and requires both analysis by SCE and the approval of the California Independent System Operator (California ISO).

SCE'S ROLE

SCE is responsible for ensuring electric system reliability in its service territory for proposed transmission modifications. For the Ivanpah project, SCE performed the System Impact Study (SIS) used to determine whether or not the proposed transmission modifications conform to reliability standards. Because the project would be connected to the California ISO controlled transmission grid, the California ISO's role is to review and approve the SIS and its conclusions.

CALIFORNIA ISO'S ROLE

The California ISO is responsible for ensuring electric system reliability for all participating transmission owners and is also responsible for developing the standards necessary to achieve system reliability. The project power will be dispatched to the California ISO grid via SCE's newly built Ivanpah 115/220-kV substation. Therefore, California ISO will review the studies of the SCE system to ensure adequacy of the proposed transmission interconnection. The California ISO determines the reliability impacts of the proposed transmission modifications on the SCE transmission system in accordance with all applicable reliability criteria. According to the California ISO tariffs, the California ISO will determine the "need" for transmission additions or upgrades downstream from the interconnection point to insure reliability of the transmission grid. The California ISO reviewed the SIS performed by SCE and issued a preliminary approval to SCE. On completion of the SCE Facility Study, the California ISO will review the study results and provide its conclusions and recommendations. The California ISO may provide written and verbal testimony on its findings at the Energy Commission hearings.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

- California Public Utilities Commission (CPUC) General Order 95 (GO-95), *Rules for Overhead Electric Line Construction*, sets forth uniform requirements for the construction of overhead lines. Compliance with this order ensures both adequate service and the safety of both the public and the people who build, maintain, and operate overhead electric lines.
- CPUC General Order 128 (GO-128), *Rules for Construction of Underground Electric Supply and Communications Systems*, sets forth uniform requirements and *minimum* standards for underground supply systems to ensure adequate service and the safety of both the public and the people who build, maintain, and operate underground electric lines.
- The *National* Electric Safety Code, 1999, provides electrical, mechanical, civil, and structural requirements for overhead electric line construction and operation.

- The combined NERC/WECC (North American Electric Reliability *Corporation*/Western Electricity Coordinating Council) planning standards provide system performance standards for assessing the reliability of the interconnected transmission system. These standards require continuity of service as their first priority and the preservation of interconnected operation as their second. Some aspects of NERC/WECC standards are either more stringent or more specific than the either agency's standards alone. These standards are designed to ensure that transmission systems can withstand both forced and maintenance outage system contingencies while operating reliably within equipment and electric system thermal, voltage, and stability limits. These standards include reliability criteria for system adequacy and security, system modeling data requirements, system protection and control, and system restoration. Analysis of the WECC system is based to a large degree on Section I.A of WECC standards, *NERC and WECC Planning Standards with Table I and WECC Disturbance-Performance Table,* and on Section I.D, *NERC and WECC Standards for Voltage Support and Reactive Power.* These standards require that power flows and stability simulations verify defined performance levels. Performance levels are defined by specifying allowable variations in thermal loading, voltage and frequency, and loss of load that may occur during various disturbances. Performance levels range from no significant adverse effects inside and outside a system area during a minor disturbance (such as the loss of load from a single transmission element) to a catastrophic loss level designed to prevent system cascading and the subsequent blackout of islanded areas and millions of consumers during a major transmission disturbance (such as the loss of multiple 500-kV lines along a common right-of- way, and/or of multiple large generators). While the controlled loss of generation or system separation is permitted under certain specific circumstances, this sort of major uncontrolled loss is not permitted (WECC, 2002).
- NERC's reliability standards for North America's electric transmission system spell out the national policies, standards, principles, and guidelines that ensure the adequacy and security of the nation's transmission system. These reliability standards provide for system performance levels under both normal and contingency conditions. While these standards are similar to the combined NERC/WECC standards, certain aspects of the combined standards are either more stringent or more specific than the NERC performance standards alone. *NERC's* reliability standards apply to both interconnected system operations and to individual service areas (NERC, 2006).
- California ISO planning standards also provide the standards and guidelines that ensure the adequacy, security, and reliability of the state's member grid facilities. These standards also incorporate the combined NERC/WECC and NERC standards. These standards are also similar to the NERC/WECC or NERC standards for transmission system contingency performance. However, the *California* ISO standards also provide additional requirements that are not found in either the WECC/NERC or NERC standards. The California ISO standards apply to all participating transmission owners interconnecting to the California ISO- controlled grid. They also apply to non-member facilities that impact the California ISO grid through their interconnections with adjacent control grids (California ISO, 2002a).

- California ISO/FERC (Federal Energy Regulatory Commission) electricity tariffs *contain* guidelines for building all transmission additions/upgrades within the California ISO-controlled grid. (California ISO, 2003a).

PROJECT DESCRIPTION

The applicant proposes to interconnect the 400 megawatt (MW) Ivanpah to SCE's proposed newly built 220 kV Ivanpah substation near Nevada border, San Bernardino County, California. The proposed Ivanpah project would develop in three phases, two 100 MW phases known as Ivanpah #1 and #2, and one 200 MW phase known as Ivanpah #3. Construction is planned to take place over approximately 48 months, with the applicant's desire that it could begin during the first quarter of 2010 and be completed during the fourth quarter 2013. Assuming the construction of Ivanpah 1, 2 and 3 were to begin in a sequential fashion during the first quarter of 2010 and be completed during the fourth quarter of 2013, the applicant would expect to commence commercial operation in the fourth quarter for each of the power plants beginning in 2011 at Ivanpah 1, in 2012 at Ivanpah 2, and in 2013 at Ivanpah 3.

Ivanpah is a solar concentrating thermal power plant, based on distributed power tower and heliostat mirror technology. The heliostat fields focus solar energy on the power tower receivers near the center of each of the heliostat arrays. The heliostat mirrors would be asymmetrically arranged around each solar power tower. Each mirror will track the sun throughout the day and reflect the solar energy to the receiver boiler within the power tower. In each plant, one Rankine-cycle reheat steam turbine receives live steam from the solar boilers and reheat steam from one solar reheater-located in the power block at the top of its own power tower. The solar field and power generation equipment would be started each morning after sunrise and insolation build-up, and shut down in the evening when insolation drops below the level required to maintain the turbine connected. Electricity would be produced by each plant's solar receiver boiler and the steam turbine generator. Each of the three ISEGS projects would connect to its own 115 kV switchyard and from there to a proposed SCE Ivanpah 115/220 kV substation which would connect to the SCE system by looping an existing transmission line into the new substation (CH2ML2008g).

SWITCHYARD AND INTERCONNECTION FACILITIES

Each of the Project's three generating units (1, 2, and 3) would be connected to the low side of its dedicated 13.8/115 kV generator step-up (GSU) transformer through 25 kV, 7,000-ampere gas-insulated (SF6) breaker. The high side of the generator step-up transformer would be connected to the project's switchyard via 115 kV, 1200-ampere disconnect switch. The step-up transformer for the steam turbine generating unit would be rated at 13.8/115 kV and 72/96/120 megavolt ampere (MVA). Each project switchyard bay will consist of a 115 kV, 1200A single circuit breaker and two 1200A disconnect switches. The switchyard circuit breaker would interconnect to an overhead 115kV single circuit transmission line via 1200A disconnect switch. Each of the three phases will connect to a new Ivanpah substation via its own dedicated 115 kV generator tie line.

The Ivanpah #1 115 kV generator tie line would be approximately 5,800 feet long, built with 477 kcmil ACSR conductors and supported by single-pole structures. The Ivanpah #2 and #3 generator tie lines would share the same poles for the last 1,400 feet of their routes before they interconnect to SCE's Ivanpah Substation. The Ivanpah #2 generator would connect to the Ivanpah Substation through 115kV, 3,900 feet-long single circuit generator tie line built with the last 1,400 feet merged with the Ivanpah #3 generator tie line to create a 1,400 feet long, overhead double circuit line prior to entering the Ivanpah Substation. The Ivanpah #3 generator tie line would be an approximately 14,100 feet long, single circuit, 115 kV line built with 1510 kcmil ACSR and would merge into a 115kV double circuit with the Ivanpah #2 generator tie line.

SCE's Ivanpah Substation would use a double-bus breaker-and-a half configuration with 3 bays and 5 positions for outgoing transmission lines. The Ivanpah Substation would consists of 115kV, 1200A circuit breakers, 115kV disconnect switches and other switching gear that will allow delivery of the project's output to the SCE grid. The existing Eldorado-Baker-Cool Water-Dunn Siding-Mountain Pass 115kV line would loop in and out through the newly built Ivanpah Substation to interconnect the project to the SCE transmission grid. (Ivanpah #2, 2007b section 3.2.2 pages 3-4 to 3-6 and Figure 01-PB-E-D-201).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

For the interconnection of this proposed project to the grid, the interconnecting utility (SCE) and the control area operator (California ISO) are responsible for ensuring grid reliability. These two entities determine the transmission system impacts of the proposed project and any mitigation measures needed to ensure system conformance with utility reliability criteria, NERC planning standards, WECC reliability criteria, and California ISO reliability criteria. System impact and facilities studies are used to determine the impacts of the proposed project on the transmission grid. Staff relies on these studies and any review conducted by the California ISO to determine the effect of the project on the transmission grid and to identify any necessary downstream facilities or indirect project impacts required to bring the transmission network into compliance with applicable reliability standards. System impact and facilities studies analyze the grid both with and without the proposed project, under conditions specified in the planning standards and reliability criteria. The standards and criteria define the assumptions used in the study and establish the thresholds through which grid reliability is determined. The studies analyze the impact of the project for the proposed first year of operation, and are based on a forecast of loads, generation, and transmission. Load forecasts are developed by the interconnected utility. Generation and transmission forecasts are established by an interconnection queue. The studies focus on thermal overloads, voltage deviations, system stability (excessive oscillations in generators and transmission system, voltage collapse, loss of loads, or cascading outages), and short circuit duties. If the studies show that the interconnection of the project causes the grid to be out of compliance with reliability standards, then the study will identify mitigation alternatives or ways in which the grid could be brought into compliance with reliability standards.

When a project connects to the California ISO-controlled grid, both the studies and mitigation alternatives must be reviewed and approved by the California ISO. If either the California ISO or interconnecting utility determines that the only feasible mitigation includes transmission modifications or additions requiring CEQA review, the Energy Commission must analyze those modifications or additions according to CEQA requirements.

PROPOSED PROJECT - SCOPE OF SYSTEM IMPACT STUDIES

The system impact studies were performed by SCE at the request of Bright Source Energy, Inc, to identify the transmission system impacts of Ivanpah's #1, #2 and #3 on SCE's 115/220/500-kV system. The studies included power flow, sensitivity, and short circuit studies, and transient and post-transient analyses (Ivanpah #1, #2 and #3, 2008a, System Impact Studies). The studies modeled the proposed project for a net output of 100 MW for Ivanpah #1 and #2, 200 MW for Ivanpah #3. The base cases included all California ISO approved major SCE transmission projects, the transmission system for the Los Angeles Department of Water and Power, and major path flow limits of Southern California Import Transmission, East-Of-River, and West-of-River. The studies considered light load conditions with generation patterns and Path 46 imports maximized to identify the extent of potential congestion and fully stress the SCE system in the area where the Ivanpah project phases are interconnecting. The detailed study assumptions are described in the studies. The power flow studies were conducted with and without Ivanpah phases connected to SCE's grid at the newly built Ivanpah Substation, using 2013 heavy summer and 2013 light spring base cases. The power flow study assessed the project's impact on thermal loading of the transmission lines and equipment. Transient and post-transient studies were conducted for Ivanpah phases of the project using the 2013 heavy summer base case to determine whether the project would create instability in the system following certain selected outages. Short Circuit studies were conducted to determine if Ivanpah phases would overstress existing substation facilities.

Power Flow Study Results and mitigation measures (Ivanpah #1 and #2)

The study determined that the system between Mountain Pass and Eldorado substation is inadequate to accommodate the full output of all generation projects queued ahead of the Ivanpah #1 and #2 power plants.

Base Case Conditions (N-0):
Under base case conditions, a portion of the Eldorado-Baker-Cool Water-Dunn Siding-Mountain Pass 115 kV line as well as the existing 115/220 kV transformer at Eldorado were found to be loaded beyond the maximum allowable limits.

Mitigation:

- Removal of approximately 36 miles of a portion of the Eldorado – Ivanpah leg of the existing Eldorado-Baker-Cool Water–Dunn Siding-Mountain Pass 115 kV line and construction of a new 36 mile long, 220 kV double circuit line, with 1590 kcmil ACSR conductors. (The circuit would initially energized at 115 kV)

- Replacement of the existing 115/220 kV, 102 MVA transformer bank at the Eldorado Substation with 115/220 KV, 280 MVA bank.

Power Flow Study Results and mitigation measures (Ivanpah #3)

The study determined that the system between Ivanpah and Eldorado substation is inadequate to accommodate the full output of all generation projects queued ahead of the Ivanpah #3 power plant.

Base Case Conditions (N-0):
Under the base case conditions, the study determined that the modified Eldorado 115/220 kV transformer bank is insufficient to accommodate Ivanpah #3. The existing Eldorado substation design does not provide the ability to install an additional 115/220 kV transformer bank without causing significant changes at the site. Adding a second transformer bank at the Eldorado substation is not a viable alternative.

> Mitigation: Therefore, an additional transformer bank should be installed at proposed Ivanpah substation to increase the operating voltage from 115 kV to 220 kV of the Eldorado-Ivanpah 220 kV transmission line. This will also require the construction of two new 220 kV line positions on the west side of Eldorado substation within the existing fence line.

With the additional upgrades triggered by the Ivanpah #3, the study identified the continued need for a Special Protection System (SPS) in order to mitigate thermal overloads identified under N-1 contingency analysis. The study did not identify any N-2 thermal overloads.

Single Outage Contingency (N-1):
The loss of the new 36 mile Eldorado-Ivanpah 220 kV transmission line under N-1 contingency conditions would disconnect the Ivanpah and Mountain Pass areas from the Eldorado substation thereby triggering voltage collapse and thermal overload problems.

> Mitigation: To mitigate this criteria violation, a previously implemented SPS will need to be modified to reflect the changes associated with the facility upgrades triggered by the Ivanpah #3. The SPS should be capable of tripping Mountain Pass 115 kV line, the new Ivanpah substation, the new Ivanpah 220 kV transmission line and the Ivanpah #3.

Single Outage Contingency (N-1):
Loss of one Ivanpah 115/220kV transformer bank results in loading the remaining transformer bank beyond its maximum emergency capability.

> Mitigation: To mitigate this criteria violation, a previously implemented SPS will need to be modified. The SPS should be capable of tripping Mountain Pass 115 kV new Ivanpah substation, New Ivanpah 220 kV transmission line or the Ivanpah #3 of the project under loss of one Ivanpah 115/220 kV transformer bank by opening the corresponding unit circuit breaker.

Transient Stability Results

Transient stability studies identified that the Ivanpah #1, #2 and #3 power plants of the project steam generators experience transient instability under 15 cycle closed in (three-phase-to-ground) system faults located at or near the proposed Ivanpah 115kV substation. To mitigate the transient stability problem, the following up grades are proposed;

- Upgrade SCE 115 kV relay protection near the proposed Ivanpah substation to provide for primary protection fault clearing time of less than 8 cycles.
- Ensure project developer installs out-of step protection on the Ivanpah #1, #2 and #3 steam turbine-generators.

Post-Transient Stability Results

Depending on the amount of generation resource on line, loss of either Eldorado-Ivanpah transmission line or loss of the 115/220 kV transformer at Eldorado resulted in a significant voltage deviation including a voltage collapse, in the Dunn Siding and Baker substation areas. To mitigate this problem, the following reliability upgrades are proposed.

- Install a Special Protection System (SPS) that trips the Ivanpah #1, #2 and #3 projects under outages of transmission facilities connecting the proposed Ivanpah substation to the Eldorado substation (transmission line and transformer bank at Eldorado substation).

Short-Circuit Duty Study Results

Short circuit studies were performed to determine the degree to which the addition of Ivanpah project increases fault duties at SCE substations, and other 115 kV, 220 kV, and 220 kV busses within the study area. The busses at which faults were simulated, the maximum three-phase and single-line-to-ground fault currents at these busses both with and without the project, and information on the breaker duties at each location are summarized in the Short Circuit Study results tables of the System Impact Study Report (Ivanpah #3, 2008b, SIS, tables 2-3, Pages 38 and 39).

The results of the three-phase-to-ground and single-phase-to-ground short-circuit duty studies identified that three 220kV 50kA circuit breakers at the Lugo Substation will need to be replaced and that two 220 kV 50kA circuit breakers also at the Lugo Substation will need to be upgraded to 63 kA rating by installing Transient Recovery Voltage (TRV) capacitor banks. Additionally, the Eldorado 220 kV substation will needed to be upgraded to 80 kA design standard as the current 63 KA capability was identified to be exceeded by a queued ahead generation projects. The breaker upgrades would occur within the fence line of existing substations and would not trigger CEQA review. Detailed Short Circuit study results will be provided as a part of the Facilities Study.

Closure and Decommissioning Impacts and Mitigation

Closure and decommissioning activities associated with Ivanpah would involve the removal of the three power plants (Ivanpah # 1, 2 and 3), their switchyards and generation tie lines from the respective switchyards to the Ivanpah Substation. Ivanpah

Substation would not be affected, and thus the integrity of the Eldorado-Baker-Cool Water-Dunn Siding-Mountain Pass transmission line would not be affected. Therefore, there would not be any significant adverse environmental effects or LORS conformance issues associated with the Ivanpah closure and decommissioning.

NO PROJECT/NO ACTION ALTERNATIVE

In the No Project / No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan.

The results of the No Project / No Action Alternative would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project.
- The benefits of the proposed project in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

If this project is not approved, renewable projects would likely be developed on other sites in the Mojave Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are three large solar projects proposed on BLM land in Nevada within a few miles of the Ivanpah site. In addition, there are currently 66 applications for solar projects covering 611,692 acres pending with BLM in the California Desert District.

CUMULATIVE IMPACTS AND MITIGATION

Staff has reviewed the lists of existing and foreseeable projects as presented in the **Cumulative Scenario** section of this FSA/DEIS. Staff's review considers whether the interconnection of Ivanpah to SCE's transmission system along with other existing and foreseeable generation projects would conform to all LORS required for safe and reliable electric power transmission. The analysis described above under the heading Proposed Project – Scope of System Impact Studies is conducted in coordination with, and the approval of, California ISO to consider existing and proposed generator interconnections to the transmission grid and their potential safety and reliability impacts under a number of conservative contingency conditions. The results of this study conclude that with implementation of the mitigation measures recommended by staff and required by California ISO as a condition of Ivanpah interconnection, Ivanpah will not contribute to a cumulative impact to the safety and reliability of the transmission system.

COMPLIANCE WITH LORS

The studies indicate that the three phases of the project would comply with NERC/WECC planning standards and California ISO reliability criteria. The applicant will design and fund construction of the proposed 220 kV Ivanpah substation and a new

36-mile long segment of Eldorado-Baker-Cool Water-Dunn Siding-Mountain Pass transmission line between Eldorado and Ivanpah Substations. Staff concludes that, assuming the proposed conditions of certification are met, the project would likely meet the requirements and standards of all applicable LORS.

NOTEWORTHY PUBLIC BENEFITS

Staff has not identified any noteworthy public benefits associated with Transmission System Engineering.

RESPONSE TO AGENCY AND PUBLIC COMMENTS ON THE PSA

No agency or public comments related to the TSE discipline have been received.

CONCLUSIONS AND RECOMMENDATIONS

The proposed Ivanpah outlet lines and termination are acceptable and would comply with all applicable laws, ordinances, regulations, and standards (LORS). The analysis of project transmission lines and equipment, both from the power plant up to the point of interconnection with the existing transmission network as well as upgrades beyond the interconnection that are attributable to the project have been evaluated by staff and are included in the environmental sections of this staff assessment. Staff's conclusions with respect to Transmission System Engineering result in the need for Ivanpah to provide the following mitigation measures:

- Mitigation of base case thermal overloads caused by Ivanpah #1 and Ivanpah #2 of the project, would require the replacement of the existing 115/220 kV transformer bank at the Eldorado substation and the upgrade of a 36 mile long segment of Eldorado-Baker-Cool Water-Dunn Siding-Mountain Pass transmission line between Eldorado and Ivanpah Substations. Ivanpah #3 would require the addition of a 115/220 kV transformer at the new Ivanpah substation.
- Mitigation of thermal overloads caused by the Ivanpah #3 under N-1 contingency analysis, would require modification of the existing Special Protection System (SPS) to reflect the topology change associated with the additional facility upgrades triggered by the Ivanpah #3 power plant.

MITIGATION MEASURES/PROPOSED CONDITIONS OF CERTIFICATION

If BLM grants a Right-of-Way and the Energy Commission approves this project, staff recommends that the following conditions of certification be met to ensure both system reliability and conformance with LORS.

TSE-1 The project owner shall furnish to BLM's Authorized Officer and the Compliance Project Manager (CPM) and to the Chief Building Official (CBO) a schedule of transmission facility design submittals, a Master Drawing List, a Master Specifications List, and a Major Equipment and Structure List. The

schedule shall contain a description and list of proposed submittal packages for design, calculations, and specifications for major structures and equipment. To facilitate audits by BLM and Energy Commission staff, the project owner shall provide designated packages to BLM's Authorized Officer and the CPM when requested.

Verification: At least 60 days prior to the start of construction (or a lesser number of days mutually agreed to by the project owner and the CBO), the project owner shall submit the schedule, a Master Drawing List, and a Master Specifications List to the CBO, BLM's Authorized Officer and to the CPM. The schedule shall contain a description and list of proposed submittal packages for design, calculations, and specifications for major structures and equipment (see a list of major equipment in **Table 1: Major Equipment List** below). Additions and deletions shall be made to the table only with CPM, BLM's Authorized Officer and CBO approval. The project owner shall provide schedule updates in the Monthly Compliance Report.

TRANSMISSION SYSTEM ENGINEERING Table 1
Major Equipment List

Breakers
Step-Up Transformer
Switchyard
Busses
Surge Arrestors
Disconnects
Take Off Facilities
Electrical Control Building
Switchyard Control Building
Transmission Pole/Tower
Grounding System

TSE-2 Prior to the start of construction, the project owner shall assign an electrical engineer and at least one of each of the following to the project: A) a civil engineer; B) a geotechnical engineer or a civil engineer experienced and knowledgeable in the practice of soils engineering; C) a design engineer who is either a structural engineer or a civil engineer fully competent and proficient in the design of power plant structures and equipment supports; or D) a mechanical engineer. (Business and Professions Code Sections 6704 et seq. require state registration to practice as a civil engineer or structural engineer in California.

The tasks performed by the civil, mechanical, electrical, or design engineers may be divided between two or more engineers, as long as each engineer is responsible for a particular segment of the project (e.g., proposed earthwork, civil structures, power plant structures, equipment support). No segment of the project shall have more than one responsible engineer. The transmission line may be the responsibility of a separate California-registered electrical

engineer. The civil, geotechnical or civil, and design engineer assigned in conformance with Facility Design condition **GEN-5**, may be responsible for design and review of the TSE facilities.

The project owner shall submit to the CBO for review and approval, the names, qualifications, and registration numbers of all engineers assigned to the project. If any one of the designated engineers is subsequently reassigned or replaced, the project owner shall submit the name, qualifications, and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify BLM's Authorized Officer and the CPM of the CBO's approval of the new engineer. This engineer shall be authorized to halt earthwork and to require changes if site conditions are unsafe or do not conform with predicted conditions used as a basis for design of earthwork or foundations.
The electrical engineer shall:

1. Be responsible for the electrical design of the power plant switchyard, outlet and termination facilities; and

2. Sign and stamp electrical design drawings, plans, specifications, and calculations.

Verification: At least 30 days prior to the start of rough grading (or a lesser number of days mutually agreed to by the project owner and the CBO), the project owner shall submit to the CBO for review and approval, the names, qualifications, and registration numbers of all the responsible engineers assigned to the project. The project owner shall notify BLM's authorized officer and the CPM of the CBO's approvals of the engineers within five days of the approval.

If the designated responsible engineer is subsequently reassigned or replaced, the project owner has five days in which to submit the name, qualifications, and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify BLM's Authorized Officer and the CPM of the CBO's approval of the new engineer within five days of the approval.

TSE-3 If any discrepancy in design and/or construction is discovered in any engineering work that has undergone CBO design review and approval, the project owner shall document the discrepancy and recommend corrective action (California Building Code, 1998, Chapter 1, Section 108.4, Approval Required; Chapter 17, Section 1701.3, Duties and Responsibilities of the Special Inspector; Appendix Chapter 33, Section 3317.7, Notification of Noncompliance). The discrepancy documentation shall become a controlled document and shall be submitted to the CBO for review and approval and shall reference this condition of certification.

Verification: The project owner shall submit a copy of the CBO's approval or disapproval of any corrective action taken to resolve a discrepancy to BLM's Authorized Officer and the CPM within 15 days of receipt. If disapproved, the project owner shall advise BLM's Authorized Officer and the CPM, within five days, the reason for disapproval, and the revised corrective action required obtaining the CBO's approval.

TSE-4 For the power plant switchyard, outlet line, and termination, the project owner shall not begin any increment of construction until plans for that increment have been approved by the CBO. These plans, together with design changes and design change notices, shall remain on the site for one year after completion of construction. The project owner shall request that the CBO inspect the installation to ensure compliance with the requirements of applicable LORS. The following activities shall be reported in the Monthly Compliance Report:

1. Receipt or delay of major electrical equipment;

2. Testing or energization of major electrical equipment; and

3. The number of electrical drawings approved, submitted for approval, and still to be submitted.

Verification: At least 30 days prior to the start of each increment of construction (or a lesser number of days mutually agreed to by the project owner and the CBO), the project owner shall submit to the CBO for review and approval the final design plans, specifications, and calculations for equipment and systems of the power plant switchyard, outlet line, and termination, including a copy of the signed and stamped statement from the responsible electrical engineer attesting to compliance with the applicable LORS, and send BLM's Authorized Officer and the CPM a copy of the transmittal letter in the next Monthly Compliance Report.

TSE-5 The project owner shall ensure that the design, construction, and operation of the proposed transmission facilities will conform to all applicable LORS, including the requirements listed below. The project owner shall submit the required number of copies of the design drawings and calculations as determined by the CBO.

1. The Ivanpah 1 will be interconnected to the SCE grid via a segment of 115kV, 477 kcmil-ACSR, approximately 5,800 feet long single circuit.

   The Ivanpah #2 will be interconnected to the SCE grid via a segment of 115-kV, 477 kcmil-ACSR, approximately 3900 feet long single circuit and a segment of 115kV, 477- kcmil, approximately 1400 feet long double circuit generator tie-line.

   The Ivanpah #3 generator tie line would be approximately 14,100 feet long, single circuit, 115kV line built with 1510 kcmil ACSR and would merge into a 115kV double circuit with the Ivanpah #2 generator tie line.

   The proposed Ivanpah substation would use a double bus breaker- and-a half configuration with 3-bays and 5 positions.

2. The power plant outlet line shall meet or exceed the electrical, mechanical, civil, and structural requirements of CPUC General Order 95 and General Order 98 or National Electric Safety Code (NESC), Title 8 of the California Code and Regulations (Title 8), Articles 35, 36, and 37 of

the “High Voltage Electric Safety Orders”, California ISO standards, National Electric Code (NEC), and related industry standards.

3. Breakers and busses in the power plant switchyard and other switchyards, where applicable, shall be sized to comply with a short-circuit analysis.

4. Outlet line crossings and line parallels with transmission and distribution facilities shall be coordinated with the transmission line owner and comply with the owner’s standards.

5. The project conductors shall be sized to accommodate the full output from the project.

6. Termination facilities shall comply with applicable SCE interconnection standards.

7. The project owner shall provide to BLM’s Authorized Officer and the CPM:

   a. The final Detailed Facility Study (DFS) including a description of facility upgrades, operational mitigation measures, and/or Special Protection System (SPS) sequencing and timing if applicable,

   b. Executed project owner and California ISO Facility Interconnection Agreement.

Verification: At least 60 days prior to the start of construction of transmission facilities (or a lessor number of days mutually agree to by the project owner and CBO), the project owner shall submit to the CBO for approval:

1. Design drawings, specifications, and calculations conforming with CPUC General Order 95 and General Order 98 or NESC; Title 8, California Code of Regulations, Articles 35, 36, and 37 of the “High Voltage Electric Safety Orders”; NEC; applicable interconnection standards, and related industry standards for the poles/towers, foundations, anchor bolts, conductors, grounding systems, and major switchyard equipment.

2. For each element of the transmission facilities identified above, the submittal package to the CBO shall contain the design criteria, a discussion of the calculation method(s), a sample calculation based on “worst-case conditions,”[1] and a statement signed and sealed by the registered engineer in responsible charge, or other acceptable alternative verification, that the transmission element(s) will conform with CPUC General Order 95 or NESC; Title 8, California Code of Regulations, Articles 35, 36 and 37 of the “High Voltage Electric Safety Orders”; NEC; applicable interconnection standards, and related industry standards.

3. Electrical one-line diagrams signed and sealed by the registered professional electrical engineer in responsible charge, a route map, and an engineering description of equipment and the configurations covered by requirements **TSE-5** 1) through 5) above.

[1] Worst-case conditions for the foundations would include for instance, a dead-end or angle pole.

4. The final Detailed Facility Study, including a description of facility upgrades, operational mitigation measures, and/or SPS sequencing and timing if applicable, shall be provided concurrently to BLM's Authorized Officer and the CPM.

TSE-6 The project owner shall provide the following Notice to the California Independent System Operator (California ISO) prior to synchronizing the facility with the California transmission system:

1. At least one week prior to synchronizing the facility with the grid for testing, provide the California ISO a letter stating the proposed date of synchronization; and

2. At least one business day prior to synchronizing the facility with the grid for testing, provide telephone notification to the California ISO Outage Coordination Department.

Verification: The project owner shall provide copies of the California ISO letter to BLM's Authorized Officer and the CPM when it is sent to the California ISO one week prior to initial synchronization with the grid. A report of the conversation with the California ISO shall be provided electronically to BLM's Authorized Officer and the CPM one day before synchronizing the facility with the California transmission system for the first time.

TSE-7 The project owner shall be responsible for the inspection of the transmission facilities during and after project construction, and any subsequent BLM authorized officer, CPM and CBO approved changes thereto, to ensure conformance with CPUC GO-95 or NESC; Title 8, CCR, Articles 35, 36 and 37 of the "High Voltage Electric Safety Orders"; applicable interconnection standards; NEC; and related industry standards. In case of non-conformance, the project owner shall inform BLM's Authorized Officer, the CPM and CBO in writing, within 10 days of discovering such non-conformance and describe the corrective actions to be taken.

Verification: Within 60 days after first synchronization of the project, the project owner shall transmit to BLM's Authorized Officer, the CPM and CBO:

1. "As built" engineering description(s) and one-line drawings of the electrical portion of the facilities signed and sealed by the registered electrical engineer in responsible charge. A statement attesting to conformance with CPUC GO-95 or NESC; Title 8, California Code of Regulations, Articles 35, 36 and 37 of the "High Voltage Electric Safety Orders"; applicable interconnection standards; NEC; and related industry standards, and these conditions shall be provided concurrently.

2. An "as built" engineering description of the mechanical, structural, and civil portion of the transmission facilities signed and sealed by the registered engineer in responsible charge or acceptable alternative verification. "As built" drawings of the electrical, mechanical, structural, and civil portion of the transmission facilities shall be maintained at the power plant and made available, if requested, for BLM's Authorized Officer or CPM audit as set forth in the "Compliance Monitoring Plan."

3. A summary of inspections of the completed transmission facilities, and identification of any nonconforming work and corrective actions taken, signed and sealed by the registered engineer in charge

REFERENCES

California ISO (California Independent System Operator). 1998a. Cal-ISO Tariff Scheduling Protocol. Posted April 1998, Amendments 1,4,5,6, and 7 incorporated.

California ISO (California Independent System Operator). 1998b. Cal-ISO Dispatch Protocol. Posted April 1998.

California ISO (California Independent System Operator). 2002a. Cal-ISO Grid Planning Standards. February 2002.

CH2ML2008g – CH2M HILL/ J. Carrier (tn: 46239). Data Responses Set 1D. Dated on 5/09/2008. Submitted to CEC / Docket Unit on 5/09/2008.

Ivanpah #1 and 2 (Ivanpah Solar Energy Generating Station 1 and 2). 2008a. Bright Source Energy, Inc. DPT1 and DPT2 project (System Impact Study) submitted to the California Energy Commission.

Ivanpah #3 (Ivanpah Solar Energy Generating Station #3). 2008a. Bright Source Energy, Inc. DPT3 project (System Impact Study) submitted to the California Energy Commission.

Ivanpah (Ivanpah Solar Energy Generating Station 1, 2 and 3). 2007b, Ivanpah Solar Power, Application for Certification. Submitted to the California Energy Commission.

NERC/WECC (North American Reliability Council/Western Electricity Coordinating Council). 2002. NERC/WECC Planning Standards. August 2002.

DEFINITION OF TERMS

AAC - All aluminum conductor

ACSR - Aluminum conductor steel-reinforced

ACSS - Aluminum conductor steel-supported

Ampacity - Current-carrying capacity, expressed in amperes, of a conductor at specified ambient conditions, at which damage to the conductor is nonexistent or deemed acceptable based on economic, safety, and reliability considerations.

Ampere - The unit of current flowing in a conductor.

Bundled - Two wires, 18 inches apart.

Bus - Conductors that serve as a common connection for two or more circuits.

Conductor - The part of the transmission line (the wire) that carries the current.

Congestion management – A scheduling protocol, which provides that dispatched generation and transmission loading (imports) will not violate criteria.

Emergency overload – See “Single Contingency.” This is also called an L-1.

Kcmil or KCM – Thousand circular mil. A unit of the conductor’s cross sectional area When divided by 1,273, the area in square inches is obtained.

Kilovolt (kV) - A unit of potential difference, or voltage, between two conductors of a circuit, or between a conductor and the ground.

Loop - An electrical cul de sac. A transmission configuration that interrupts an existing circuit, diverts it to another connection, and returns it back to the interrupted circuit, thus forming a loop or cul de sac.

Megavar - One megavolt ampere reactive.

Megavars - Mega-volt-Ampere-Reactive. One million Volt-Ampere-Reactive. Reactive power is generally associated with the reactive nature of motor loads that must be fed by generation units in the system.

Megavolt ampere (MVA) – A unit of apparent power. It equals the product of the line voltage in kilovolts, current in amperes, and the square root of 3, divided by 1,000.

Megawatt (MW) – A unit of power equivalent to 1,341 horsepower.

Normal operation/normal overload – The condition arrived at when all customers receive the power they are entitled to, without interruption and at steady voltage, and with no element of the transmission system loaded beyond its continuous rating.

N-1 condition – See “single contingency.”

Outlet - Transmission facilities (circuit, transformer, circuit breaker, etc.) linking generation facilities to the main grid.

Power flow analysis – A forward-looking computer simulation of essentially all generation and transmission system facilities that identifies overloaded circuits, transformers, and other equipment and system voltage levels.

Reactive power – Generally associated with the reactive nature of motor loads that must be fed by generation units in the system. An adequate supply of reactive power is required to maintain voltage levels in the system.

Remedial action scheme (RAS) – An automatic control provision, which, for instance, will trip a selected generating unit upon a circuit overload.

SF6 (sulfur hexafluoride) – An insulating medium.

Single contingency – Also known as “emergency” or “N-1 condition,” the occurrence when one major transmission element (circuit, transformer, circuit breaker, etc.) or one generator is out of service.

Solid dielectric cable – Copper or aluminum conductors that are insulated by solid polyethylene type insulation and covered by a metallic shield and outer polyethylene jacket.

Switchyard - An integral part of a power plant and used as an outlet for one or more electric generators.

Thermal rating – See “ampacity.”

TSE - Transmission system engineering.

Tap - A transmission configuration creating an interconnection through a sort single circuit to a small or medium sized load or a generator. The new single circuit line is inserted into an existing circuit by utilizing breakers at existing terminals of the circuit, rather than installing breakers at the interconnection in a new switchyard.

Undercrossing – A transmission configuration where a transmission line crosses below the conductors of another transmission line, generally at 90 degrees.

Underbuild - A transmission or distribution configuration where a transmission or distribution circuit is attached to a transmission tower or pole below (under) the principle transmission line conductors.

OTHER CEQA AND NEPA CONSIDERATIONS

Prepared by Robert Dover and John Kessler

This section includes discussions of other topics as required by CEQA and/or NEPA, including identification of significant unavoidable adverse impacts, discussion of significant irreversible and irretrievable commitment of resources, and growth-inducing effects.

Significant Unavoidable Adverse Impacts

The environmental impacts of the proposed project are described in the environmental analysis sections of this FSA/DEIS. The analysis has identified impacts that are significant, and cannot be reduced to less than significant levels through the application of mitigation measures. Those impacts which have been determined to be significant and unavoidable are summarized below.

Biological Resources

The Ivanpah Solar Electric Generating System (ISEGS) project would have major impacts to the biological resources of the Ivanpah Valley, significantly affecting many sensitive plant and wildlife species and eliminating a broad expanse of relatively undisturbed Mojave Desert habitat. Approximately 4,073 acres of occupied desert tortoise habitat would be permanently lost and a minimum of 25 desert tortoises would need to be translocated west of the ISEGS project site. Impact avoidance and minimization measures described in staff's analysis and included in the conditions of certification would help reduce impacts to sensitive biological resources. However, compensatory measures are necessary to offset project-related losses to less-than-significant levels.

The ISEGS project site supports a diverse flora including numerous special-status plant species. Eight special-status plant species, only one of which is considered sensitive by the Bureau of Land Management (BLM), would be directly impacted by construction of ISEGS. Energy Commission staff consider impacts to five of these (Mojave milkweed, desert pincushion, nine-awned pappus grass, Parish's club-cholla, and Rusby's desert-mallow) to be significant according to California Environmental Quality Act (CEQA) guidelines because the project would eliminate a substantial portion of their documented occurrences in the state. Depending on the degree of avoidance that the applicant can achieve, Energy Commission staff's proposed avoidance and minimization measures may reduce impacts to three special-status plant species (desert pincushion, nine-awned pappus grass, and Parish's club-cholla) to less-than-significant levels. However, impacts to Mojave milkweed and Rusby's desert-mallow would remain significant in a CEQA context even after implementation of the special-status plant impact avoidance and minimization measures described in Energy Commission staff's proposed conditions of certification.

Land Use

Impacts of the ISEGS project would combine with impacts of present and reasonably foreseeable projects to result in a contribution to cumulative impacts in the Ivanpah Valley area related to land use which would be significant with respect to CEQA as well

as NEPA significance criteria in 40 CFR 1508.27. Impacts of the ISEGS project would also combine with the potential impacts of reasonably foreseeable renewable energy projects in the southern California Mojave desert to result in significant and unmitigable regional cumulative impacts related to land use.

In addition, staff concludes that the project would not conform with applicable goals and policies of the San Bernardino General Plan Conservation and Open Space Elements as follows:

1. Conservation Element Goal D/CO 1, calling for preservation of scenic vistas in the County. Staff found that the project would have adverse effects on scenic vistas.

2. Open Space Element Goal OS 5, calling for the County to maintain and enhance the visual character of scenic routes in the County; and Policy OS 5.2, which states that "Development along scenic corridors will be required to demonstrate through visual analysis that proposed improvements are compatible with the scenic qualities present." The visual analysis of the project found that it would not be compatible with the scenic qualities present in the viewshed of portions of Highway I-15 designated as a County scenic route.

Visual Resources

BLM and Energy Commission staff have analyzed visual resource-related information pertaining to the proposed Ivanpah Solar Electric Generating System (ISEGS) and conclude that the proposed project would result in a substantial adverse impact to existing scenic resource values as seen from several Key Observation Points in the Ivanpah Valley and Clark Mountains, including:

- The Primm Valley Golf Course
- Middle-ground-distance viewpoints on Highway I-15
- Viewpoints in the Mojave National Preserve on the east face of Clark Mountain
- Viewpoints in the Stateline Wilderness Area, including the Umberci Mine and vicinity

Staff found that with recommended conditions of certification, potentially significant visual impacts at the Primm Valley Golf Course (KOPs 1 and 2) could be mitigated to less than significant levels in the long term. However, staff has concluded that potentially significant visual impacts at the other locations cited above could not be mitigated to less than significant levels and would thus result in significant and unavoidable impacts.

Staff also concludes that the project in combination with foreseeable future projects could have significant unavoidable cumulative visual impacts of two kinds:

1. Cumulative impacts within the immediate project viewshed, essentially comprising foreseeable future projects in the Ivanpah Valley; and

2. Cumulative impacts of foreseeable future solar and other renewable energy projects within the southern California Mojave Desert.

In addition, staff concludes that the project would not conform with applicable goals and policies of the San Bernardino General Plan Conservation and Open Space Elements as described above in Land Use.

Irreversible and Irretrievable Commitment of Resources

Section 15126.2(c) of CEQA requires that CEQA documentation address significant irreversible changes and irretrievable commitments of resources that would be caused by a proposed project. Similarly, 40 CFR 1502.16 of the NEPA regulations requires a discussion of any irreversible or irretrievable commitments of resources which would be involved in the proposed project.

Implementation of the proposed project would result in the consumption of energy as it relates to the fuel needed for construction-related activities. Large amounts of gasoline, diesel, and jet fuel would be required for project construction. Additionally, construction would require the manufacture of new materials, some of which would not be recyclable at the end of the lifetime of the proposed project. The raw materials and energy required for the production of these materials would also result in an irretrievable commitment of natural resources. Operation of the proposed project would not cause a substantial increase in the consumption or use of non-renewable resources.

Implementation of the proposed project would require the loss of approximately 4,073 acres of vegetation and habitat. The loss of this habitat would be long-term, enduring throughout the proposed 50-year lifespan of the facility. Following decommissioning, restoration would be conducted which would involve removal of structures, restoration of topography, and revegetation, all of which would work towards restoration of the original habitat. However, it is likely that restoration of native vegetation would be slow, and the success uncertain. Therefore, the loss of desert tortoise habitat is assumed to be permanent since restoration of vegetation for which they depend for foraging and other factors affecting the quality of the restored habitat are uncertain. As noted above in the discussion of Significant Unavoidable Adverse Impacts to Biological Resources, the ISEGS project site also supports a diverse flora including numerous special-status plant species. Eight special-status plant species, only one of which is considered sensitive by BLM, would be directly impacted by construction of ISEGS. Energy Commission staff consider impacts to five of these (Mojave milkweed, desert pincushion, nine-awned pappus grass, Parish's club-cholla, and Rusby's desert-mallow) to be significant according to California Environmental Quality Act guidelines because the project would eliminate a substantial portion of their documented occurrences in the state. Depending on the degree of avoidance that the applicant can achieve, staff's proposed avoidance and minimization measures may reduce impacts to three of these species (desert pincushion, nine-awned pappus grass, and Parish's club-cholla) to less-than-significant levels. However, impacts to Mojave milkweed and Rusby's desert mallow would remain significant even after implementation of the special-status plant avoidance and minimization measures described in Energy Commission staff's proposed conditions of certification.

The majority of access required for construction and operation of the proposed project would utilize existing public ROWs and access roads. The proposed project would require re-routing the existing Colosseum Road through the construction logistics area,

but the re-routed road would re-connect with the existing road to the west of the facility. Therefore, the project would not significantly affect opportunities for public access..

Construction and operation of the proposed project would require the use of a limited amount of hazardous materials such as fuel, lubricants, and cleaning solvents. All hazardous materials would be stored, handled, and used in accordance with Best Management Practices and applicable, federal, state, and local regulations, including a construction-phase Stormwater Pollution Prevention Plan (SWPPP) and an operational-phase SWPPP. Assuming appropriate implementation of these plans and practices as are recommended in the conditions of certification, potential degradation of the environment due to accidental spills associated with the proposed project's use of hazardous materials would be less than significant.

Visual impacts would be significant and long-term considering the context and intensity of the project effects in general. The context of the project is one directly adjoining a national preserve and two designated wilderness areas, and a land-sailing site of regional or greater importance. Intensity of potential effects involves the unique scenic characteristics of the local landscape as indicated by the national preserve and wilderness designations of portions of the project viewshed; concerns expressed by public commenters to date; and a degree of uncertainty as to the level of discomfort or disability glare from the solar tower receivers; and concern over cumulative visual effects of renewable projects on the southern California Mojave Desert as a whole. The loss of visual quality would be long-term, enduring throughout the proposed 50-year lifespan of the facility. After the end of the project's useful life, it would be decommissioned as described in the Applicant's Draft Closure, Revegetation, and Rehabilitation Plan. The facility would be removed to a depth of three feet below grade, original contours restored, and the site revegetated. However, the removal of the existing facility would leave a very prominent visual impact over the entire site due to the strong color contrast created between graded, disturbed soil areas and undisturbed soil areas in the vicinity of the project site. In addition, revegetation of areas in this desert region are difficult and generally of limited success. Thus, visual recovery from land disturbance of closure and decommissioning would likely occur only over a very long period of time.

Growth-Inducing Effects

Section 15126.2(d) of the CEQA Guidelines requires that CEQA documents address the ways in which a proposed project encourages economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Section 1508.8(b) of NEPA also requires that an EIS discuss growth-inducing impacts of a project. The discussion must address how a proposed project may remove obstacles to growth, or encourage or facilitate other activities that could significantly impact the environment, either individually or cumulatively. Typically, the growth-inducing potential of a proposed project would be considered significant if it fosters growth or a concentration of population above what is assumed in local and regional land use plans, or in projections made by regional planning authorities. Significant growth impacts could also occur if a project adds infrastructure or service capacity which could accommodate growth levels which exceed those permitted by local or regional plans and policies.

The proposed project would employ up to 959 construction personnel and 90 operations personnel. Research shows that construction workers would commute as much as two hours each direction from their communities rather than relocate, and operations workers would commute as much as one hour (EPRI 1982). Staff reviewed the socioeconomics data for counties within the one-hour and two-hour commute ranges, which is within the study area and includes San Bernardino County and Clark County. **SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE Table 3** indicates that a total of 231,000 construction workers are available within the study area. In addition, a total of 90 workers would account for a negligible amount of the total San Bernardino County and Clark County total labor force. As all workers would reside within the study area, no impacts to existing population levels would occur. Because the number of operational workers required represents such a small portion of the local available labor force, no significant impacts to the study area population or employment base would result from proposed project operation.

As discussed in the Introduction to this FSA/DEIS, the primary need for the proposed project is driven by Federal and State requirements regarding the generation of renewable energy. According to the Energy Commission, peak electricity demand within California is projected to increase at a rate of 1.35% per year from 2008 through 2018 (CEC 2007), and therefore, additional generating capacity from new sources will be required. The proposed project is not intended to supply power related to growth for any particular development, either directly or indirectly, and would not result in direct growth-inducing impacts. However, the proposed project could facilitate growth indirectly through the additional increased capacity of electric power that it would make available.

GENERAL CONDITIONS
INCLUDING
COMPLIANCE MONITORING AND CLOSURE PLAN

Prepared by Steve Munro

INTRODUCTION

The project's General Compliance Conditions of Certification, including Compliance Monitoring and Closure Plan (Compliance Plan) have been established as required by Public Resources Code section 25532. The plan provides a means for assuring that the facility is constructed, operated, and closed in compliance with public health and safety, environmental, and other applicable regulations, guidelines, and conditions adopted or established by the California Energy Commission and specified in the written decision on the Application for Certification or otherwise required by law. The Compliance Plan will be integrated with a U.S. Bureau of Land Management (BLM) Compliance Monitoring Plan (hereafter referred to as the Compliance Plan) to assure compliance with the terms and conditions of any approved Right-of-Way (ROW) grant including the approved Plan of Development (POD)

The Compliance Plan is composed of elements that:

- set forth the duties and responsibilities of BLM's Authorized Officer, the Compliance Project Manager (CPM), the project owner, delegate agencies, and others;
- set forth the requirements for handling confidential records and maintaining the compliance record;
- state procedures for settling disputes and making post-certification changes;
- state procedures for requesting and approving ROW Grant or POD changes;
- state the requirements for periodic compliance reports and other administrative procedures that are necessary to verify the compliance status for all BLM and Energy Commission approved conditions of certification/mitigation measures;
- establish requirements for modifications or amendments to facility Closure, Revegetation, and Restoration Plans; and
- specify conditions of certification for each technical area containing the measures required to mitigate any and all potential adverse project impacts associated with construction, operation and closure below a level of significance. Each specific condition of certification also includes a verification provision that describes the method of assuring that the condition has been satisfied.

Conditions of Certification referred to herein serve the purpose of both the Energy Commission's Conditions of Certification for purposes of the California Environmental Quality Act (CEQA) and BLM's Mitigation Measures for purposes of the National Environmental Policy Act (NEPA).

DEFINITIONS

The following terms and definitions are used to establish when Conditions of Certification are implemented.

BLM AUTHORIZED OFFICER:

The BLM Authorized Officer for the Project is the BLM Needles Field Manager or his designated Compliance Inspector that is responsible for oversight and inspection of all construction and operational related activities on public land.

PRE-CONSTRUCTION SITE MOBILIZATION

Site mobilization is limited preconstruction activities at the site to allow for the installation of fencing, construction trailers, construction trailer utilities, and construction trailer parking at the site. Limited ground disturbance, grading, and trenching associated with the above mentioned pre-construction activities is considered part of site mobilization. Walking, driving or parking a passenger vehicle, pickup truck and light vehicles is allowable during site mobilization.

CONSTRUCTION

Onsite work to install permanent equipment or structures for any facility.

Ground Disturbance

Construction-related ground disturbance refers to activities that result in the removal of top soil or vegetation at the site beyond site mobilization needs, and for access roads and linear facilities.

Grading, Boring, and Trenching

Construction-related grading, boring, and trenching refers to activities that result in subsurface soil work at the site and for access roads and linear facilities, e.g., alteration of the topographical features such as leveling, removal of hills or high spots, moving of soil from one area to another, and removal of soil.

Notwithstanding the definitions of ground disturbance, grading, boring and trenching above, construction does **not** include the following:

1. the installation of environmental monitoring equipment;

2. a soil or geological investigation;

3. a topographical survey;

4. any other study or investigation to determine the environmental acceptability or feasibility of the use of the site for any particular facility; and

5. any work to provide access to the site for any of the purposes specified in “Construction” 1, 2, 3, or 4 above.

START OF COMMERCIAL OPERATION

For compliance monitoring purposes, “commercial operation” begins after the completion of start-up and commissioning, when each of the power plants has reached reliable steady-state production of electricity at the rated capacity. At the start of commercial operation, plant control is usually transferred from the construction manager to the plant operations manager.

BLM’S AUTHORIZED OFFICER AND COMPLIANCE PROJECT MANAGER RESPONSIBILITIES

BLM’s Authorized Officer and the Compliance Project Manager (CPM) shall oversee the compliance monitoring and is responsible for:

1. Ensuring that the design, construction, operation, and closure of the project facilities are in compliance with the terms and conditions of BLM’s ROW Grant and the Energy Commission Decision

2. Resolving complaints

3. Processing post-certification changes to the conditions of certification, project description (petition to amend), and ownership or operational control (petition for change of ownership) (See instructions for filing petitions)

4. Documenting and tracking compliance filings

5. Ensuring that compliance files are maintained and accessible

BLM’s Authorized Officer is the contact person for BLM and will consult with appropriate responsible agencies, Energy Commission, and Energy Commission staff when handling disputes, complaints, and amendments. The CPM is the contact person for the Energy Commission and will consult with appropriate responsible agencies, BLM, Energy Commission, and Energy Commission staff when handling disputes, complaints, and amendments.

All project compliance submittals are submitted to BLM’s Authorized Officer and the CPM for processing. Where a submittal required by a condition of certification requires BLM’s Authorized Officer and/or CPM approval, the approval will involve all appropriate BLM personnel, Energy Commission staff and management. All submittals must include searchable electronic versions (pdf or word files).

CHIEF BUILDING OFFICIAL RESPONSIBILITIES

The Chief Building Official (CBO) shall serve as BLM's and the Energy Commission's delegate to assure the project is designed and constructed in accordance with BLM's Right-of-Way Grant, the Energy Commission's Decision including Conditions of Certification, California Building Standards Code, local building codes and applicable laws, ordinances, regulations and standards to ensure health and safety. The CBO is

typically made-up of a team of specialists covering civil, structural, mechanical and electrical disciplines whose duties include the following:

1. Performing design review and plan checks of all drawings, specifications and procedures;

2. Conducting construction inspection;

3. Functioning as BLM's and the Energy Commission's delegate including reporting noncompliance issues or violations to the BLM Authorized Officer for action and taking any action allowed under the California Code of Regulations, including issuing a Stop Work Order, to ensure compliance;

4. Exercising access as needed to all project owner construction records, construction and inspection procedures, test equipment and test results; and

5. Providing weekly reports on the status of construction to BLM's Authorized Officer and the CPM.

PRE-CONSTRUCTION AND PRE-OPERATION COMPLIANCE MEETING

BLM's Authorized Officer and the CPM shall schedule pre-construction and pre-operation compliance meetings prior to the projected start-dates of construction, plant operation, or both. The purpose of these meetings is to assemble technical staff from BLM, the Energy Commission, the project owner and construction contractor to review the status of all pre-construction or pre-operation requirements, contained in BLM's and the Energy Commission's conditions of certification. This is to confirm that all applicable conditions of certification have been met, or if they have not been met, to ensure that the proper action is taken. In addition, these meetings ensure, to the extent possible, that BLM and Energy Commission conditions will not delay the construction and operation of the plant due to oversight and to preclude any last minute, unforeseen issues from arising. Pre-construction meetings held during the certification process must be publicly noticed unless they are confined to administrative issues and processes.

BLM AND ENERGY COMMISSION RECORD

BLM and the Energy Commission shall maintain the following documents and information as a public record, in either the Energy Commission's Compliance file or Dockets file, for the life of the project (or other period as required):

- All documents demonstrating compliance with any legal requirements relating to the construction and operation of the facility;
- All monthly and annual compliance reports filed by the project owner;
- All complaints of noncompliance filed with BLM and the Energy Commission; and
- All petitions/requests for project or condition of certification changes and the resulting BLM, Energy Commission staff or Energy Commission action.

PROJECT OWNER RESPONSIBILITIES

The project owner is responsible for ensuring that the compliance conditions of certification and all other conditions of certification that appear in BLM's ROW Grant and the Energy Commission Decision are satisfied. The compliance conditions regarding post-certification changes specify measures that the project owner must take when requesting changes in the project design, conditions of certification, or ownership. Failure to comply with any of the conditions of certification or the compliance conditions may result in reopening of the case and revocation of the Energy Commission certification; an administrative fine; or other action as appropriate. A summary of the Compliance Conditions of Certification is included as **Compliance Table 1** at the conclusion of this section.

The BLM ROW grant holder will comply with the terms, conditions, and special stipulations of the ROW grant. Failure to comply with applicable laws or regulations or any of the terms and conditions of a BLM ROW grant may result in the suspension or termination of the ROW grant (43 CFR 2807.17). Prior to suspending or terminating a ROW grant, BLM will provide written notice to the holder stating it intends to suspend or terminate and will provide reasonable opportunity to correct any noncompliance.

COMPLIANCE MITIGATION MEASURES/CONDITIONS OF CERTIFICATION

Unrestricted Access (COMPLIANCE-1)

BLM's Authorized Officer, responsible BLM staff, the CPM, responsible Energy Commission staff, and delegated agencies or consultants shall be guaranteed and granted unrestricted access to the power plant site, related facilities, project-related staff, and the records maintained on-site, for the purpose of conducting audits, surveys, inspections, or general site visits. Although BLM's Authorized Officer and the CPM will normally schedule site visits on dates and times agreeable to the project owner, BLM's Authorized Officer and the CPM reserve the right to make unannounced visits at any time.

Compliance Record (COMPLIANCE-2)

The project owner shall maintain project files on-site or at an alternative site approved by BLM's Authorized Officer and the CPM for the life of the project, unless a lesser period of time is specified by the conditions of certification. The files shall contain copies of all "as-built" drawings, documents submitted as verification for conditions, and other project-related documents. As-built drawings of all facilities including linear facilities shall be provided to the BLM Authorized Officer for inclusion in the BLM administrative record within 90-days of completion of that portion of the facility or project.

BLM and Energy Commission staff and delegate agencies shall, upon request to the project owner, be given unrestricted access to the files maintained pursuant to this condition.

Compliance Verification Submittals (COMPLIANCE-3)

Each condition of certification is followed by a means of verification. The verification describes the Energy Commission's procedure(s) to ensure post-certification compliance with adopted conditions. The verification procedures, unlike the conditions, may be modified as necessary by BLM's Authorized Officer and the CPM.

Verification of compliance with the conditions of certification can be accomplished by the following:

1. Monthly and/or annual compliance reports, timely filed by the project owner or authorized agent, reporting on work done and providing pertinent documentation, as required by the specific conditions of certification;

2. Appropriate letters from delegate agencies verifying compliance;

3. BLM and Energy Commission staff audits of project records; and/or

4. BLM and Energy Commission staff inspections of work, or other evidence that the requirements are satisfied.

Verification lead times associated with start of construction may require the project owner to file submittals during the certification process, particularly if construction is planned to commence shortly after certification.

A cover letter from the project owner or authorized agent is required for all compliance submittals and correspondence pertaining to compliance matters. **The cover letter subject line shall identify the project by AFC number, the appropriate condition(s) of certification by condition number(s), and a brief description of the subject of the submittal**. The project owner shall also identify those submittals not required by a condition of certification with a statement such as: "This submittal is for information only and is not required by a specific condition of certification." When submitting supplementary or corrected information, the project owner shall reference the date of the previous submittal and BLM/CEC submittal number.

The project owner is responsible for the delivery and content of all verification submittals to the BLM's Authorized Officer and CPM, whether such condition was satisfied by work performed by the project owner or an agent of the project owner.

All hardcopy submittals shall be addressed to each of the following:

BLM's Authorized Officer
(CACA-48668, 49502, 49503, and 49504)
U.S. Bureau of Land Management
1303 South Highway 95
Needles, CA 92363

Compliance Project Manager
(07-AFC-5C)
California Energy Commission
1516 Ninth Street (MS-2000)
Sacramento, CA 95814

Those submittals shall be accompanied by a searchable electronic copy, on a CD or by e-mail, as agreed upon by BLM's Authorized Officer and the CPM.

If the project owner desires BLM and/or Energy Commission staff action by a specific date, that request shall be made in the submittal cover letter and shall include a detailed explanation of the effects on the project if that date is not met.

Pre-Construction Matrix and Tasks Prior to Start of Construction (COMPLIANCE-4)

Prior to commencing construction, a compliance matrix addressing only those conditions that must be fulfilled before the start of construction shall be submitted by the project owner to BLM's Authorized Officer and the CPM. This matrix will be included with the project owner's first compliance submittal or prior to the first pre-construction meeting, whichever comes first. It will be submitted in the same format as the compliance matrix described below. In order to begin any on-site mobilization or surface disturbing activities on public land, the BLM Authorized Officer must approve a written Notice to Proceed (NTP). NTPs will be phased as appropriate to facilitate timely implementation of construction.

Construction shall not commence until the pre-construction matrix is submitted, all pre-construction conditions have been complied with, and BLM's Authorized Officer and the CPM have issued a letter and BLM has issued a NTP to the project owner authorizing construction. Various lead times for submittal of compliance verification documents to BLM's Authorized Officer and the CPM for conditions of certification are established to allow sufficient BLM and Energy Commission staff time to review and comment and, if necessary, allow the project owner to revise the submittal in a timely manner. This will ensure that project construction may proceed according to schedule.

Failure to submit compliance documents within the specified lead-time may result in delays in authorization to commence various stages of project development.

If the project owner anticipates commencing project construction as soon as the project is certified, it may be necessary for the project owner to file compliance submittals prior to project certification. Compliance submittals should be completed in advance where the necessary lead time for a required compliance event extends beyond the date anticipated for start of construction. The project owner must understand that the submittal of compliance documents prior to project certification is at the owner's own risk. Any approval by Energy Commission staff is subject to change, based upon BLM's ROW Grant and the Energy Commission Decision.

Compliance Reporting

There are two different compliance reports that the project owner must submit to assist BLM's Authorized Officer and the CPM in tracking activities and monitoring compliance with the terms and conditions of BLM's ROW Grant and the Energy Commission Decision. During construction, the project owner or authorized agent will submit Monthly Compliance Reports. During operation, an Annual Compliance Report must be submitted. These reports, and the requirement for an accompanying compliance matrix, are described below. The majority of the conditions of certification require that compliance submittals be submitted to BLM's Authorized Officer and the CPM in the monthly or annual compliance reports.

Compliance Matrix (COMPLIANCE-5)

A compliance matrix shall be submitted by the project owner to BLM's Authorized Officer and the CPM along with each monthly and annual compliance report. The compliance matrix is intended to provide BLM's Authorized Officer and the CPM with the current status of all conditions of certification in a spreadsheet format. The compliance matrix must identify:

1. the technical area;

2. the condition number;

3. a brief description of the verification action or submittal required by the condition;

4. the date the submittal is required (e.g., 60 days prior to construction, after final inspection, etc.);

5. the expected or actual submittal date;

6. the date a submittal or action was approved by the Chief Building Official (CBO), BLM's Authorized Officer, CPM, or delegate agency, if applicable; and

7. the compliance status of each condition, e.g., "not started," "in progress" or "completed" (include the date).

8. if the condition was amended, the date of the amendment.

Satisfied conditions shall be placed at the end of the matrix.

Monthly Compliance Report (COMPLIANCE-6)

The first Monthly Compliance Report is due one month following the Energy Commission business meeting date upon which the project was approved, unless otherwise agreed to by BLM's Authorized Officer and the CPM. The first Monthly Compliance Report shall include the AFC number and an initial list of dates for each of the events identified on the **Key Events List. The Key Events List Form is found at the end of this section.**

During pre-construction and construction of each power plant, the project owner or authorized agent shall submit an original and an electronic searchable version of the Monthly Compliance Report within 10 working days after the end of each reporting month. Monthly Compliance Reports shall be clearly identified for the month being reported. The reports shall contain, at a minimum:

1. A summary of the current project construction status, a revised/updated schedule if there are significant delays, and an explanation of any significant changes to the schedule;

2. Documents required by specific conditions to be submitted along with the Monthly Compliance Report. Each of these items must be identified in the transmittal letter, as well as the conditions they satisfy and submitted as attachments to the Monthly Compliance Report;

3. An initial, and thereafter updated, compliance matrix showing the status of all conditions of certification (fully satisfied conditions do not need to be included in the matrix after they have been reported as completed);

4. A list of conditions that have been satisfied during the reporting period, and a description or reference to the actions that satisfied the condition;

5. A list of any submittal deadlines that were missed, accompanied by an explanation and an estimate of when the information will be provided;

6. A cumulative listing of any approved changes to conditions of certification;

7. A listing of any filings submitted to, or permits issued by, other governmental agencies during the month;

8. A projection of project compliance activities scheduled during the next two months. The project owner shall notify BLM's Authorized Officer and the CPM as soon as any changes are made to the project construction schedule that would affect compliance with conditions of certification;

9. A listing of the month's additions to the on-site compliance file; and

10. A listing of complaints, notices of violation, official warnings, and citations received during the month, a description of the resolution of the resolved actions, and the status of any unresolved actions.

All sections, exhibits, or addendums shall be separated by tabbed dividers or as acceptable by BLM's Authorized Officer and the CPM.

Annual Compliance Report (COMPLIANCE-7)

After construction of each power plant is complete or when a power plant goes into commercial operation, the project owner shall submit Annual Compliance Reports instead of Monthly Compliance Reports. The reports are for each year of commercial operation and are due to BLM's Authorized Officer and the CPM each year at a date agreed to by BLM's Authorized Officer and the CPM. Annual Compliance Reports shall be submitted over the life of the project unless otherwise specified by BLM's Authorized Officer and the CPM. Each Annual Compliance Report shall include the AFC number, identify the reporting period and shall contain the following:

1. An updated compliance matrix showing the status of all conditions of certification (fully satisfied conditions do not need to be included in the matrix after they have been reported as completed);

2. A summary of the current project operating status and an explanation of any significant changes to facility operations during the year;

3. Documents required by specific conditions to be submitted along with the Annual Compliance Report. Each of these items must be identified in the transmittal letter, with the condition it satisfies, and submitted as attachments to the Annual Compliance Report;

4. A cumulative listing of all post-certification changes by the Energy Commission or changes to the BLM ROW grant or approved POD by BLM , or cleared by BLM's Authorized Officer and the CPM;

5. An explanation for any submittal deadlines that were missed, accompanied by an estimate of when the information will be provided;

6. A listing of filings submitted to, or permits issued by, other governmental agencies during the year;

7. A projection of project compliance activities scheduled during the next year;

8. A listing of the year's additions to the on-site compliance file;

9. An evaluation of the on-site contingency plan for unplanned facility closure, including any suggestions necessary for bringing the plan up to date [see Compliance Conditions for Facility Closure addressed later in this section]; and

10. A listing of complaints, notices of violation, official warnings, and citations received during the year, a description of the resolution of any resolved matters, and the status of any unresolved matters.

Confidential Information (COMPLIANCE-8)

Any information that the project owner deems confidential shall be submitted to the Energy Commission's Dockets Unit with an application for confidentiality pursuant to Title 20, California Code of Regulations, section 2505(a). Any information that is determined to be confidential shall be kept confidential as provided for in Title 20, California Code of Regulations, section 2501 et. seq. Any information the ROW holder deems confidential shall be submitted to the BLM Authorized Officer with a written request for said confidentiality along with a justification for the request. All confidential submissions to BLM should be clearly stamped "proprietary information" by the holder when submitted.

Annual Energy Facility Compliance Fee (COMPLIANCE-9)

Pursuant to the provisions of Section 25806(b) of the Public Resources Code, the project owner is required to pay the Energy Commission an annual compliance fee, which is adjusted annually. The amount of the fee for FY2009-2010 was $19,823. The initial payment is due on the date the Energy Commission adopts the final decision. You will be notified of the amount due. All subsequent payments are due by July 1 of each year in which the facility retains its certification. The payment instrument shall be made payable to the California Energy Commission and mailed to: Accounting Office MS-02, California Energy Commission, 1516 9th St., Sacramento, CA 95814.

Reporting of Complaints, Notices, and Citations (COMPLIANCE-10)

Prior to the start of construction, the project owner must send a letter to property owners living within one mile of the project notifying them of a telephone number to contact project representatives with questions, complaints or concerns. If the telephone is not staffed 24 hours per day, it shall include automatic answering with date and time stamp

recording. All recorded complaints shall be responded to within 24 hours. The telephone number shall be posted at the project site and made easily visible to passersby during construction and operation. The telephone number shall be provided to BLM's Authorized Officer and the CPM who will post it on the Energy Commission's web page at:

http://www.energy.ca.gov/sitingcases/power_plants_contacts.html

Any changes to the telephone number shall be submitted immediately to BLM's Authorized Officer and the CPM, who will update the web page.

In addition to the monthly and annual compliance reporting requirements described above, the project owner shall report and provide copies to BLM's Authorized Officer and the CPM of all complaint forms, including noise and lighting complaints, notices of violation, notices of fines, official warnings, and citations, within 10 days of receipt. Complaints shall be logged and numbered. Noise complaints shall be recorded on the form provided in the **NOISE** conditions of certification. All other complaints shall be recorded on the complaint form (Attachment A).

FACILITY CLOSURE

At some point in the future, the project will cease operation and close down. At that time, it will be necessary to implement the Closure, Revegetation and Restoration Plan to ensure that the closure occurs in such a way that public health and safety and the environment are protected from adverse impacts. Although the project setting for this project does not appear, at this time, to present any special or unusual closure problems, it is impossible to foresee what the situation will be in 30 years or more when the project ceases operation. Therefore, provisions must be made that provide the flexibility to deal with the specific situation and project setting that exist at the time of closure. Laws, Ordinances, Regulations and Standards (LORS) pertaining to facility closure are identified in the sections dealing with each technical area. Facility closure will be consistent with LORS in effect at the time of closure. Closure would be conducted in accordance with Condition of Certification BIO-14 that requires the project owner to develop and implement a Closure, Revegetation and Rehabilitation Plan.

There are at least three circumstances in which a facility closure can take place: planned closure, unplanned temporary closure and unplanned permanent closure**.**

CLOSURE DEFINITIONS

Planned Closure

A planned closure occurs when the facility is closed in an anticipated, orderly manner, at the end of its useful economic or mechanical life, or due to gradual obsolescence.

Unplanned Temporary Closure

An unplanned temporary closure occurs when the facility is closed suddenly and/or unexpectedly, on a short-term basis, due to unforeseen circumstances such as a natural disaster or an emergency. Short-term is defined as cessation of construction

activities or operations of a power plant for a period less than 6 months long. Cessation of construction of operations for a period longer than 6 months in considered a permanent closure.

Unplanned Permanent Closure

An unplanned permanent closure occurs if the project owner closes the facility suddenly and/or unexpectedly, on a permanent basis. This includes unplanned closure where the owner implements the on-site contingency plan. It can also include unplanned closure where the project owner fails to implement the contingency plan, and the project is essentially abandoned.

COMPLIANCE CONDITIONS FOR FACILITY CLOSURE

Planned Closure (COMPLIANCE-11)

In order to ensure that a planned facility closure does not create adverse impacts, a closure process that provides for careful consideration of available options and applicable laws, ordinances, regulations, standards, and local/regional plans in existence at the time of closure, will be undertaken. To ensure adequate review of a planned project closure, the project owner shall submit a revision or update to the approved Closure, Revegetation and Rehabilitation Plan to BLM and the Energy Commission for review and approval at least 12 months (or other period of time agreed to by BLM's Authorized Officer and the CPM) prior to commencement of closure activities. The project owner shall file 50 copies and 50 CDs with the Energy Commission and 10 copies and 10 CDs with BLM (or other number of copies agreed upon by BLM's Authorized Officer and the CPM) of a proposed facility closure plan/Closure, Revegetation and Rehabilitation Plan.

The plan shall:

1. identify and discuss any impacts and mitigation to address significant adverse impacts associated with proposed closure activities and to address facilities, equipment, or other project related materials that must be removed from the site;

2. identify a schedule of activities for closure of the power plant site, transmission line corridor, and all other appurtenant facilities constructed as part of the project;

3. address conformance of the plan with all applicable laws, ordinances, regulations, standards, and local/regional plans in existence at the time of facility closure, and applicable conditions of certification; and.

4. Address any changes to the site revegetation, rehabilitation, monitoring and long-term maintenance specified in the existing plan that are needed for site revegetation and rehabilitation to be successful.

Prior to submittal of an amended or revised Closure, Revegetation and Restoration Plan, a meeting shall be held between the project owner, BLM's Authorized Officer and the Energy Commission CPM for the purpose of discussing the specific contents of the plan.

In the event that there are significant issues associated with the proposed facility Closure, Revegetation and Restoration plan's approval, or the desires of local officials or interested parties are inconsistent with the plan, BLM's Authorized Officer the CPM shall hold one or more workshops and/or BLM and the Energy Commission may hold public hearings as part of its approval procedure.

As necessary, prior to or during the closure plan process, the project owner shall take appropriate steps to eliminate any immediate threats to public health and safety and the environment, but shall not commence any other closure activities until BLM and the Energy Commission approves the facility Closure, Revegetation and Restoration plan.

Unplanned Temporary Closure/On-Site Contingency Plan (COMPLIANCE-12)

In order to ensure that public health and safety and the environment are protected in the event of an unplanned temporary facility closure, it is essential to have an On-Site Contingency Plan in place. The On-Site Contingency Plan will help to ensure that all necessary steps to mitigate public health and safety impacts and environmental impacts are taken in a timely manner.

The project owner shall submit an On-Site Contingency Plan for BLM's Authorized Officer and CPM review and approval. The plan shall be submitted no less than 60 days (or other time agreed to by BLM's Authorized Officer and the CPM) after approval of any NTP or letter granting approval to commence construction for each phase of construction. A copy of the approved plan must be in place during commercial operation of the facility and shall be kept at the site at all times.

The project owner, in consultation with BLM's Authorized Officer and the CPM, will update the On-Site Contingency Plan as necessary. BLM's Authorized Officer and the CPM may require revisions to the On-Site Contingency Plan over the life of the project. In the annual compliance reports submitted to the Energy Commission, the project owner will review the On-Site Contingency Plan, and recommend changes to bring the plan up to date. Any changes to the plan must be approved by BLM's Authorized Officer and the CPM.

The On-Site Contingency Plan shall provide for taking immediate steps to secure the facility from trespassing or encroachment. In addition, for closures of more than 90 days, unless other arrangements are agreed to by BLM's Authorized Officer and the CPM, the plan shall provide for removal of hazardous materials and hazardous wastes, draining of all chemicals from storage tanks and other equipment, and the safe shutdown of all equipment. (Also see specific conditions of certification for the technical areas of Hazardous Materials Management and Waste Management.)

In addition, consistent with requirements under unplanned permanent closure addressed below, the nature and extent of insurance coverage, and major equipment warranties must also be included in the On-Site Contingency Plan. In addition, the status of the insurance coverage and major equipment warranties must be updated in the annual compliance reports.

In the event of an unplanned temporary closure, the project owner shall notify BLM's Authorized Officer and the CPM, as well as other responsible agencies, by telephone, fax, or e-mail, within 24 hours and shall take all necessary steps to implement the On-Site Contingency Plan. The project owner shall keep BLM's Authorized Officer and the CPM informed of the circumstances and expected duration of the closure.

If BLM's Authorized Officer and the CPM determine that an unplanned temporary closure is likely to be permanent, or for a duration of more than 6 months, a Closure Plan consistent with the requirements for a planned closure shall be developed and submitted to BLM's Authorized Officer and the CPM within 90 days of BLM's Authorized Officer and the CPM's determination (or other period of time agreed to by BLM's Authorized Officer and the CPM).

Unplanned Permanent Closure/On-Site Contingency Plan (COMPLIANCE-13)

The On-Site Contingency Plan required for unplanned temporary closure shall also cover unplanned permanent facility closure. All of the requirements specified for unplanned temporary closure shall also apply to unplanned permanent closure.

In addition, the On-Site Contingency Plan shall address how the project owner will ensure that all required closure steps will be successfully undertaken in the event of abandonment.

In the event of an unplanned permanent closure, the project owner shall notify BLM's Authorized Officer and the CPM, as well as other responsible agencies, by telephone, fax, or e-mail, within 24 hours and shall take all necessary steps to implement the On-Site Contingency Plan. The project owner shall keep BLM's Authorized Officer and the CPM informed of the status of all closure activities.

To ensure that public health and safety and the environment are protected in the event of an unplanned temporary closure, the project owner shall submit an On-Site Contingency Plan no less than 60 days after a NTP is issued for each phase of development.

Post Certification Changes to BLM's ROW Grant and/or the Energy Commission Decision: Amendments, Ownership Changes, Insignificant Project Changes and Verification Changes (COMPLIANCE-14)

The project owner must petition the Energy Commission pursuant to Title 20, California Code of Regulations, section 1769, in order to modify the project (including linear facilities) design, operation or performance requirements, and to transfer ownership or operational control of the facility. The BLM ROW holder must file a written requests in the form an an application to the BLM Authorized Officer in order to change the terms and conditions of their ROW grant or POD. Written requests will be in a manner prescribed by the BLM Authorized Officer.

It is the responsibility of the project owner to contact BLM's Authorized Officer and **the CPM to determine if a proposed project change should be considered a**

project modification pursuant to section 1769. Implementation of a project modification without first securing BLM and either Energy Commission or Energy Commission staff approval, may result in enforcement action in accordance with section 25534 of the Public Resources Code.

A Petition to Amend is required for changes to the project as specified below. For verification changes, a letter from the project owner is sufficient. In all cases, the petition or letter requesting a change should be submitted to BLM's Authorized Officer and the CPM, who will file it with the Energy Commission's Dockets Unit in accordance with Title 20, California Code of Regulations, section 1209.

The criteria that determine which type of approval and the process that applies are explained below. They reflect the provisions of Section 1769 at the time this condition was drafted. If the Commission's rules regarding amendments are amended, the rules in effect at the time an amendment is requested shall apply.

Amendment

The project owner shall petition the Energy Commission, pursuant to Title 20, California Code of Regulations, Section 1769(a), when proposing modifications to the project (including linear facilities) design, operation, or performance requirements. If a proposed modification results in deletion or change of a condition of certification, or makes changes that would cause the project not to comply with any applicable laws, ordinances, regulations or standards, the petition will be processed as a formal amendment to the Energy Commission's final decision, which requires public notice and review of the BLM-Energy Commission staff analysis, and approval by the full Energy Commission. The petition shall be in the form of a legal brief and fulfill the requirements of Section 1769(a). Upon request, the CPM will provide you with a sample petition to use as a template.

The ROW holder shall file an application to amend the BLM ROW grant for any substantial deviation or change in use. The requirements to amend a ROW grant are the same as when filing a new application including paying processing and monitoring fees and rent.

Change of Ownership

Change of ownership or operational control also requires that the project owner file a petition pursuant to section 1769(b). This process requires public notice and approval by the full Commission and BLM. The petition shall be in the form of a legal brief and fulfill the requirements of Section 1769(b). Upon request, the CPM will provide you with a sample petition to use as a template. The transfer of ownership of a BLM ROW grant must be through the filing of an application for assignment of the grant.

Insignificant Project Change

Modifications that do not result in deletions or changes to conditions of certification, and that are compliant with laws, ordinances, regulations and standards may be authorized by BLM's Authorized Officer and the CPM as an insignificant project change pursuant to section 1769(a) (2). This process usually requires minimal time to complete, and it requires a Energy Commission 14-day public review of the Notice of Insignificant

Project Change that includes the BLM and Energy Commission staff's intention to approve the modification unless substantive objections are filed. These requests must also be submitted in the form of a "Petition to Amend" as described above. BLM and the Energy Commission intend to integrate a process to jointly approve insignificant project changes to avoid duplication of approval processes and ensure appropriate documentation for the public record.

Verification Change

A verification may be modified by BLM's Authorized Officer and the CPM without requesting an amendment to the ROW Grant or Energy Commission decision if the change does not conflict with the conditions of certification and provides an effective alternate means of verification.

CBO DELEGATION AND AGENCY COOPERATION

In performing construction and operation monitoring of the project, BLM and Energy Commission staff act as, and have the authority of, the Chief Building Official (CBO). BLM and Energy Commission staff may delegate CBO responsibility to either an independent third party contractor or the local building official. BLM and the Energy Commission intend to avoid duplication by integrating the responsibilities of the CBO with those of a BLM compliance inspector and will work jointly in the selection of a CBO. BLM and Energy Commission staff retain CBO authority when selecting a delegate CBO, including enforcing and interpreting federal, state and local codes, and use of discretion, as necessary, in implementing the various codes and standards.

BLM and Energy Commission staff may also seek the cooperation of state, regional and local agencies that have an interest in environmental protection when conducting project monitoring.

ENFORCEMENT

BLM's legal authority to enforce the terms and conditions of its ROW Grant is specified in 43 CFR 2807.16 to 2807.19. BLM may issue an immediate temporary suspension of activities it they determine a holder has violated one or more of the terms, conditions, or stipulation of the grant. BLM may also suspend or terminate a ROW grant if a holder does not comply with applicable laws and regulation or any terms, conditions, or special stipulations contained in the grant. Prior to suspending or terminating a ROW grant, BLM will provide written notice to the holder stating it intends to suspend or terminate and will provide reasonable opportunity to correct any noncompliance.

The Energy Commission's legal authority to enforce the terms and conditions of its Decision is specified in Public Resources Code sections 25534 and 25900. The Energy Commission may amend or revoke the certification for any facility, and may impose a civil penalty for any significant failure to comply with the terms or conditions of the Energy Commission Decision. The specific action and amount of any fines the Energy Commission may impose would take into account the specific circumstances of the incident(s). This would include such factors as the previous compliance history, whether

the cause of the incident involves willful disregard of LORS, oversight, unforeseeable events, and other factors the Energy Commission may consider.

ENERGY COMMISSION NONCOMPLIANCE COMPLAINT PROCEDURES

Any person or agency may file a complaint alleging noncompliance with the conditions of certification. Such a complaint will be subject to review by the Energy Commission pursuant to Title 20, California Code of Regulations, section 1237, but in many instances the noncompliance can be resolved by using the informal dispute resolution process. Both the informal and formal complaint procedure, as described in current State law and regulations, are described below. They shall be followed unless superseded by future law or regulations.

Informal Dispute Resolution Process

The following procedure is designed to informally resolve disputes concerning the interpretation of compliance with the requirements of this compliance plan. The project owner, the Energy Commission, or any other party, including members of the public, may initiate an informal dispute resolution process. Disputes may pertain to actions or decisions made by any party, including the Energy Commission's delegate agents.

This process may precede the more formal complaint and investigation procedure specified in Title 20, California Code of Regulations, section 1237, but is not intended to be a substitute for, or prerequisite to it. This informal procedure may not be used to change the terms and conditions of certification as approved by the Energy Commission, although the agreed upon resolution may result in a project owner, or in some cases the Energy Commission staff, proposing an amendment.

The process encourages all parties involved in a dispute to discuss the matter and to reach an agreement resolving the dispute. If a dispute cannot be resolved, then the matter must be brought before the full Energy Commission for consideration via the complaint and investigation procedure.

Request for Informal Investigation

Any individual, group, or agency may request the Energy Commission to conduct an informal investigation of alleged noncompliance with the Energy Commission's terms and conditions of certification. All requests for informal investigations shall be made to the designated CPM.

Upon receipt of a request for informal investigation, the CPM shall promptly notify the project owner of the allegation by telephone and letter. All known and relevant information of the alleged noncompliance shall be provided to the project owner, BLM and to the Energy Commission staff. The CPM will evaluate the request and the information to determine if further investigation is necessary. If the CPM find that further investigation is necessary, the project owner will be asked to promptly investigate the matter. Within seven working days of the CPM's request, provide a written report to the CPM of the results of the investigation, including corrective measures proposed or undertaken. Depending on the urgency of the noncompliance matter, the CPM may

conduct a site visit and/or request the project owner to also provide an initial verbal report, within 48 hours.

Request for Informal Meeting

In the event that either the party requesting an investigation or the Energy Commission staff is not satisfied with the project owner's report, investigation of the event, or corrective measures proposed or undertaken, either party may submit a written request to the CPM for a meeting with the project owner. Such request shall be made within 14 days of the project owner's filing of its written report. Upon receipt of such a request, the CPM shall:

1. immediately schedule a meeting with the requesting party and the project owner, to be held at a mutually convenient time and place;

2. secure the attendance of appropriate Energy Commission staff and staff of any other agencies with expertise in the subject area of concern, as necessary;

3. conduct such meeting in an informal and objective manner so as to encourage the voluntary settlement of the dispute in a fair and equitable manner;

4. After the conclusion of such a meeting, promptly prepare and distribute copies to all in attendance and to the project file, a summary memorandum that fairly and accurately identifies the positions of all parties and any understandings reached. If an agreement has not been reached, the CPM shall inform the complainant of the formal complaint process and requirements provided under Title 20, California Code of Regulations, section 1230 et seq.

Formal Dispute Resolution Procedure-Complaints and Investigations

Any person may file a complaint with the Energy Commission's Dockets Unit alleging noncompliance with a Commission decision adopted pursuant to Public Resources Code section 25500. Requirements for complaint filings and a description of how complaints are processed are in Title 20, California Code of Regulations, section 1237.

KEY EVENTS LIST

PROJECT/POWER PLANT: _____ DOCKET #: _____
BLM'S AUTHORIZED OFFICER: _____

COMPLIANCE PROJECT MANAGER: _____

EVENT DESCRIPTION	DATE
Certification Date	
Obtain Site Control	
Online Date	
POWER PLANT SITE ACTIVITIES	
Start Site Mobilization	
Start Ground Disturbance	
Start Grading	
Start Construction	
Begin Pouring Major Foundation Concrete	
Begin Installation of Major Equipment	
Completion of Installation of Major Equipment	
First Roll of Steam Turbine	
Obtain Building Occupation Permit	
Start Commercial Operation	
Complete All Construction	
GENERATION TIE LINE ACTIVITIES	
Start Generation Tie Line Construction	
Synchronization with Grid and Interconnection	
Complete Generation Tie Line Construction	
FUEL SUPPLY LINE ACTIVITIES	
Start Gas Pipeline Construction and Interconnection	
Complete Gas Pipeline Construction	
WATER SUPPLY LINE ACTIVITIES	
Start Water Supply Line Construction	
Complete Water Supply Line Construction	

COMPLIANCE TABLE 1
SUMMARY of COMPLIANCE CONDITIONS OF CERTIFICATION

CONDITION NUMBER	SUBJECT	DESCRIPTION
COMPLIANCE-1	Unrestricted Access	The project owner shall grant BLM and Energy Commission staff and delegate agencies or consultants unrestricted access to the power plant site.
COMPLIANCE-2	Compliance Record	The project owner shall maintain project files on-site. BLM and Energy Commission staff and delegate agencies shall be given unrestricted access to the files.
COMPLIANCE-3	Compliance Verification Submittals	The project owner is responsible for the delivery and content of all verification submittals to BLM's Authorized Officer and the CPM, whether such condition was satisfied by work performed or the project owner or his agent.
COMPLIANCE-4	Pre-construction Matrix and Tasks Prior to Start of Construction	Construction shall not commence until the all of the following activities/submittals have been completed: • property owners living within one mile of the project have been notified of a telephone number to contact for questions, complaints or concerns, • a pre-construction matrix has been submitted identifying only those conditions that must be fulfilled before the start of construction, • all pre-construction conditions have been complied with, • BLM's Authorized Officer and the CPM have issued a letter to the project owner authorizing construction.
COMPLIANCE-5	Compliance Matrix	The project owner shall submit a compliance matrix (in a spreadsheet format) with each monthly and annual compliance report which includes the status of all compliance conditions of certification.
COMPLIANCE-6	Monthly Compliance Report including a Key Events List	During construction, the project owner shall submit Monthly Compliance Reports (MCRs) which include specific information. The first MCR is due the month following the Energy Commission business meeting date on which the project was approved and shall include an initial list of dates for each of the events identified on the Key Events List.

CONDITION NUMBER	SUBJECT	DESCRIPTION
COMPLIANCE-7	Annual Compliance Reports	After construction ends and throughout the life of the project, the project owner shall submit Annual Compliance Reports instead of Monthly Compliance Reports.
COMPLIANCE-8	Confidential Information	Any information the project owner deems confidential shall be submitted to BLM and the Energy Commission's Dockets Unit with a request for confidentiality.
COMPLIANCE-9	Annual fees	Payment of Annual Energy Facility Compliance Fee to the Energy Commission;
COMPLIANCE-10	Reporting of Complaints, Notices and Citations	Within 10 days of receipt, the project owner shall report to BLM's Authorized Officer and the CPM, all notices, complaints, and citations.
COMPLIANCE-11	Planned Facility Closure	The project owner shall submit any revisions or changes to the Closure, Revegetation and Restoration Plan to BLM's Authorized Officer and the CPM at least 12 months prior to commencement of a planned closure.
COMPLIANCE-12	Unplanned Temporary Facility Closure	To ensure that public health and safety and the environment are protected in the event of an unplanned temporary closure, the project owner shall submit an On-Site Contingency Plan no less than 60 days after a NTP is issued for each power plant.
COMPLIANCE-13	Unplanned Permanent Facility Closure	To ensure that public health and safety and the environment are protected in the event of an unplanned temporary closure, the project owner shall submit an On-Site Contingency Plan no less than 60 days after a NTP is issued for each power plant.
COMPLIANCE-14	Post-certification changes to the ROW Grant and/or Decision	The project owner must petition the Energy Commission and file an application to amend the ROW grant to delete or change a condition of certification, modify the project design or operational requirements and/or transfer ownership of operational control of the facility.

ATTACHMENT A

COMPLAINT REPORT/RESOLUTION FORM

PROJECT NAME: AFC Number:
COMPLAINT LOG NUMBER _____ Complainant's name and address: Phone number: _____
Date and time complaint received: Indicate if by telephone or in writing (attach copy if written): Date of first occurrence:
Description of complaint (including dates, frequency, and duration):
Findings of investigation by plant personnel: Indicate if complaint relates to violation of the ROW Grant: Indicate if complaint relates to violation of a CEC requirement: Date complainant contacted to discuss findings: _____
Description of corrective measures taken or other complaint resolution: Indicate if complainant agrees with proposed resolution: If not, explain: Other relevant information:
If corrective action necessary, date completed: ____ Date first letter sent to complainant: ___(copy attached) Date final letter sent to complainant: ___(copy attached)
This information is certified to be correct. Plant Manager's Signature: _____ Date:

(Attach additional pages and supporting documentation, as required.)

Summary of Agency and Public Preliminary Staff Assessment (PSA) Comments

The following are comments received from agencies, interest groups and members of the public to the Preliminary Staff Assessment that was published on December 9, 2008. Please refer to the appropriate technical section of this document for responses to the comments.

Society for the Conservation of Big Horn Sheep – letter dated January 14, 2009

# / Topic(s)	Comment
SCBHS 1 **Bio**	The first item that needs to be considered and factored in would be the need for a baseline to be established as to what we have prior to construction, intensive monitoring during construction? and follow-up on an ongoing basis to assure that there are no undesirable affects that cannot be adjusted for. This should include, but in no way be limited to air and ground surveys of the desert sheep in the surrounding mountain ranges with perhaps some discussions regarding the bordering sheep with Nevada. We do 'share a population in some areas, and there maybe an influence that needs to be Understood. Capture work, collaring and monitoring the movement of a sampling of the local bighorns before, during and after is crucial information that the Department of Fish & Game most assuredly will be in need of in order for proper .management. The baseline is to be established by the Department of Fish & Game professionals.
SCBHS 2 **Bio**	Another item that is absolutely mandatory is the consideration for a one to one and a half mile buffer zone from the toe of the sloping mountain areas that migrate towards I-15. This will help with the connectivity of the local population and maintain the metapopulation dynamic at work with this sheep population (population shared by Nevada, their sheep visit ours, our sheep visit theirs). This wildlife corridor is absolutely essential for a healthy and viable population and for a healthy gene pool exchange. This safe zone or buffer zone establishes a guideline or benchmark for any future development and additional loss of habitat.
SCBHS 3 **Bio & Water**	With regard to potential aquifer depletion with the additional use of water for construction and/or maintenance, we are not convinced that this .will not have an adverse effect on the surrounding springs and seeps that are so precious to the resident wildlife population, and the importance of water management and conservation that must be applied. The use of soil additives to curtail dust should and must be explored. We will re-emphasize the need for habitat improvement through additional water sources to safeguard any potential depletion and/or lack thereof.
SCBHS 4 **Bio & Water**	The importance of an agreement or a memorandum of understanding from all government agencies, (Department of Fish & Game, Bureau of Land Management, National Park Service, etc.) to assure that habitat improvements can and will take place in and around surrounding areas controlled by these authorities. Habitat work such as water hole improvements, replacement water, new wildlife drinkers, existing spring improvements, or spring development will help offset the negative impact on this and/or other future projects. This is a very important issue, something that we feel strongly about and an issue that must be addressed from the beginning.
SCBHS 5	To have the affected areas be decommissioned or reverted back to natural habitat upon the sunset of the original

Bio & Compliance	agreement/viability of current and/or future technology, and that reclamation be full and complete, not unlike mining companies are obliged to do after production and/or usefulness has been achieved; This will offset speculators and future developments that may radiate from this site, as well as others, and that if everybody has an understanding that this will revert back to the critters, all concerned will become better stewards of this or surrounding areas in order to assure the successful transition.
SCBHS 6 **Bio**	One other item that has not much to do with the sheep population, but an area that we are concerned about is the disruption and use of the affected habitat, i.e. plant life, etc. It is our desire to see the full use of this material utilized in conjunction with not only the healing process of the peripheral impacted area, but be inventoried and warehoused for future reclamation needs.
SCBHS 7 **Bio**	Another item that needs to be explored, but by no means needs to have the financial burden place totally upon Bright Source Corporation, would be a land bridge over state highway I-15 that would assure the connectivity that has been tragically compromised by the highway systems, namely I-40 and I-15. The health and well-being of the large vertebrate population in our desert regions has been clearly influenced (negatively) by being so fragmented, and with a little vision and cooperation with all the alternative energy resources, windmill, solar, etc, it may help offset the future effects of this fragmentation. We are in the process of fragmenting the fragments, which could be the death nil of particular species, and there is a simple fix that could be shared by a multitude of land use principle. The energy commission should explore this in depth and factor this into any and all mitigation.

County of San Bernardino – Public Works letter dated January 5, 2009 – No Comment

Craig Deutsche letter dated January 14, 2009

# / Topic(s)	Comment
CD 1 **Bio**	Of course it is difficult to obtain all the data that one would wish, but the suggestion that a project could be approved without knowing what the consequences might be seems unsupportable. Every effort must be made to resolve these uncertainties.
CD 2 **Bio**	I am particularly concerned about impacts which the ISEGS would have upon habitat, plans, and wildlife. The site of the project is outstanding desert tortoise habitat, and as these are a threatened species they need special consideration. The plan suggests that a number of tortoise would be removed. The experience which the US Army has had in the translocation of tortoise to accommodate expansion of the Fort Irwin military complex has been disastrous. There must be assurances that there will be no similar result if the Ivanpah project were to go ahead.
CD 3 **Bio**	If ultimately it is determined that impacts to the biological resources at the site cannot be suitably mitigated, and if permits for the project are nevertheless granted, then the applicant, Bright Source, must be required to provide substantial compensation for the negative impacts that result.

Sierra Club – San Gorgonio Chapter letter dated January 22, 2009	
# / Topic(s)	**Comment**
SC 1 **Bio**	We urge that (1) the Applicant's proposed habitat acquisition ratio of 1:1 be rejected, (2) the Applicant be required to provide substantial compensation for the direct, indirect, and cumulative impacts to the biological resources of the Ivanpah Basin, (3) a thorough plan for the required compensation be completed prior to any California Energy Commission (CEC) decision on the merits of the application, and (4) the Private Land Alternative be given full consideration by the CEC.
SC 2 **Bio**	We are concerned that over 4,000 acres of occupied desert tortoise habitat would be permanently lost and that the project would fragment and degrade adjacent habitat (PSA 2008, 5.2-1). We are concerned that special-status wildlife would lose breeding and foraging habitat and that ten special-status plant species would be impacted by construction of Ivanpah SEGS (use a single footnote for this section). We are concerned that Ivanpah SEGS may disrupt the forage areas and the movement corridors of mule deer and desert bighorn sheep as they travel from the Clark Mountains (PSA 2008, 5.2-15).
SC 3 **Visual**	We share Staff's conclusion that the impacts of Ivanpah SEGS to the visual resources of the Ivanpah Basin are unmitigable, and we are very concerned. With power towers rising 459 feet above the ground and heliostats spread over nearly 6.4 square miles, Ivanpah SEGS will unquestionably obstruct what are now sweeping and inspiring views from several points within the Mojave National Preserve. It would be most unfortunate if the CEC were to override the Staff finding that the impact on visual resources is unmitigable.
SC 4 **Bio**	In that over 4,000 acres of quality desert tortoise habitat would be permanently lost through the construction of Ivanpah ISEGS, we find the Applicant's proposed compensation through habitat acquisition (or an assessed financial contribution) at a 1:1 ratio to be unacceptable. The Applicant's argument for a habitat acquisition ratio of 1:1 that the Ivanpah SEGS site is not "critical habitat" ignores the long-term and continued destruction of Mojave desert tortoise habitat.
SC 5 **Bio**	Ten plant species listed by the California Native Plant Society would be directly impacted by construction of Ivanpah SEGS. Of even greater concern is the fact that the project would eliminate a substantial portion of the known occurrences within California of Rusby's desert-mallow, cave evening-primrose, Mojave milkweed, and desert pincushion.
SC 6 **Bio**	We contend that the Applicant must be required to provide substantial compensation for the direct, indirect, and cumulative impacts to the biological resources of the Ivanpah Basin. Habitat acquisition at a ratio of 5:1 and habitat enhancement to ensure that those lands are managed and maintained for wildlife and plants in perpetuity must be the central features of this compensation. We readily agree with Staff's conclusion that the "applicant's proposed mitigation, acquisition, and enhancement of approximately 4,065 acres would be insufficient to avoid significant direct, indirect, and cumulative impacts to the biological resources of the Ivanpah Valley...." (PSA 2008, 1-10). But we cannot endorse the "compensatory mitigation approach" that Staff proposes. That approach is too nebulous given the level of compensation required of the Applicant. Simplicity is a virtue here -- acquisition of habitat at a ratio of 5:1 and

	enhancement of that habitat should be the foundation of the required compensation.
SC 7 **Alternatives**	Finally, we urge that the Private Land Alternative be given full consideration by the CEC. Conservationists in Southern California in 2008 explored the option of placing solar facilities on private, disturbed lands rather than on pristine public lands and concluded that using disturbed lands is a viable option for siting power facilities utilizing preferred energy sources. Consistent with that finding, Alternatives Figure 5 in the PSA shows an area of private land surrounding Daggett with appropriate slope and solarity requirements that is a better location from an environmental perspective for the proposed SEGS.

Jenny Wilder letter dated January 14, 2009

# / Topic(s)	Comment
JW 1 **Bio**	There will be significant negative impact of the ISEGS to the natural habitat and wildlife in the area.
JW 2 **Visual**	A significant visual impact (including dark skies) in the Ivanpah Basin.
JW 3 **Soil & Water**	I am concerned about the use of the ground water for the ISEGS. The area is desert, where rain water is typically measured in inches, not feet. Global warming models indicate that rainfall will decrease significantly in the Western United States, making the groundwater ever more precious. How much ground water is available and how long is it expected to last without recharging? What will be the impact on the natural resources with a reduction in the ground table? Will the wells be metered?
JW 4 **Power Plant Efficiency** **TSE**	Where is the demand/need for the power to be produced by this project? How much electrical power is 400 megawatts? How many homes would that serve and where are those homes/businesses located? How much energy is lost in the transmission of that power? Can that amount of electric power (which requires water and natural gas), be produced more efficiently and without destroying habitat in some other way such as at the place of demand (houses or businesses)?

National Parks Conservation Association letter dated January 21, 2009

# / Topic(s)	Comment
NPCA 1 **Bio**	NPCA recommends that all recommendations brought forth by the Biological Opinion of the USFWS be utilized if tortoises are to be relocated to ensure compliance with section 9 of the Endangered Species Act.
NPCA 2 **Bio**	NPCA urges that equitable mitigation ratio (5:1) be required for mitigation of any destruction of desert tortoise habitat. According to the California Department of Fish and Game (CDFG) a ratio of 5: 1 is offered for quality tortoise habitat. NPCA recommends that analysis based On the parameters set forth by CDFG be made and a just ratio be offered

	based on this assessment.
NPCA 3 **Bio**	NPCA urges the Joint-Lead Association (JLA) utilize the Mojave Desert Land Trust to ensure that available mitigation properties that exist as in holdings within Mojave National Preserve be given first priority for acquisition. Mojave National Preserve is one of the few remaining refugia for healthy, high density population of the desert tortoise, based on its level of protection and high quality habitat. The purchase of in-holdings within Mojave National Preserve would bolster the acreage and protection of habitat available for this thriving population of desert tortoises.

Lynn Davis – email dated January 21, 2009

# / Topic(s)	Comment
LD 1 **Bio**	The development of the ISEGS project by Bright Source Energy, on over one million acres in our southwestern deserts will endanger or destroy many special status plant species, degrade desert tortoise habitat to near extinction, accelerate water loss in a state desperately in need of a sustainable, long range water conservation strategy, eliminate thousands of acres of forage for Big Horn Sheep, mule deer, the endangered Golden Eagle and many other bird, animal and plant species. Immediate and cumulative affects will be catastrophic. I strongly urge, as a citizen of California, that Bright Source Energy be required to provide a FULL compensatory mitigation package. Mitigation must include like for like, acre for acre. It must meet the California Department of Fish and Game's FULL MITIGATION STANDARD.

Clark County Department of Aviation letter dated January 21, 2009

# / Topic(s)	Comment
CCDA 1 **Transportation**	As the PSA reports, the ISEGS could adversely affect aviation operations at SNSA due to glare from the solar thermal arrays. The potential for adverse impacts from glare could also affect operations at the existing Jean Airport. CCDOA strongly urges the Commission to study this issue in more detail with respect to both airports. The glare could be a significant hazard to air navigation, particularly for SNSA because of the proximity of flight tracks to the ISEGS location. The close proximity between the ISEGS and the flight paths mean it is likely that at some point the aircraft will be in line with reflective mirrors pointed at the receiver tower. Any spillage of the beam would then be focused directly on the aircraft. This glare could potentially blind a pilot during this critical phase of flight. The towers themselves would also be a source of glare that could create significant hazards. These serious effects should be analyzed in the FSA.
CCDA 2 **Transportation**	The thermal plumes from the ISEGS could also create hazards to air navigation. The concentrated heat from the project may produce enough rising hot air to cause turbulence to overflying aircraft. The PSA makes no mention of thermal effects to air navigation. This issue must be examined fully in order to understand the potential impacts to air navigation.

CCDA 3 **Transportation**	There are several military training routes in the vicinity. The ISEGS will clearly have an impact to these routes and any development must therefore be coordinated with the military.
CCDA 4 **Transportation**	Traffic and Transportation table 1 omits mention of a critical federal law that contains several relevant obligations. Specifically in dealing with the Ivanpah Valley Airport Public Lands Transfer Act. The Commission should examine the degree to which the proposed ISEGS facility conflicts (or does not conflict) with the Airspace Feasibility Study, and with the FAA's statutory obligations to ensure VFR access to the Las Vegas Basin at a level that is equal to or better than existing access and to minimize impacts to the Mojave.

Defenders of Wildlife letter dated January 23, 2009

# / Topic(s)	Comment
DW 1 **Bio**	Given the importance of this habitat, the high number of tortoise on this land, and the severe impacts to tortoise from the project, we strongly recommend that the project proponent do all it can to avoid impacts to tortoises first, then minimize those impacts that cannot be avoided, and finally, if all else fails, adequately mitigate for those impacts. To that end, we strongly urge that the project follow the recommendations found the current Desert Tortoise Recovery Plan for avoidance and minimization measures.
DW 2 **Bio**	In addition, the project proposes a mitigation ratio of 1:1 for desert tortoise habitat. We strongly oppose such a mitigation ratio. The recommended ratio for good quality tortoise habitat is 5:1. DFG determines mitigation ratios for desert tortoise based on: (1) presence of the species; (2) habitat quality; (3) disturbance level of habitat; (4) adjacent land uses; (5) connectivity; and (6) projected growth. Defenders of Wildlife would like to see an analysis of mitigation ratios addressing the above 6 parameters.
DW 3 **Bio**	Staff should also consider the risks posed by the translocation program in structuring the compensatory mitigation program. The U.S. Army suspended its Desert Tortoise translocation program when at least 15% of the translocated tortoises died, mostly due to predation (see http://www.pe.com/localnews/inland/stories/PE_News_Local_S_tortoises10.450e731.html). The tremendous risks involved with translocation militate towards a higher compensatory mitigation ratio.
DW 4 **Bio**	Other impacts to tortoise must be fully analyzed and addressed, such as new water sources that attract predators, impacts to tortoise water sources from proposed groundwater pumping, impacts from roads, and impacts from vegetation management. For example, if additional water sources will be placed on site, it could increase raven populations within the surrounding area. A raven monitoring plan would need to be included, as ravens can have a very detrimental impact on tortoises. In addition, while the project will obviously involve roads and a great deal of traffic (particularly during construction), the project application fails to consider the use of fencing to avoid impacts to the tortoise.
DW 5 **Bio**	The project mentions the use of translocation of desert tortoises as a part of the mitigation strategy. At this time Defenders is reviewing the new USFWS Guidelines for Clearance and Translocation of Desert Tortoises from the ISEGS project. We do not believe that translocation, in and of itself, provides adequate mitigation. Instead, any

	translocation must be in conjunction with the preservation of habitat. Further, the Translocation Plan will need to comply with the recommendations of the FWS 1994 Desert Tortoise Recovery Plan
DW 6 **Bio**	Defenders urges that the Banded Gila Monster be included on the list of species to be analyzed and addressed. Recent scientific research has found that Gila monsters appear to use two overwintering sites (rocky hills and surrounding bajadas). D.F. DeNardo, et al., 2007 Desert Tortoise Council Symposium Abstract). Thus, this project could be important habitat for the Gila monster.
DW 7 **Bio**	Defenders also urges that the EIS/FSA assess the impacts to bighorn sheep. While the California Natural Diversity Database ("CNDDB") reports the last occurrence of bighorn sheep in this area to be in 1986, we understand that the Society for Bighorn Sheep possesses updated information showing that this project area is a wildlife corridor for bighorn sheep. Therefore, we strongly urge that this project analyze and address impact to bighorn sheep and their ability to move across the Ivanpah Valley. Furthermore, given the proposed pumping of groundwater, we strongly urge that the impacts of this pumping be analyzed and addressed with respect to potential impacts on the desert seeps and springs used by bighorn sheep.
DW 8 **Bio**	The project fails to acknowledge and address any impacts to the burrowing owl. In addition to being a Species of Special Concern, the burrowing owl is also protected under Fish and Game Code Section 3503.5 and the Migratory Bird Treaty Act. Impacts to burrowing owls must be assessed in the EIS/FSA. If impacts are found to exist, then the measures found in the DFG's Burrowing Owl Survey Protocol and Mitigation Guidelines should be adhered to.
DW 9 **Bio**	The project application details impacts to some plant species, particularly the barrel cactus and Mojave yucca. However, since the original plant surveys were admittedly conducted during a dry year, we strongly urge that additional surveying be conducted this spring in order to better assess impacts to a number of special status plants and to prescribe adequate mitigation. We do not support deferring this analysis to pre-construction surveys. Indeed, given the biodiversity found on the project site during a dry year survey, we believe that this site contains a large number and extent of rare plants. With respect to mitigation as currently proposed in the application, we also strongly urge that the environmental documents do a much more thorough job of describing adequate mitigation should a rare plant show up on the project. Right now, the project application sets forth a list of potential mitigation strategies, but commits to none and analyzes none.
DW 10 **Bio**	We are very concerned about the extent of the impact of the proposed project on the Creosote Bush-White Bursage Barrel Cactus Community Type. With 10,000 acres of this plant community existing in 20 to 30 locations, the project appears to impact more than 1/3 of the community type. Such an impact appears to be very significant and must be fully analyzed and addressed in the EIS/FSA.
DW 11 **Bio**	The proposed project will reroute and fill in a number of existing ephemeral washes that flow into the Ivanpah Dry Lake. The EIS/FSA must analyze and address impacts to the Dry Lake and fairy shrimp.
DW 12 **Bio**	The EIS/FSA must analyze and address the impacts of the groundwater pumping on desert species and habitat.

Soil & Water	
DW 13 **Bio**	The EIS/FSA must analyze and address impacts to migratory birds from this project, including any potential impacts from the evaporation ponds.
DW 14 **Bio** **Socio** **Cumulative**	The EIS/FSA Must Adequately Analyze Cumulative Impacts. The EIS/FSA must analyze the other proposed renewable energy projects in this region, any foreseeable growth in this area, including in Primm, the foreseeable impacts of climate change, and any other reasonably foreseeable future projects. The impacts should include a discussion of the growth due to the workers associated with this project.
DW 15 **Alternatives**	The EIS/FSA Must Include An Adequate Range of Alternatives and Provide Meaningful Analysis of These Alternatives. We strongly advise that the project proponents take care not to unreasonably constrain their range of alternatives in the EIS/FSA by formulating a limited purpose and scope of the project. For example, we would oppose a purpose and need statement that simply describes the project as the goal instead of reflecting the larger goal of generating renewable solar energy. With an adequately designed purpose and need statement, the project's range of alternatives should involve, at a minimum, an environmentally preferred alternative, a no action alternative, and an alternative that provides for power generation closer to the power consumption.

Bureau of Land Management letter dated January 23, 2009

# / Topic(s)	Comment
BLM 1 **Bio**	We are concerned by the potential habitat loss and significant impacts to biological resources, specifically to desert tortoise and other rare wildlife and plant species, from the ISEGS project. Based on the area's important natural and biological values and the potential for damage from the construction, use and maintenance of solar facilities, we urge the agencies to utilize the upcoming federal/state environmental review – Environmental Impact Statement/Environmental Impact Report – as the basis for determining whether the impacts from this development can be mitigated sufficiently and whether it is consistent with all applicable LORS. We also strongly support the staff proposal for a compensatory mitigation approach and urge the applicant to provide all information requested in the PSA related to biological resources as soon as possible. As part of this effort, it will be necessary for the agencies to determine the appropriate habitat mitigation ratio to ensure the long-term health and viability of the desert tortoise. Further, we note that, although translocation is a tool to enhance the conservation of the desert tortoise, it should not be substituted for preserving desert tortoise habitat (Field et al 2007).
BLM 2 **Air** **Soil & Water**	To protect the soil resources of the ISEGS project area, we support the staff's recommendation for the inclusion of conditions of certifications to ensure BMPs are in place to mitigate soil erosion by wind and water.

BLM 3 **Soil & Water**	Additional information is needed regarding the source of potable water and the impacts from potable water use and groundwater pumping. To ensure the long term sustainability of the area's water quality and quantity, the agencies should perform an in-depth impacts analysis and develop a comprehensive impacts minimization and mitigation plan.
BLM 4 **Cultural**	The agencies should carefully evaluate the final results of field research to determine whether cultural resources exist in the project area. If cultural resources exist, the agencies should thoroughly analyze the impacts of the ISEGS project to those resources and develop a comprehensive impacts minimization and mitigation plan
BLM 5 **Executive Summary** **Cumulative Scenario** **Visual**	In the case of the ISEGS project, the agencies should consider whether the benefits which the ISEGS renewable energy project will outweigh the costs of the visual and other impacts from this development. The agencies should also follow the staff recommendation that all of staff's proposed conditions of certification be adopted in order to minimize visual impacts to the greatest feasible extent. We further recommend that the agencies consider inclusion of any appropriate additional conditions of certification which could reduce visual impacts. In addition, given the number of projects proposed for the California Desert, we urge the agencies to recognize the likely cumulative visual and other impacts from renewable energy and transmission development in the Desert and to begin right now to develop comprehensive mitigation strategies to address these impacts in connection with future projects. Only by developing such strategies can the need for renewable energy development be balanced with protection of visual and other resources on public lands.
BLM 6 **Air**	The agencies should require implementation of the proposed specific mitigation measures during construction and operation of the facility to reduce the short and long-term impacts of ozone precursors, CO and CO2, and PM 10 to less than significant. The agencies should also require additional analysis of criteria emissions from the delivery of materials and any other activities which may have air quality impacts. If the analysis indicates potential impacts, the agencies should develop a comprehensive impacts minimization and mitigation plan.
BLM 7 **Air**	The agencies should comprehensively analyze the ISEGS project's impacts to GhG emissions, including GhG emissions during manufacture, construction, operation, decommissioning, and reclamation of the project site. The analysis should consider both the potential for the project to reduce GhG emissions as well as potential for the project to increase GhG emissions, for example, by disturbing undisturbed land currently useful for carbon sequestration.

Tasha La Doux letter dated January 30, 2009

# / Topic(s)	Comment
TLD 1 **Visual**	The impacts discussed in this proposal fail to address the impacts of light pollution to the surrounding desert, much of which is Federal Wilderness and/or National Park Service (NPS) land with specific mandates to protect and conserve their resources, including the "night sky".
TLD 2 **Bio**	As discussed in the PSA, the negative impacts to desert tortoise are significant. If the project is approved the mitigation ratio should be based on the BLM/USFWS standard mitigation requirement of 5:1. The suggestion that desert tortoise can be moved as a mitigation measure is not taking into account the high death rate (>20%) experienced by Ft. Irwin when employing a similar method. Moving tortoises has proven to be a failed mitigation

	measure. In addition, the long-term and cumulative negative impacts to the desert tortoise population were not addressed.
TLD 3 **Bio**	The PSA fails to address the significant loss of *Asclepias nyctaginifolia*; if approved, the ISEGS footprint will eliminate >75% of its known population in the State.
TLD 4 **Bio**	The PSA fails to address the significant negative impacts of this project to the movement of Desert Bighorn Sheep and Mule Deer between mountain ranges. The PSA states that these animals are "likely" to use the Ivanpah Valley as migration corridors, when the fact is these animals undoubtedly use each and every desert valley in the process of migrating from one mountain range to the next. The long-term and cumulative negative impacts to the native ungulate populations were not addressed in the PSA.
TLD 5 **Socio** **Recreation**	The PSA fails to address the cumulative and long-term impacts to the tourism industry for the desert region. The deserts of North America are unique bioregions on the planet and bring a significant number of tourists to the area. The negative impacts to the visual, biological, air quality, soils and water resources will destroy the unique desert habitat that brings people from all over the world to experience.

Basin and Range Watch letter dated January 31, 2009

# / Topic(s)	Comment
BRW 1 **Facility Design** **Efficiency**	POWER GENERATION**:** For the natural gas-fired start-up boiler- What percentage of the megawatts would be from natural gas?
BRW 2 **Air**	AIR QUALITY: For dust control during operation and construction, where will water come from? How much will be used? This should be explained and estimated numbers of gallons should be listed.
BRW 3 **Air** **Bio**	Current research has proven that deserts serve as carbon sinks. Curiously, their findings indicate that certain desert ecosystems may exceed temperate forests and grasslands in their rapid absorption of CO2, and may exceed those systems due to the desert's possible "processing" of CO2. It also appears that it is the soil itself acting as the carbon sink. Desert plants such as cacti also use Crassulacean Acid Metabolism (CAM) metabolic pathways, which allows for CO2 uptake and storage and conversion into plant body. *(Science 13 June 2008: Vol. 320. no. 5882, pp. 1409 – 1410 DOI: 10.1126/science.320.5882.1409)* This should be included in the EIS. Will the non-carbon burning energy generated by this plant equal the amount of carbon released by destroying carbon-using and -storing desert plants, soil microfauna and flora?
BRW 4 **Bio**	For most of the mitigation measures in Biological Resources Table 4 the mitigation measure is to "protect and enhance offsite populations or some other form of compensatory mitigation (**BIO-17**); implement weed management plan (**BIO-13**); implement Best Management Practices (**BIO-11**)." It seems obvious that there are few if any mitigation

	practices available to compensate for such a great loss of biological diversity. What are these mitigation practices? Will these plants be propagated from seed? If so where would they be planted? What will happen to succulents, yuccas and Joshua trees that are displaced? Will they be moved, sold for landscaping or destroyed? What habitats would be suitable for transplanting? What locations?
BRW 5 **Bio** **Soil & Water**	Noxious Weeds: What mitigation would be taken to prevent the spread of noxious weeds? Would herbicides be used? If so, which ones? What risks would this have on native species and groundwater?
BRW 6 **Bio**	Banded Gila Monster Will the site be surveyed for this species? If so, what methods will be used?
BRW 7 **Bio**	Desert Tortoise: "The 2007/2008 protocol desert tortoise surveys found 25 live desert tortoises, 97 desert tortoise carcasses, 214 burrows, and 50 other tortoise sign." The finding of 97 desert tortoise carcasses may indicate a problem with respiratory disease or possible some other impact. How can a project that destroys so much habitat for this species be considered when such a die off is noted? A line distance sampling survey should be conducted during activity seasons for the next couple of years before approval of this project is considered.
BRW 8 **Bio**	Will total clearance be done where all tortoises be found and removed, including digging out burrows? Please specify this. Where will mitigation land be bought? Will all tortoises be placed on the same mitigation land? What will be the location? Will follow-up studies be carried out to determine the success of translocation and survival? How will coyote and other predation be prevented on translocated tortoises? "....develop a Desert Tortoise Translocation Plan" - this should be finished before the Ivanpah project is approved.
BRW 9 **Bio**	What kind of reduction measures would be taken to minimize raven predation on tortoises? If native predators are to be exterminated, the EIS needs to explain how this will take place. Will the same measures apply to coyotes on the translocation site? The EIS should be able to describe and admit the unattractive details that will need to be implemented for predator reduction.
BRW 10 **Bio**	Birds - Conduct pre-construction nesting surveys, implement avoidance measures.- Will construction take place during spring nesting? If so, will protection be given to nesting birds on the construction site, such as taping off the nesting area until nesting is complete for Brewer's sparrow, Le Conte's thrasher?
BRW 11 **Bio**	Where would burrowing owls be relocated to?
BRW 12 **Bio**	"The applicant acknowledges that Nelson's big horn sheep could occur in the project area (CH2M Hill 2008a). However, the AFC (BSG 2007a) does not provide sufficient project-specific information on use of the site by Nelson's big-horn sheep to identify areas that might provide foraging habitat and movement corridors, to assess potential impacts, or to develop appropriate mitigation measures. It may be possible to offset potential project impacts to

	Nelson's bighorn sheep with implementation of Condition of Certification **BIO-17**, the compensatory mitigation plan, if the plan included enhancement measures that would benefit bighorn." The PSA seems to recognize this problem of foraging habitat, but provides no solution to the problem. The project should be delayed until more attention is given to this issue.
BRW 13 **Worker Safety**	The EIS should discuss the potential exposure of workers to hazardous materials. If these are people hired locally, this could have an impact on local communities and the medical services.
BRW 14 **Bio**	Why do herbicides need to be used? How will this effect native plants?
BRW 15 **Haz Mat**	Transporting dangerous chemicals poses a threat to native plants and wildlife as well as people in local areas and nearby communities. This proposes an unneeded public health risk. Please make a list of potential impacts hazardous material may have on specific flora and fauna including desert tortoise, bighorn sheep, rare plants and other wildlife.
BRW 16 **Land Use**	Land Use Table 3 states that it is unknown if the project is consistent with the CDCA plan and the NEMO plan . We feel it is not. The PSA should be delayed until this can be determined.
BRW 17 **Air**	The PSA states the project will create 90 jobs and people will have to commute one hour each way. Will these people be required to drive electric cars? This does not really help reduce green house gases.
BRW 18 **Soil & Water** **Visual**	Wastewater: PSA- "For onsite processing of domestic wastewater, each phase would include a small package sewage system, including a larger system located at the Administration/warehouse building. Sewage sludge would be removed from the site by a sanitary service. Recycled water from the sewage treatment plants would be used for landscaping." Where will this landscaping be on site? Will recycled wastewater seep into groundwater and pollute nearby tortoise habitat?
BRW 19 **Haz Mat** **Waste**	What protocols would be used if such heavy-metal-containing wastes are spilled during construction or operation? How will environmental contamination be prevented?
BRW 20 **Bio**	Will tortoise monitoring and exclusion fences be placed along all new pipelines constructed in both California and Nevada?
BRW 21 **Bio** **Soil & Water**	The administration and warehouse building, a substation, a sewage package treatment plant, and detention ponds would be located in between Ivanpah No. 1 and Ivanpah No. 2." Are any toxins or pollutants present in these detention ponds that would harm birds or wildlife that drink from them? What liners will be used to prevent groundwater contamination?
BRW 22	Will tortoise exclusion fences and biological monitors be present during all phases of upgrading and construction of

Bio	transmission lines? Will new lines be insulated to prevent bird electrocution?
BRW 23 **Bio**	Will tortoise exclusion fences and biological monitors be present during grading of new roads in desert habitat? Will tortoises encountered in burrows be removed and placed away from construction? How will any Gila monsters encountered underground be dealt with to protect them? Will cacti and yuccas be moved or discarded in new roads? Will mitigation habitat equal to the amount of desert habitat destroyed for new roads be purchased by the applicant?
BRW 24 **Soil & Water**	Water quality: PSA- "The applicant has not adequately modeled potential impacts to water quality due to pumping induced migration of low quality playa groundwater towards higher quality groundwater. Therefore, staff cannot reach a conclusion regarding the potential project-related water quality impacts." Please provide this.
BRW 25 **Soil & Water**	Altering, filling, or rerouting the existing ephemeral streams could change the flow and character of the runoff water reaching the Ivanpah playa. However, staff has not received a Sedimentation Report or revised grading plans, DESCP, or SWPPPs, and therefore, cannot evaluate the potential project-related impacts to the Ivanpah playa." Please provide this.
BRW 26 **Bio**	Would detention basin maintenance affect tortoises, and how will this be mitigated? Will tortoise exclusion fences be maintained? Will tortoises be allowed to access the detention basins?
BRW 27 **Soil & Water**	If a very large flood occurs, which has happened more frequently in our experience in the Mojave desert, what will happen to the plant? Will hazardous waste be strewn across tortoise habitat? What measures are going to be taken to divert large floods?
BRW 28 **Soil & Water**	"... the project's total groundwater use of 5,000 AF (50 years x 100 AFY)..." Will this amount of water use combined with other projects in Ivanpah Valley such as the Primm Golf Course negatively impact groundwater resources used by desert plants, succulents, animals, nearby springs? Future solar projects are planned for Ivanpah Valley, so more groundwater will be pumped. How does the this project project competition from future renewable projects that will also pump groundwater?
BRW 29 **Soil & Water**	"Over the next 50 years, the use of the IVGB groundwater is expected to increase and, along with that increased use, the overdraft in the sub-basin is expected to become greater. The project's pumping of groundwater alone would contribute to this overdraft, but currently amounts to only 2.1 percent of the existing cumulative pumping volume in the IVGB. This increase is nominal and not cumulatively considerable. Therefore, staff believes there would not be an adverse impact to the groundwater resources in the basin. Ivnapah Valley is already overdrafted from groundwater pumping. How does this justify pumping even more water in an arid region?
BRW 30 **Bio** **Haz Mat**	An herbicide would be used to eradicate noxious weeds and nonnative species." How will herbicide spraying be controlled so that toxins do not blow into adjacent deserts or accumulate in dust that blows into desert habitats nearby during windstorms?
BRW 31	The EIS admits in no uncertain terms that the project will have negative, degrading impacts to the visual quality of Ivanpah Valley, Clark Mountain, adjacent wilderness areas and the night sky in the area. It fails to address how the

Visual	visual impacts will adversely effect the tourism in the area. Slapping class designations on the views is arbitrary and will have little significance to those of us who love the area. We can not think of a worse way to maintain the visual quality of public lands.
BRW 32 **Executive Summary**	Due to the environmental devastation that this project will cause as well as the admitted unresolved issues, we would like to request that this PSA be modified and released for another 3 month public comment period.

Basin and Range Watch letter dated July 11, 2009

# / Topic(s)	Comment
BRW 1 **Bio**	We are concerned that the schedule Solar Partners LLC et al. (Bright Source) is attempting to follow is too rapid to insure that the translocation plan can be successful.. The number of only 25 individual desert tortoises *(Gopherus agassizii)* that need to be translocated is based on presence/absence surveys and could be inaccurate. We request that at least four more surveys of the entire area including the translocation sites be conducted during both the spring and fall months in both 2010 and 2011. These surveys should include line distance surveys. Given the quality of the habitat, we do not feel that Bright Source has adequately determined an accurate population number.
BRW 2 **Bio**	We do not believe that the translocation area is an acceptable location to move the tortoises to. The relocation site is located at a lower elevation which will receive less rainfall and be subjected to higher summer temperatures. Former research has indicated that the project area supports 50 to 100 individuals per square mile and the lower lying habitat near Interstate 15 only supports only 20 to 50 per square mile (Berry 1984). The translocation sites are also a poor choice due to the close proximity to Highway 15 and the golf course. The highway attracts subsidized predators looking for food and the golf course has an abundance of water and perches that increases the local populations of both ravens (*Corvus corax*), and coyotes *(Canis latrans).* The failures of the recent attempts to translocate desert tortoises from the Ft Irwin National Training Center are well known and have resulted in the loss of many tortoises. The extreme predator control measures of numerous coyotes and ravens have not helped the situation. Translocating the tortoises to the sites near the highway could result in the loss of both adult and juvenile tortoises.
BRW 3 **Bio**	Basin and Range Watch is curious as to how the sites by the highway were selected and would like to suggest that a different translocation site be selected. Suitable areas in the Mojave National Preserve have been identified.

BRW 4 **Bio**	Recent genetic studies by Murphy et al.,2007 have concluded that tortoise populations from different recovery units including the Northeastern Mojave Recovery Unit are unique. It makes little sense from a recovery perspective to even disturb this site. The Ivanpah Solar Generating System Preliminary Staff Assessment has also stated that over 90 carcasses were found during the surveys. It would be good to know the cause of the deaths of these animals. Because the proposed project site is located within the Northeastern Mojave Recovery Unit, this kind of die off could indicate a significant problem with this population. A large energy facility destroying close to 5,000 acres of tortoise habitat is probably the worst kind of development that could be considered in regards to preserving this population. We would like to know how many, if any of the live tortoises found on the site were tested for upper respiratory tract disease (URTD).

LIST OF PREPARERS

IVANPAH SOLAR ELECTRIC GENERATING SYSTEM
LIST OF PREPARERS

Executive Summary ..... Robert Dover, Tom Hurshman and John Kessler

Introduction ..... Robert Dover, Tom Hurshman and John Kessler

Proposed Action Alternative - Project Description ..... Robert Dover and John Kessler

Alternatives ..... Susan V. Lee

Cumulative Scenario ..... Susan V. Lee

Air Quality ..... William Walters, P.E.

Biological Resources ..... Misa Milliron and Susan Sanders

Cultural Resources and Native American Values ..... M. D. McGuirt and S. C. Murray

Hazardous Materials Management ..... Geoff Lesh and Rick Tyler

Land Use ..... Amanda Stennick

Noise and Vibration ..... Steve Baker

Public Health and Safety ..... Alvin Greenberg, Ph.D.

Socioeconomics and Environmental Justice ..... Negar Vahidi and Scott Debauche

Soils and Water Resources ..... C. Dennis, P.G., P. Marshall, CHG, and R. Dover

Traffic and Transportation ..... Jason Ricks and James Jewell

Transmission Line Safety and Nuisance ..... Obed Odoemelam

Visual Resources ..... William Kanemoto

Waste Management ..... Ellie Townsend-Hough

Worker Safety and Fire Protection ..... Geoff Lesh and Rick Tyler

Geology, Paleontology and Minerals ..... Patrick A. Pilling, Ph.D., P.E., G.E., D.GE.

Livestock Grazing ..... Robert Dover

Wild Horses and Burros ..... Robert Dover

Recreation ..... , Robert Dover, William Walters, P.E.. and John Kessler, P.E.

Facility Design ..... Shahab Koshmashrab

Power Plant Efficiency ..... Shahab Koshmashrab and Steve Baker

Power Plant Reliability ..... Shahab Koshmashrab

Transmission System Engineering ..... Sudath Arachchige and Mark Hesters

Other Considerations ..... Robert Dover and John Kessler

General Conditions..... Steve Munro

Project Secretary..... .Maria Sergoyan

DECLARATION OF
John S. Kessler

I, John S. Kessler, declare as follows:

1. I am presently a consultant to the California Energy Commission for the Siting Office of the Siting, Transmission and Environmental Protection Division as a Project Manager**.**

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Executive Summary, Introduction, Project Description and Recreation** for the Ivanpah Solar Electric Generation System project based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: October 22, 2009 Signed: _____

At: Sacramento, California

JOHN S. KESSLER
Kessler and Associates, LLC
2801 Shady Lane, Pollock Pines, CA 95726
Ofc: (530) 644-2010, Fax: (530) 644-2051
Email: zephyr@innercite.com

PROFESSIONAL EXPERIENCE:

Mr. Kessler is a licensed Civil Engineer in California with over 28 years experience in water supply and power generation, which includes planning and managing projects with responsibilities in operations, maintenance, environmental assessment, licensing, regulatory compliance , permitting and project management.

May 2000 - Present: Principal - Kessler and Associates

Established Kessler and Associates to provide engineering, regulatory and operating services related to energy and associated water supply projects;

California Energy Commission (CEC) – Application for Certification (AFC) Licensing Process
Project Management and Soil & Water Resource Assessments of Proposed Gas-Fired Generating Facilities (Serving as Project Manager or Technical Lead to assess all potential soil and water resource impacts and/or evaluate water supply/cooling alternatives for the following projects:)

- Humboldt Bay Repowering Project, 06-AFC-7, Serving as the Project Manager of the AFC licensing process before the CEC for the Humboldt Bay Repowering Project (HBRP); The HBRP is a proposed 163-MW facility to replace aging generating units of Humboldt Bay Power Plant.
- Victorville 2 Hybrid Power Project, 07-AFC-1, Serving as the Project Manager of the AFC licensing process before the CEC for the Victorville 2 Hybrid Power Project (Victorville 2); which is a proposed 563 MW facility integrating combined cycle and solar-thermal technology.
- Walnut Creek Energy Park, 05-AFC-2; Co-authored Staff Assessment;
- Vernon Power Plant, 06-AFC-1; Co-authored Staff Assessment;
- Los Esteros Critical Energy Facility, 01-AFC-12; Authored Staff Assessment and coordinated the resolution of storm water discharge issues into Coyote Creek with responsible agencies including City of San Jose, Santa Clara Valley Water District, San Francisco RWQCB, and the U.S. Army Corps of Engineers;
- San Francisco Electric Reliability Project, 04-AFC-01; Authored initial Staff Assessment;
- Blythe Energy Project Transmission Line Modifications, 99-AFC-8, Co-authored Staff Assessment/Environmental Assessment;
- Blythe II Energy Project, 02-AFC-01; Prepared a Water Supply & Cooling Alternatives Analysis;
- San Joaquin Valley Energy Center, 01-AFC-22; Co-authored Staff Assessment;
- Palomar Power Plant, 01-AFC-24; Supported soil and storm water testimony;
- Tesla Power Plant, 01-AFC-21; Prepared Water Supply Alternatives Analysis, and coordinated closely with local agencies to demonstrate the feasibility of using recycled water; The final Commission decision adopted our recommendation to require use of recycled water;

- Inland Empire Energy Center, 01-AFC-17; Co-authored Staff Assessment;
- Russell City Energy Center, 01-AFC-7; Co-authored Staff Assessment;
- East Altamont Energy Center, 01-AFC-6; Prepared a Water Supply Alternatives Analysis, and coordinated with agency representatives to demonstrate the feasibility of using recycled water; The final Commission decision adopted our recommendation to require use of recycled water;
- Valero Cogeneration Project, 01-AFC-05, Co-authored Staff Assessment;
- Avenal Power Plant, 01-AFC-20; Co-authored Staff Assessment before project was suspended;
- Baldwin Hills – Supported Evidentiary Hearings before being withdrawn by the applicant;

CEC – Assessment of Alternative Generation Technologies
Served as the author of the Hydropower Chapter discussing the status of development, potential for new development, costs, and deployment constraints including environmental effects, in comparison to development of gas-fired generation technologies;

CEC - Water Discharge Assessment of Coastal Power Plants – Executive Order 22-01
Served as Project Manager of Water Resources to assess the generation curtailments resulting from regulatory-required cooling water discharge limitations at various coastal thermal power plants;

CEC - Environmental Performance Report of California's Electric Generation Facilities
Co-authored the 2001, 2003 and 2005 Water and Biological Resources Sections, providing research and analysis of trends in power plant water resource utilization affected by technological changes, improved environmental safeguards, regulatory influences in market development, and diminishing supplies of fresh water;

CEC – California/Mexico Border Energy Issues – 2005 EPR White Paper
Authored the Water Chapter evaluating water quality and supply issues associated with existing and planned energy infrastructure along the U.S-Mexico border, finding that power plant water demands threaten to compromise our most fundamental needs, securing enough water to sustain life and food production;

CPUC – EIR for PG&E's Application for Authorization to Divest its Hydroelectric Generating Facilities and Related Assets - Served as Hazards Section Leader and Team Member of the Public Services and Utilities Section in preparing the EIR for considering PG&E's divestiture of its entire hydroelectric system; The environmental assessment included evaluating the safety and potential risks of PG&E's dams throughout its hydroelectric system in Northern California.

DWR – Oroville Relicensing
Prepared a description of operations for the Oroville Complex, in support of the FERC Relicensing process to understand project constraints and opportunities for modified operations to enhance natural resource protection, water supply and power generation.

Utica Power Authority – Dam Safety and Project Management Services
Serving as UPA's dam safety engineer and project manager of environmental compliance and special construction projects; The projects include managing natural resources, and planning maintenance and construction improvements to water conveyance and storage facilities.

El Dorado Irrigation District – Engineering, Regulatory Permitting and Compliance Services
Assessed condition of the 23-mile El Dorado Canal water conveyance system, proposing a range of maintenance and capital improvements including cost estimates; Am currently preparing Standard

Operating Procedures and facilitating employee training for project O&M, and preparing license compliance plans for protection of natural resources;

September 1995 – April 2000: Hydroelectric Director - El Dorado Irrigation District
Overall responsibilities included managing operation, maintenance, construction and regulatory activities and the acquisition of the El Dorado Hydroelectric Project from PG&E to EID; Construction activities included managing improvements to the penstock and powerhouse, replacing and relining sections of the penstock, and replacing turbine nozzle bodies, jet deflectors, governors, hydraulic oil systems and associated plant controls. Planning and feasibility studies included evaluating alternatives for replacing canal sections and a diversion dam which incurred flood damage and resulted in approximately $30 million in capital replacement.

Aug. 1993 – Sept. 1995: Project Engineer - Northern California Power Agency
Managed planning of various enhancements and aquatic resource studies associated with the North Fork Stanislaus River Hydroelectric Project and relicensing studies associated with the Angels and Utica Projects; Coordinated initial development phases of new biomass energy from the Gridley Rice Straw Project for prototype development testing in the production of ethanol;

July 1984 – August 1993: Hydro Supervisor – Pacific Gas & Electric Company
Managed the operations, maintenance, capital improvements and regulatory compliance activites for the El Dorado and Chili Bar Hydroelectric Projects; Responsibilities included planning, estimating and managing numerous water conveyance and dam maintenance/capital projects;

Aug. 1979 – July 1984 - Hydraulic Engineer and Hydrographer/Hydrologist - PG&E
Managed various capital projects within PG&E's and its water district/agency partner's hydroelectric systems, including the low level outlet repair of New Bullards Bar Dam, that required several weeks of underwater construction. Also forecasted snowpack runoff and planned water storage and conveyance schedules for optimizing hydro generation production as integrated with PG&E's other generation and power import sources;

EDUCATION AND PROFESSIONAL CERTIFICATES:
- State Of California Professional Civil Engineer, License No. C034897;
- B.S. Civil Engineering, University Of California, Davis, June 1979;
- A.A. Diablo Valley College, Pleasant Hill, June 1976;

HONORS AND AWARDS:
- 2001 Outstanding Performance Award from the State of California - Energy Commission;
- 1999 Outstanding Achievement Award for Transfer of the El Dorado Hydroelectric Project from PG&E to the El Dorado Irrigation District;

PROFESSIONAL ASSOCIATIONS:
- American Society of Civil Engineers

Jsk:JK's Resume – 2007 - CEC

DECLARATION OF
Susan V. Lee

I**, Susan V. Lee** declare as follows:

1. I am presently employed by Aspen Environmental Group, consultant to the California Energy Commission's Facilities Siting Office of the Systems Assessments and Facilities Siting Division as a **Senior Associate**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Alternatives** analysis and **Cumulative** impact scenario for the Ivanpah Solar Electric Generating System (07-AFC-05) based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: October 26, 2009 Signed: 

At: San Francisco, California



Aspen Environmental Group

SUSAN V. LEE

Vice President, San Francisco Operations

ACADEMIC BACKGROUND

M.S., Applied Earth Science, Stanford University, 1984
B.A., Geology, Oberlin College, 1977

PROFESSIONAL EXPERIENCE

Ms. Lee has over 25 years of technical and managerial experience in environmental assessment, and she currently manages Aspen's San Francisco Office. Her expertise is in management of environmental assessment for infrastructure and energy projects (renewable energy projects, electric transmission lines, pipelines, and gas-fired power plants) under both the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). Ms. Lee has managed preparation of several major controversial transmission line and pipeline siting EIR/EISs, including the Sunrise Powerlink, Path 15, Jefferson-Martin, Tri-Valley, and Devers–Palo Verde No. 2. Prior to employment at Aspen, Ms. Lee worked for 10 years with the Federal government [the U.S. Minerals Management Service (MMS) and the U.S. Geological Survey (USGS)].

Ms. Lee has worked for Aspen Environmental Group since 1993. She has contributed to both technical and project management aspects of Aspen's environmental projects, including the following:

- **California Energy Commission**. Ms. Lee has supported CEC staff since the fall of 2000. To date, she has prepared analyses for 14 power plants throughout the State, and she has also contributed to several special project reports. She has participated in numerous public workshops and hearings around the state, and completed the CEC's Expert Witness Training. Her major efforts for the CEC include the following:
  - Ms. Lee is managing the Alternatives and Cumulative impact analyses for several solar thermal projects on public lands, coordinating NEPA issues with BLM staff and CEQA issues with the Energy Commission's Project Manager.
  - Ms. Lee managed preparation of the CEC's first comprehensive dry cooling analysis for a coastal power plant using once-through cooling, the **Morro Bay Power Plant Modernization Project**. She managed a team of authors who developed a preliminary cooling design, and provided impact analysis.
  - Ms. Lee has prepared staff assessment **Alternatives Analyses** (consistent with CEQA and the CEC's procedures) for the CEC's staff reports considering proposed new or re-powered power plants at South Bay (San Diego), Blythe (BEP II), Morro Bay, El Segundo, Avenal, San Joaquin Valley, Potrero Unit 7 (San Francisco), Tracy, East Altamont, Henrietta, and the San Francisco Electric Reliability Project. She also prepared the alternatives analysis for the CEC's Blythe Transmission Modifications Project. In addition to preparing staff assessment sections documenting comparative impacts of alternatives, this work includes making presentations at PSA Workshops and testifying at Evidentiary Hearings.
  - Ms. Lee managed a three-year transmission corridor modeling project, **Planning Alternative Corridors for Transmission (PACT)**, in conjunction with the CEC PIER Environmental Program. The model uses Geographic Information Systems and decision modeling to assist in comparing potential alternative transmission corridors. Aspen's work included overall contract management, as well as development and management of a Project Steering Committee and six Technical Advisory Groups.
  - Ms. Lee prepared a detailed Background Report and made a presentation at an Energy Commission workshop on "**Comparative Alternatives to Transmission**" as part of the Integrated Energy Policy Report (IEPR) 2004 Update process. This project evaluated non-wires alternatives to transmission lines;

ongoing work is related to development of a methodology for consideration of these alternatives as part of the transmission planning process.

- Ms. Lee served as the CEC's **Project Manager** for the Small Power Plant Exemption (SPPE) environmental review process for the Woodland Generation Station 2, an 80-megawatt power plant proposed by the Modesto Irrigation District.
- Ms. Lee managed preparation of **Power Plant Cooling Options Reports** for the Potrero Unit 7 Project, Morro Bay, SMUD Cosumnes, and El Segundo power plants. These analyses include conceptual design of dry cooling systems, hybrid cooling systems, and water supply options including use of reclaimed water in both once through and hybrid cooling systems.
- Ms. Lee has provided management and technical support to Aspen's preparation of several reports for the CEC: the Environmental Performance Report, the Coastal Power Plant Study, and the Alternative Generation Technology study.

- **California Valley Solar Ranch EIR.** Under contract to San Luis Obispo County, Ms. Lee is managing preparation of an EIR to evaluate development of a 250 MW solar photovoltaic power facility on nearly 4,000 acres in the Carrizo Plain.
- **SDG&E Sunrise Powerlink Transmission Project EIR/EIS**. Under a $14 million contract to the CPUC, and under a Memorandum of Understanding with the Bureau of Land Management (BLM), Ms. Lee managed preparation of an EIR/EIS for a highly controversial 150-mile transmission line from Imperial County to coastal San Diego County.
- **SCE Devers–Palo Verde No. 2 Transmission Line Project EIR/EIS**. Under contract to the CPUC, Ms. Lee managed preparation of an EIR/EIS to evaluate the impacts of a constructing a 230-mile 500 kV transmission line between the Palo Verde generating hub in Arizona and SCE's Devers Substation.
- **Long-Term Procurement Planning and Barriers to Renewable Power Implementation**. For the CPUC, Ms. Lee and a team of environmental and economic specialists developed environmental and economic data and developed timelines of permitting and barriers to implementing the proposed 33 percent Renewable Portfolio Standard, including ranking and screening of available energy resources.
- **Jefferson-Martin 230 kV Transmission Line Project**. Ms. Lee managed preparation of an EIR for PG&E's proposed 27-mile transmission line through scenic San Mateo County in the Highway 280 corridor, urban Colma and Daly City, and across San Bruno Mountain for the California Public Utilities Commission (CPUC).
- **PG&E Northeast San Jose Transmission Reinforcement Project**: Ms. Lee served as the Project Manager for this CPUC contract to evaluate PG&E's proposed transmission improvements in Santa Clara and Alameda Counties.
- **PG&E Tri-Valley 2002 Capacity Increase Project.** Ms. Lee managed preparation of the Draft and Final EIRs for this controversial and complex project during 2000 and 2001, which was certified by the CPUC in May 2001. The Draft EIR (over 800 pages) evaluated proposed transmission lines and substations in the Tri-Valley area (Cities of Pleasanton, Dublin, Livermore, and San Ramon) of Alameda and Contra Costa Counties, and responded to a high level of local concern regarding electric and magnetic fields (EMFs).

DECLARATION OF
Testimony of William Walters, P.E.

I, **William Walters,** declare as follows:

1. I am presently employed by Aspen Environmental Group, a contractor to the California Energy Commission, Systems Assessment and Facilities Siting Division, as a senior associate in engineering and physical sciences.

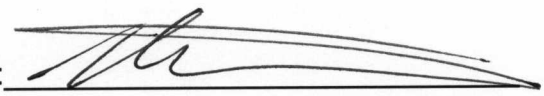
2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Air Quality**, and assisted in the preparation of the **Recreation** staff testimony, for the **Ivanpah Solar Electric Generating System project** based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: September 24, 2009 Signed: 

At: Agoura Hills, California

WILLIAM WALTERS, P.E.
Air Quality Specialist

ACADEMIC BACKGROUND
B.S., Chemical Engineering, 1985, Cornell University

PROFESSIONAL EXPERIENCE

Mr. Walters has over 20 years of technical and project management experience in environmental compliance work, including environmental impact reports, emissions inventories, source permitting, energy and pollution control research RCRA/CERCLA site assessment and closure, site inspection, and source monitoring,.

Aspen Environmental Group 2000 to present

Responsible as lead technical and/or project manager of environmental projects. Specific responsibilities and projects include the following:

- **Engineering and Environmental Technical Assistance to Conduct Application for Certification Review for the California Energy Commission:**
  - Preparation and project management of the air quality section of the Staff Assessment and/or Initial Study and the visual plume assessment for the following California Energy Commission (CEC) licensing projects: Hanford Energy Park; United Golden Gate, Phase I; Huntington Beach Modernization Project (including Expert Witness Testimony); Woodland Generating Station 2; Ocotillo Energy Project, Phase I; Magnolia Power Project; Colusa Power Project; Inland Empire Energy Center; Rio Linda/Elverta Power Plant Project; Roseville Energy Center; Henrietta Peaker Project; Tracy Peaking Power Plant Project (including Expert Witness Testimony); Avenal Energy Project; San Joaquin Valley Energy Center (including expert witness testimony); Salton Sea Unit 6 Project (including expert witness testimony); Modesto Irrigation District Electric Generation Station (including expert witness testimony); Walnut Energy Center (including expert witness testimony); Riverside Energy Resource Center (including expert witness testimony); Pastoria Energy Facility Expansion; Panoche Energy Center; Starwood Power Plant; and Riverside Energy Resource Center Units 3 and 4 Project (in progress).
  - Preparation and project management of the visual plume assessment for the following California Energy Commission (Energy Commission) licensing projects: Metcalf Energy Center Power Project (including Expert Witness Testimony); Contra Costa Power Plant Project (including Expert Witness Testimony); Mountainview Power Project; Potrero Power Plant Project; El Segundo Modernization Project; Morro Bay Power Plant Project; Valero Cogeneration Project; East Altamont Energy Center (including expert witness testimony); Russell City Energy Center; SMUD Cosumnes Power Plant Project (including expert witness testimony); Pico Power Project; Blythe Energy Project Phase II; City of Vernon Malburg Generating Station; San Francisco Electric Reliability Project; Los Esteros Critical Energy Facility Phase II; Roseville Energy Park; City of Vernon Power Plant; South Bay Replacement Project; Walnut Creek Energy Park; Sun Valley Energy Project; Highgrove Power Plant; Colusa Generating Station; Russell City Energy Center; Avenal Energy Project; Carlsbad Energy Center; Community Power Project; Panoche Energy Center; San Gabriel Generating Station; Sentinel Energy Project; and Victorville 2 Hybrid Power Project.
  - Assistance in the aircraft safety review of thermal plume turbulence for the Riverside Energy Resources Center; Russell City Energy Center Amendment (including expert witness testimony); Eastshore Energy Power Plant (including expert witness testimony); Carlsbad Energy Center (in progress), Riverside Energy Resource Center Units 3 and 4 Project; Victorville 2 Hybrid Power Project; and the Blythe Energy Power

Plant and Blythe Energy Project Phase II (including expert witness testimony) siting cases. Assistance in the aircraft safety review of thermal and visual plumes of the operating Blythe Energy Power Plant. Preparation of a white paper on methods for the determination of vertical plume velocity determination for aircraft safety analyses.

- Preparation and instruction of a visual water vapor plume modeling methodology class for the CEC.
- Preparation and project management of the public health section of the Initial Study for the Woodland Generating Station 2 Energy Commission licensing project.
- Preparation of project amendment or project compliance assessments, for air quality or visual plume impacts, for several licensed power plants, including: Metcalf Energy Center; Pastoria Power Plant; Elk Hills Power Plant; Henrietta Peaker Project; Tracy Peaker Project; Magnolia Power Project; Delta Energy Center; SMUD Cosumnes Power Plant; Walnut Energy Center; San Joaquin Valley Energy Center; City of Vernon Malburg Generating Station; Otay Mesa Power Plant; Los Esteros Critical Energy Facility; Pico Power Project; Riverside Energy Resource Center; Blythe Energy Project Phase II; Inland Empire Energy Center; Salton Sea Unit 6 Project; and Starwood Power-Midway Peaking Power Plant.
- Preparation of the air quality section of the staff paper "A Preliminary Environmental Profile of California's Imported Electricity" for the Energy Commission and presentation of the findings before the Commission.
- Preparation of the draft staff paper "Natural Gas Quality: Power Turbine Performance During Heat Content Surge", and presentation of the preliminary findings at the California Air Resources Board Compressed Natural Gas Workshop and a SoCalGas Technical Advisory Committee meeting.
- Preparation of the staff paper "Emission Offsets Availability Issues" and preparation and presentation of the Emission Offsets Constraints Workshop Summary paper for the Energy Commission.
- Preparation of information request and data analysis to update the Energy Commission's Cost of Generation Model capital and operating cost factors for combined and simple cycle gas turbine projects. Additionally, performed a review of the presentation for the revised model as part of the CEC's 2007 Integrated Energy Policy Report workshops, and attended the workshop and answering Commissioner questions on the data collection and data analysis.

- For the **Los Angeles Department of Water and Power (LADWP)**:
  - Preparation of the Air Quality Inventory for the LADWP River Supply Pipeline Project EIR.
  - Project management and preparation of the Air Quality Section for the LADWP Valley Generating Station Stack Removal IS/MND support project.
- For the **U.S. Army Corps of Engineers (Corps)**:
  - Preparation of the Air Quality Section and General Conformity Analysis for the Matilija Dam Ecosystem Restoration Project EIS/R for the Corps.
  - Preparation of emission inventory and General Conformity Analysis of the Murrieta Creek Flood Control Project and the Joint Red Flag exercise to be conducted in the Nevada Test and Training Range.
  - Emission inventory for the construction activities forecast for the San Jose/Old San Jose Creeks Ecosystem Restoration project for the Corps.

- Other Projects:
  - Preparation of the Air Quality Section of the LAUSD New School Construction Program EIR and provided traffic trip and VMT calculation support for the Traffic and Transportation Section.

- Preparation of the draft staff paper "Natural Gas Quality: Power Turbine Performance During Heat Content Surge", and presentation of the preliminary findings at the California Air Resources Board Compressed Natural Gas Workshop and a SoCalGas Technical Advisory Committee meeting.
- Preparation of the Air Quality Section of the Environmental Information Document in support of the Coastal Consistency Determinations for the suspension of operation requests for undeveloped units and leases off the Central California Coast.
- Preparation of comments on the Air Quality, Alternatives, Marine Traffic, Public Safety, and Noise section of the Cabrillo Port Liquefied Natural Gas Deepwater Port Draft EIS/EIR for the City of Oxnard.
- Preparation of the emission estimates used in the Air Quality Sections for the DWR Tehachapi Second Afterbay Project Initial Study and EIR.

Camp Dresser & McKee, Inc. 1998 to 2000

Mr. Walters was responsible as lead technical and/or project manager of environmental projects. Specific responsibilities and projects include the following:

- Preparation of emission inventories and dispersion modeling for criteria and air toxic pollutants for the Los Angeles International Airport Master Plan (LAXMP) EIS/EIR.
- Project Manager/Technical lead for the completion of air permit applications and air compliance audits for two Desa International fireplace accessory manufacturing facilities located in Santa Ana, California.
- Project manager/technical lead for the completion of Risk Management Plans (RMPs) for four J.R. Simplot food processing facilities in Oregon, Idaho, and Washington and the Consolidated Reprographics facility located in Irvine, California.

Planning Consultants Research 1997 to 1998

Mr. Walters was responsible as lead technical and/or project manager of environmental projects. Specific responsibilities and projects include the following:

- Project Manager for a stationary source emission audit of the entire Los Angeles International Airport complex for Los Angeles World Airports (LAWA) in support of the LAXMP.
- Review of the Emission Dispersion Modeling System (EDMS) and preparation of a report with findings to the Federal Aviation Administration for LAWA in support of the LAXMP.
- Project manager for the ambient air monitoring and deposition monitoring studies performed for LAWA in support of the LAXMP, including the selection of the monitoring sites and specialty subcontractor, and review of all monitoring data.

Aspen Environmental Group/Clean Air Solutions 1995 to 1996

Mr. Walters was responsible as lead technical and/or project manager of environmental projects. Specific responsibilities and projects include the following:

- Manager of the Portland, Oregon, office of Clean Air Solutions from March 1995 to December 1995, with responsibilities including Project Management, Business Development, and Administration.
- Control technology assessment, engineering support and Notice of Intent to construct preparation for J.R. Simplot's Hermiston, Oregon, food processing facility. Review and revision of an Air Contaminant Discharge Permit application, Title V permit application, and PSD modeling analysis for J.R. Simplot's Hermiston facility.

- Air quality compliance report including an air emission inventory, regulation and permit compliance determination, and recommendations for compliance for Lumber Tech, Inc.'s Lebanon, Oregon, wood products facility.

Fluor Daniel, Inc. 1990 to 1995 and 1996 to 1997

Mr. Walters was responsible as lead technical or project manager for major environmental projects for both government and private clients. His projects included:

- Prepared several air permit applications for the ARCO Los Angeles Refinery Polypropylene Plant Project; Phase I environmental assessments for properties located in Southern California; and a site investigation and RCRA closure plan for a hazardous waste storage site in Vernon, California.
- Project manager of the Anaconda Smelter site for the U.S. Environmental Protection Agency's (EPA) Alternative Remedial Contract System (ARCS) project during the conclusion of technical activities and project closeout. Prepared a cost recovery report for the project.
- Performed environmental analysis for the Bonneville Power Authority, including air pollution BACT analysis, wastewater analysis, and evaluation of secondary environmental effects of electric power producing technologies.

Jacobs Engineering Group 1988 to 1990

Mr. Walters was responsible for a wide range of air pollution regulatory and testing projects, including the following:

- Project manager of air toxic emission inventory reports prepared for U.S. Borax's boron mining and refining facility and the Naval Aviation Depot (N. Island Naval Base, San Diego, California).
- Prepared air permit applications and regulatory correspondence for several facilities including the U.S. Department of Energy's Feed Material Production Center uranium processing facility in Fernald, Ohio; Evaluation of a sludge dewatering process at Unocal's Wilmington, California, Refinery; and United Airlines blade repair facility at the San Francisco Airport.
- Characterized and quantified air emissions for offshore oil and gas development activities associated with Federal oil and gas Lease Sale 95, offshore southern California, for the U.S. Minerals Management Service.

CERTIFICATIONS

- Chemical Engineer, California License 5973
- CARB, Fundamentals of Enforcement Seminar
- EPA Methods 1-8, 17; Training Seminar

AWARDS

- California Energy Commission Outstanding Performance Award 2001

DECLARATION OF
Misa Milliron, Senior Biologist

I, Misa Milliron, declare as follows:

1. I am presently employed by the California Energy Commission in the Environmental Office of the Siting, Transmission & Environmental Protection Division as a Planner II.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on Biological Resources for the Ivanpah Solar Electric Generating System Project based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated:_____ Signed:_____

At: Sacramento, California

N. MISA MILLIRON

EDUCATION

University of Georgia, Athens *2000*
- M.S. Botany

California Polytechnic State University, San Luis Obispo *1997*
- B.S. Biological Sciences, Botany Concentration, *Magna Cum Laude*

WORK EXPERIENCE

California Energy Commission

Research Development and Demonstration Division, Public Interest Energy Research Program

Technical Lead, Terrestrial Resources *June 2009 - Present*

Siting, Transmission and Environmental Protection Division

Senior Biologist, Technical Lead *May 2007 - Present*

Biologist *May 2006 - May 2007*

- Manage and develop ideas for energy-related biological research.
- Develop and present oral and written testimony on energy-related environmental analyses and land use planning, natural resource management, energy facility siting issues and evaluate compliance with applicable local, state, and federal laws, ordinances, regulations, and standards.
- Identify, describe, and analyze policy, regulatory, electric transmission corridor planning, and biological resource issues related to construction and operation of electrical energy production facilities and associated electric transmission systems, alternative energy technologies including wind and geothermal facilities, and Commission programs.
- Conduct project management and team leadership, manage contract budgets, and coordinate work of contract personnel for the Order Instituting Informational proceeding pursuant to the California Public Resources Code on the Development of *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development.*
- Coordinate multi-agency input as well as write and edit sections for the *Guidelines*, which were identified as a priority policy issue in the Commission's 2005 *Integrated Energy Policy Report.*
- Consult with and advise Office Managers, Division Chiefs, Executive Office, and Commissioners and their advisers on electricity-related siting and planning subjects.
- Evaluate compliance with conditions of certification related to biological resources.
- Coordinate with biological resource protection and management agencies, environmental organizations, universities, and special interest groups to ensure input into Commission programs.
- Organize and conduct public workshops and meetings concerning Commission projects.
- Review information for *Environmental Performance Report* updates.
- Review job applications, develop interview questions, serve on interview panels, and make recommendations on potential new hires in the Biology Unit.
- Represent the Commission at college recruitment fairs.
- Serve as acting supervisor of Biology and Cultural Resources Unit as needed during supervisor's absences.
- Won Superior Accomplishment Award for outstanding performance and contribution in 2006.

California Native Plant Society (CNPS)

Rare Plant Botanist *March 2004 – June 2006*

- Provide leadership and project management equivalent to a Planner II – Energy Facilities Siting
- Manage Rare Plant Program's plant science activities and establish yearly, quarterly and daily priorities, including natural resource management activities
- Supervise and monitor work of consultants, volunteers, and interns
- Monitor species affected by development, including intra- and inter-state electric transmission corridors.
- Provide advice and data to consultants working for large electricity companies on utility transmission planning alternatives analysis and natural resource management.
- Conduct timely data entry and quality control of the CNPS rare plant database.

- Coordinate and expand interagency botanists group, network of local and regional rare plant experts, and consult with chapter Rare Plant Coordinators.
- Research status, nomenclature, distribution, abundance, and endangerment for the CNPS Inventory of Rare and Endangered Plants of California.
- Compile and disseminate concise technical reports on rare plants for public agencies, conservationists, consultants, researchers, media, and others.
- Develop oral presentations and write articles in CNPS publications regarding program activities.
- Organize meetings to facilitate yearly program evaluation.
- Serve on job search committee, screen applications, and interview references.
- Train interim, Program Assistant Rare Plant Botanist in key Program areas as described below.
- Consult on rare plant science activities, priorities, and data issues (2006-2007).

EDAW, Inc. *Sacramento Office* *October 2001 – April 2004*

Botanist

- Identify, describe, and analyze policy, regulatory, electric transmission corridor planning, and biological resource issues related to construction and operation of electrical energy production facilities and associated electric transmission systems, and alternative energy technologies including geothermal facilities as well as other major development.
- Apply knowledge of local, state, and federal laws, ordinances, regulations, and standards on biological resources.
- Authored numerous environmental impact analyses, rare plant survey reports, floristic inventories, restoration monitoring reports, and wetland delineations related to land use planning, natural resource management.
- Primary biologist responsible for analysis of wetlands on a large inter-state electric transmission corridor.
- Conduct alternatives analysis for utility transmission corridor planning and utility intertie projects.
- Conduct botanical surveys in a variety of habitats throughout California (and southern Oregon) to facilitate environmental planning for both public agency and private sector clients, including electric utility companies.
- Document and map rare plants and sensitive habitats using traditional field mapping or GPS.
- Determine potentially suitable habitat areas, perform jurisdictional wetland delineations, characterize plant communities and ecological processes/functions, and make impact assessments based on field data and previously reported information.
- Apply knowledge of existing laws on biological resources through CEQA/NEPA document and other report preparation.

Office of the Registrar *University of Georgia* *February 2000-October 2001*

Administrator and Web Content Manager

- Designed and created the first comprehensive on-line tutorial for the University's registration system.
- Facilitated the design of a new Registrar website and served as a technical writer and editor.
- Determined honors eligibility for combined degree students and coordinated commencement ceremony.
- Assisted in the reporting and organization of student statistics using the Registrar Systems database.

Botany Department *University of Georgia* *January 1999 - August 2000*

Plant Taxonomy Laboratory Instructor

- Coordinated course organization and content with lecture instructor and collected plant material for labs.
- Delivered lectures on plant morphology and identification, dichotomous key construction, field collection techniques and plant classification.
- Led field trips to greenhouses, state botanical gardens, and local natural areas.
- Composed keying and identification tests and graded graduate student plant collections and field notebooks.

Plant Anatomy Laboratory Instructor

- Prepared anatomical slide demonstrations using fresh plant material and delivered lectures.
- Authored, administered, and graded lab exams.
- Provided weekly written feedback on lab reports and developed study guides for exams.

Molecular Systematics Laboratory Instructor

- Demonstrated the use of current phylogenetic analysis software and web-based bioinformatics resources.
- Created lab exercises and user-friendly help documents for computer programs.
- Directed and evaluated graduate student class research projects.

Biological Sciences Department *Cal Poly, San Luis Obispo* *August 1996 - June 1997*

Field Botany Teaching Assistant (Volunteer)

- Identified and collected California native plants in diverse plant communities on extended field trips.
- Administered and graded exams in both field and lab settings.
- Led review field trips and prepared specimens for study.

Introductory Biology Teaching Assistant

- Designed, proctored and graded weekly lab practical exams.

Student Academic Services *Cal Poly, San Luis Obispo* *August 1994 - June 1997*

Biology of Plants and Fungi Supplemental Instructor

- Mediated student discussion sessions.
- Delivered brief review lectures and wrote practice exams.

Biology and Botany Study Group Leader

- Tutored introductory biology, botany, and plant taxonomy.
- Guided plant identification field trips.
- Taught study strategies and learning techniques.

Tutoring Program Assistant

- Assign students to appropriate study groups and tutors.
- Maintain database of students, tutors, and study groups.
- Answer questions related to academic assistance program.
- Completed data entry of student surveys for program evaluation statistics.

OTHER RELEVANT EXPERIENCE

Energy Commission- Sponsored Training *2006-2007*

- Applied Project Management
- Time Management and Organizing Skills
- Essential Facilitation
- Business Writing and Grammar Skills
- Management and Leadership Skills
- Expert Witness Training

Plants of the Tropics Course	*Fairchild Tropical Garden, FL*	*1999*
Tropical Plant Systematics Course	*Organization for Tropical Studies, Costa Rica*	*1998*
Wrigley Botanical Garden Internship	*Catalina Island, CA*	*1996*

The California Native Plant Society Rare Plant Program and Inventory. Poster presentation, Botany 2004 conference of the American Bryological and Lichenological Society, American Fern Society, American Society of Plant Taxonomists and Botanical Society of America.

Ward, M. and A. Howald. 2005. The California Native Plant Society's Rare Plant Program: 37 Years of Plant Science. *Fremontia*: 33(2): 17-23.

Rare Plants of the Ione Formation in California. Poster presentation on rare plant survey results, regulatory status, and natural history for the Botany 2003 Conference.

Ward, N.M. and R.A. Price. 2002. Phylogenetic Relationships of Marcgraviaceae: Insights from three chloroplast genes. *Systematic Botany* 27(1): 149-160.

Ward, N.M. 2000. Master's Thesis: Molecular Systematics and Evolution of Marcgraviaceae.

Werner, N.M. and R.A. Price. 2000. Phylogeny and morphological evolution of Marcgraviaceae: Insights from three chloroplast genes. *American Journal of Botany* 87(6 Suppl.): 183.

Werner, N.M. 1997. Undergraduate Thesis: A Plant Survey of Bitter Creek National Wildlife Refuge.

DECLARATION OF
Susan D. Sanders

I**, Susan D. Sanders,** declare as follows:

1. I am presently under contract with Aspen Environmental Group to provide environmental technical assistance to the California Energy Commission. Under Contract No. 700-05-002, I am serving as a Biological Resource Specialist and Project Manager to provide Peak Workload Support for the Energy Facility Siting Program and for the Energy Planning Program.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Biological Resources** for the **Ivanpah Solar Electric Generating System Project** based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: September 24, 2009 Signed: _____

At: Nevada City, California



Susan Sanders Biological Consulting

12213 Half Moon Way
Nevada City, California 95959
Phone: (530) 477-7415 Fax: (530) 477-7580
ssanders55@comcast.net

RESUME OF SUSAN SANDERS

EDUCATION

Ph.D.	Zoology	University of California, Davis (1983)
M.A.	Zoology	University of California, Davis (1979)
B.A.	Zoology	University of California, Berkeley (1976)

PROFESSIONAL AFFILIATIONS/CERTIFICATIONS

Wildlife Society, Sacramento-Shasta Chapter
Sierra Nevada Willow Flycatcher Working Group
Certified by California Unified Certification Program as DBE/WBE firm (UCP # 25204)

CONTINUING EDUCATION (UC Davis, University Extension)

Threatened and Endangered Reptiles and Amphibians of Northern California
Wetlands Regulations, Impacts, and Mitigation
Endangered Species: Resources, Law, and Potential Solutions
Resolving Endangered Species Conflicts: Practical Approaches to Problem Solving

REGULATORY COMPLIANCE EXPERTISE in coordination with state, federal, and local agencies in the environmental review process for projects regulated by the California Environmental Quality Act, National Environmental Policy Act, Federal and State Endangered Species Acts, National Fish & Wildlife Coordination Act, Clean Water Act, and California Coastal Act. Also experienced in providing technical support and agency coordination for license and permit applications.

TECHNICAL EXPERTISE in surveys for threatened and endangered wildlife species; biological inventories; habitat management plans; raptor surveys; wildlife habitat assessment; mitigation monitoring; expert testimony, constraints analysis; sensitive species research. Prepared Biological Assessments for endangered, threatened, and candidate species, and conducted field surveys and literature reviews for willow flycatchers, tricolored blackbirds, Swainson's hawks, burrowing owls, California spotted owls, San Joaquin kit fox, bald eagles, valley elderberry longhorn beetles, and many other special-status species. Conducted surveys for raptor species of special concern, including white-tailed kite, northern goshawk, and Cooper's hawk.

PROJECT MANAGEMENT EXPERIENCE on large and complex projects, including a two-year survey of 11,000 acres in the Plumas National Forest for a proposed land exchange, involving supervision of eight technical specialists and subconsultants. Responsible for overseeing numerous transportation and revegetation projects and mitigation monitoring programs which involved budget, personnel, and subconsultant management, agency and client coordination, and preparation of technical reports. Managed long-term (five-year) revegetation/mitigation monitoring projects with annual reporting requirements.

CONSULTING EXPERIENCE (1982 - 2007)

CALIFORNIA ENERGY COMMISSION TECHNICAL ASSISTANCE

Currently assisting the CEC in evaluating the environmental aspects of new power plant applications throughout the state, and also providing technical expertise as an avian specialist. I have completed or am currently involved in the following projects:

- **California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development in California:** Currently **s**erving as author and coordinator for a statewide effort to develop science-based protocols for pre-and post-construction monitoring to assess the effects of wind energy development on birds and bats. Worked closely with CEC and California Department of Fish and Game staff, coordinated the efforts of an eight-member Science Advisory Committee, helped organize public workshops, worked with wind energy developers, and non-governmental organizations on this collaborative guidelines effort.
- **Pastoria Energy Facility Expansion**. Worked with CEC staff in reviewing the Application for Certification and associated reference material, prepared Data Adequacy Form, Data Request, Preliminary and Final Staff Assessment.
- **San Francisco Energy Reliability Project**: Reviewed the Application for Certification and related information material, met with CEC staff and United States Fish and Wildlife Service regarding endangered species issues, prepared and Final Preliminary Staff Assessment.
- **Black Mountain Wind Energy and 69kV Transmission Line Project**: Acting as CEC's avian specialist, reviewed the extensive literature of effects of wind development on avian populations, met with the Public Interest Energy Research staff, and prepared a comment letter on behalf of CEC for the Notice of Preparation for this project.
- **Notice of Preparation Review for Proposed Wind Energy Project:** Provided comment letters on behalf of CEC for the Notice of Preparation for Shiloh II Wind Plant Project (Solano County), and WECS 20 Project (City of Desert Hot Springs).

LITIGATION SUPPORT/EXPERT WITNESS

El Portal Road Improvement Project. Conducted field surveys and reviewed the Biological Assessment, Environmental Assessment/FONSI for the El Portal Road Improvement Project litigation (Sierra Club *et al. vs.* National Park Service). Prepared declarations and response to defendants opposition briefs, and provided other technical assistance to project attorneys. (Client: Mariposans for Environmentally Responsible Growth and Sierra Club).

Merced River Plan. Conducted field surveys and reviewed the Merced Wild and Scenic River Comprehensive Management Plan and Final Environmental Impact Statement (Sierra Club *et al. vs.* National Park Service). Prepared declarations and response to defendants opposition briefs, and provided other technical assistance to project attorneys. (Client: Friends of Yosemite Valley and Sierra Club).

Lower American River Instream Flows. Conducted original research and provided declarations on the effects of reduced instream flow to wildlife for the Friends of the American River v. EBMUD, Lower American River. Provided technical assistance to project attorneys,

prepared declarations, and provided expert testimony before the State Water Resources Control Board. (Client: Sacramento County and Friends of the American River Parkway).

Putah Creek v. Solano Irrigation District. Litigation support and expert testimony regarding wildlife/fishery impacts of reduced flows in Putah Creek. Provided depositions, declarations, expert witness testimony, and other litigation support (Client: Putah Creek Council).

CEQA/NEPA Documents. Prepared biological resource sections of Environmental Impact Reports/Statements, Initial Studies, and Environmental Assessments for numerous commercial and residential developments, redevelopment projects, transportation projects, dams, and other water projects throughout northern California. Conducted wildlife and plant community surveys, habitat assessments, agency contacts, data analysis and report preparation. Secured 1602 Streambed Alteration Agreements from California Department of Fish and Game, Section 404 Permits from U.S. Army Corps of Engineers, and 401 Permits from Regional Water Quality Control Board. Some representative projects include:

- Pacific Bell Route 101 Fiber Optic Cable, Kern County (PAR Environmental Services, Inc. [PAR]);
- Higgins Corner Marketplace, Nevada County (FHK Development);
- Hinkle Creek Nature Area Biological Inventory/Impact Analysis, Folsom (PAR);
- Willow Flycatcher Surveys, Lake Isabella Project, Kern County (Jones & Stokes);
- Biological Resources Survey, Galilee and TRC Parcels, Roseville, Placer County (PAR);
- Burrowing Owl Impact Analysis/Mitigation Monitoring, Northpointe, Sacramento County (PAR);
- Laguna Creek Interceptor and Sewer Alignment Constraints Study, Sacramento County (PAR);
- Marin Public Safety and Emergency Radio System Project, Marin County (Cord Communication)
- Biological Studies for Endangered Species Compliance, Isabella Dam, Kern County (PAR);
- Granite Quarry, Placerville (The Bedrock Group);
- Pacific-Bell Rocklin Central Dialing Station, Rocklin, Placer County (PAR);
- Whitney Oaks Raptor Surveys, Placer County (Live Oak Enterprises/Pulte Homes);
- Auburn Ranch Subdivision Project, Placer County (Area West Engineers);
- Equestrian Ridge Estates, Placer County (PAR);
- Willow Creek Assessment District Swainson's Hawk Surveys, Sacramento County (PAR);
- Bucks Lake Spotted Owls Surveys, Menasha Corporation, Plumas County (PAR);
- Roseville Water Facilities Project, City of Roseville, Placer County (Geier & Geier Consulting);
- Sugar Bowl Ski Resort Expansion, Placer County (Omni-Means, Engineers/Planners);
- City of Lincoln Waste Water Treatment Plant Expansion, Placer County (City of Lincoln);
- The Heritage at Bickford Ranch, Placer County (Geobotanical Phenomenology);
- South Branch 60 kV Pole Line Project, Roseville, Placer County (PAR);
- Smith-Moulton Pipeline Project, Nevada County (PAR);
- Morada Ranch Annexation, San Joaquin County (Omni-Means);
- Clover Valley Lakes Estates EIR, Placer County (Planning Concepts);
- Turtle Island, Loomis, Placer County (Export International);
- Fort Hunter-Liggett Wildlife Resource Surveys, Monterey County (Jones & Stokes Associates);
- Superconducting Super Collider EIR/EIS, Yolo and Solano Counties (EIP Associates);
- South Lake Tahoe Redevelopment Agency EIR, El Dorado County (Wagstaff & Brady);
- Stanford Ranch EIR, Placer County (Jones & Stokes Associates);
- Northeast Roseville Specific Plan EIR, Placer County, Placer County (Jones & Stokes Associates).
- Teichert/Granite Aggregate Mining Site, Sacramento County (Holliman, Hackard, & Taylor);
- Lower Laguna Drainage Master Plan, Sacramento County (PAR);
- Natomas Ditch Abandonment and Pipeline Construction Project, Sacramento County (PAR);
- Tuolumne River Wildlife Studies for FERC License, Tuolumne County (Holton & Associates);
- Turner Creek Hydroelectric Project, Plumas County (Jones & Stokes Associates);
- Calabazas Creek Flood Control Project, Santa Clara County (Santa Clara Valley Water District).

Transportation Projects. Prepared Caltrans Natural Environment Study Reports, Biological Assessments, Categorical Exemption/Exclusions, Preliminary Environmental Study Forms, and other documentation for bridge replacements, interchange modifications, seismic retrofits, road widenings, emergency storm damage repairs, and other transportation projects in Caltrans Districts 1, 2, 3, 4, 5, 6, and 10. Representative projects include:

- Auburn Boulevard Improvement Project, Citrus Heights, Sacramento County (PAR)
- Valley Drive Bridge Replacement Project, Nevada County (Nevada County DOTS)
- SR 101/Prado Rd. Interchange Improvement Project, San Luis Obispo County, (PAR)
- I-580/Isabel Avenue Interchange Project, Livermore, Alameda County (PAR);
- Gladding Road Bridge Replacement, Coon Creek, Placer County (Planning Concepts);
- Lozanos Road Bridge Replacement, Auburn Ravine, Placer County (PAR);
- Coyote Creek Bridge Replacement Project, Calaveras County (PAR);
- Route 99/Route 120 East Interchange Project, Manteca, San Joaquin County (PAR);
- Route 99/Prado Road Interchange, San Luis Obispo County (PAR);
- Ralston Avenue/Route 101 Interchange, Belmont, San Mateo County (PAR);
- Route 1 Improvement Project, Sand City to Seaside, Monterey County, PEAR (PAR);
- Northeast Area Transportation Plan, Constraints Analysis, Sacramento (PAR);
- Wilbur Avenue Overcrossing Project, Antioch, Contra Costa (PAR);
- Alpine Road Storm Damage Repair, San Mateo County (PAR);
- Pescadero Road Storm Damage Repair, San Mateo County (PAR);
- Route 92 Widening, Half Moon Bay, San Mateo County (PAR);
- Route 99/Hammer Lane Interchange Improvements, Stockton, San Joaquin County (PAR);
- Hammer Lane Widening, Stockton, San Joaquin County (PAR);
- La Gonda Way and Paraiso Drive Bridge Seismic Retrofit, Danville, Contra Costa County (PAR);
- Highway 162 Bridge Storm Damage Repair Project, Sacramento River, Glenn County (PAR);
- Norwood Avenue Reconstruction Project, Sacramento County (Planning Center);
- HOV Lane Construction, US 50, Sunrise to El Dorado Blvd., Sacramento/El Dorado Co. (PAR);
- Dry Creek Bridge Replacement Project, Route 99, Butte County (PAR);
- Ladies Canyon Bridge Storm Damage Repair, Sierra County, (PAR);
- Emergency Storm Damage Repair, Routes 49 and 89, Sierra and Nevada Counties, (PAR);
- Emergency Storm Damage Repair Project for: Route 70/89, Feather River Canyon, Route 20, 147, Plumas, Nevada, and Butte Counties, (PAR);
- Interstate 5 - Benjamin Holt/Hammer Lane Interchange project, San Joaquin County (PAR);
- State Route 113/Interstate 5 Connector Study, City of Woodland, Yolo County, California (PAR);
- Frederickson Road Widening, Antioch, Contra Costa County (May Consulting);
- East Lime Kiln Road Reconstruction Project, Nevada County (PAR);
- Lower Sacramento Road and Bridge Widening, Stockton, San Joaquin County (May Consulting);
- Sierra College Boulevard Widening Project, Roseville, Placer County (PAR);
- State Route 50/Folsom Interchange Improvement Project, Sacramento County (PAR);
- Pico Creek Bridge Replacement Project, Route 1, San Luis Obispo County (PAR)
- Burns Creek Bridge Replacement Project, Route 1, Monterey County (PAR);
- Pajaro River Bridge Replacement Project, Monterey and San Luis Obispo Counties (PAR);
- Route 113 Widening/North 1st Street Improvements, Dixon, Solano County (Planning Concepts);
- Bridgeport School Bridge Replacement Project, El Dorado County (PAR);
- State Route 49 Widening, Auburn, Placer County (PAR);
- Claus Road Bridge Widening, Modesto, Stanislaus County (PAR);
- Interstate 80/Enterprise Boulevard Interchange, City of West Sacramento, Yolo County (PAR).

Nevada County Biological Inventories/Habitat Management Plans. Conducted site specific vegetation and wildlife surveys in accordance with Policy 13.2A of the Nevada County General Plan; prepared Management Plans in accordance with Sec. L-II 4.3.3, General Provisions of the July 27, 2000 Zoning Ordinances. Representative projects include:

- Waxman Parcel Biological Inventory, Old Wood Road (Nevada City Engineering)
- Habitat Management Plan for DesJardins Dry Creek Crossing (Cranmer Engineering)
- Gregory Creek Biological Inventory, Truckee (King Engineering)
- Landon Parcel Biological Inventory and Management Plan, Wolf Road (California Survey Company)
- Oslin-Tarkowski Biological Inventory, Peardale (Ms. Jeanette Oslin)
- Jackson Parcel, Purdon Road (Mr.
- Hyatt Property Biological Inventory and Management Plan, Dry Creek (Mr. Mike Hyatt)
- Penn Valley Community Church, Penn Valley (Mr. Keith Brown)
- Chapa-De Health Clinic, Grass Valley (Ms. Elaine. Lieske, Architect)
- Inventory and Management Plan for Agren Pond Project, Penn Valley (Mr. Ray Agren)
- Humboldt Lily Plant Preservation Plan (Sares-Regis Group)
- Moore Property, Chicago Park (American Surveys)
- Callaghan Property, Lake of the Pines (Sylvester Engineering)
- Tracy Property, Duggans Road (Cranmer Engineering)
- Ragsdale Creek Setback Study, Higgins Area (Nevada County Planning Department)
- CDFG 1603 Permit Application, Eskaton Village, Grass Valley (Sares-Regis Group)
- Cedar Ridge Baptist Church Expansion, Cedar Ridge (Cedar Ridge Baptist Church)
- Penn Valley Properties, Penn Valley (Sylvester and Creighton)
- Record Connection Property, Brunswick Basin (Daggett Design)
- Droitcour Property, Wolf Road (Mr. Gerald Stapp)
- Hyepark Estates, near Wolf Road (King Engineering)
- Bartel Property Lake Setback (Nevada City Engineering)
- KLOVE Radio Tower, Banner Mountain (Westower Communications)
- Haas-Menasha Property, Ponderosa Way, Rough and Ready (Cliff McDivitt Surveying)
- Eskaton Village, Grass Valley (Sylvester & Creighton)
- Quist Property, Higgins Corner (Sylvester & Creighton)
- Hobart Mills Industrial Park (Sylvester & Creighton)
- Milhous Ranch, North San Juan (Sylvester & Creighton)
- Extasia Workshop Project, Tyler Foote Crossing Road, San Juan Ridge (Mr. Bruce Boyd, AIA);
- Flynn Property, Retrac Way, Grass Valley (Mr. Martin Flynn);
- McGuire Property, Banner Lava Cap Road, Nevada City (Mr. Kirk McGuire);
- Biological Inventory for 240-acre parcel near Donner Lake (Mr. James Mitchell);
- Brunswick Inn Project, Grass Valley (Sylvester Engineering);
- Lopez Tentative Map, Scott's Flat Road (Sylvester Engineering);
- Sierra Knoll Estates, Higgins Corner (Mr. and Mrs. Steve Joos);
- Smallwood Property, Grass Valley (Mr. Jay Smallwood).
- Harmony Ridge Resort (Sylvester & Creighton)

Land Exchanges. Prepared Biological Assessments/Evaluations for Forest Service land exchanges in the Plumas National Forest. The largest of these was the 11,000 acre Soper-Wheeler Company land exchange, a two-year project requiring management of eight employees and several subconsultants for surveys of rare plants, California spotted owls, northern goshawks, red-legged frogs, and other sensitive species. Other projects include the Crites Mineral Fraction Land Exchange and the Saunders Land Exchange, Plumas National Forest, (PAR).

Mitigation Monitoring. Supervised the design and ongoing monitoring of wetland and sensitive species mitigation projects, including riparian revegetation, vernal pool creation, and mitigation banking. Some projects involved preparation of a Habitat Mitigation and Monitoring Plan, and long-term monitoring efforts (five years plus), as well as preparation of annual reports, and

coordination with US Army Corps of Engineers, US Fish and Wildlife Service, California Department of Fish and Game, California Department of Transportation, and the US Environmental Protection Agency. Projects include:

- Humboldt Lily Mitigation Monitoring, Eskaton Village, Nevada County (Eskaton)
- Dark Horse Mitigation Monitoring, Nevada County (Nevada City Engineering)
- Northpointe, Burrowing Owl Mitigation Monitoring, Sacramento County (PAR)
- Burrowing Owl Mitigation Monitoring, Meadowview, Sacramento County (PAR)
- Wilbur Avenue Overhead Project, Habitat Restoration for Lange's Metalmark Butterfly, Antioch, Contra Costa County, (PAR)
- Swainson's Hawk Nest Monitoring, Garden Highway, Sacramento, Sacramento County (PAR)
- Sierra College Boulevard Riparian Revegetation Monitoring, Roseville, Placer County (PAR);
- Roseville Sanitary Landfill Riparian Revegetation Project, Roseville, Placer County (PAR);
- State Route 99/Calvine Interchange Vernal Pool Vegetation and Fairy Shrimp Mitigation Monitoring, Sacramento County (PAR);
- Potrero Hills Landfill Bird Deterrence Monitoring, Solano County (Global Environmental);
- State Route 50/Folsom Boulevard Improvement Project, Beach Lakes Mitigation Bank (PAR);
- Niblick Bridge Riparian Revegetation and Mitigation Monitoring, San Luis Obispo County (PAR).

TEACHING EXPERIENCE

Lecturer. Biology 10, UCD Zoology Department (1985): Instructor - biology for non-majors.
Lab Coordinator. Zoology 2L, UCD Zoology Department (1983-1984): Trained and supervised teaching assistants, managed introductory zoology laboratories.
Teaching Assistant. UCD Zoology Department (1977-1983): General Zoology, Vertebrate Structure, Introductory Biology.
Outstanding UCD Graduate Teaching Assistant (1983).

PUBLICATIONS

California Energy Commission and California Department of Fish and Game. 2007. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development.* Commission Final Report. California Energy Commission, Renewables Committee, and Energy Facilities Siting Division, and California Department of Fish and Game, Resources Management and Policy Division. CEC700-2007-008-CMF.
Beedy, E. C., S. D. Sanders, and D. A. Bloom. 1991. Breeding status, distribution, and habitat associations of the tricolored blackbird (*Agelaius tricolor*), 1850-1989. June 21, 1991. Jones & Stokes Associates (JSA 88-187.) Sacramento, CA. Prepared for USFWS, Sacramento, CA.
Flett, M. A. and S. D. Sanders. 1987. Ecology of a Sierra Nevada population of Willow Flycatchers. Western Birds. 18:37-42.
Fowler, C., B. Valentine, S. Sanders, and M. Stafford. 1991. Habitat Suitability Index Model: Willow Flycatcher (*Empidonax traillii*). USDA Forest Service, Tahoe National Forest.
Harris, J. D., S. D. Sanders, and M. A. Flett. 1987. Willow Flycatcher surveys in the Sierra Nevada. Western Birds. 18:27-36.
Sanders, S. D. 1983. Foraging Ecology of a Sierra Nevada population of Douglas Tree Squirrels (*Tamiasciurus douglasii*). Ph.D. Dissertation, University of California, Davis.
Sanders, S. D. and M. A. Flett. 1989. The ecology of a Sierra Nevada population of Willow Flycatchers (*Empidonax traillii*), 1986 and 1987. California Management Branch Administrative Report No. 89-3, California Department of Fish and Game.

DECLARATION OF
Michael D. McGuirt

I, **Michael D. McGuirt**, declare as follows:

1. I am presently employed by The California Energy Commission in the **Siting, Transmission, and Environmental Protection Division** as a **Planner II**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on **Cultural Resources,** for the Ivanpah Solar Energy Generating System project, based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: September 2, 2009 Signed: _____

At: Sacramento, California

MICHAEL D. MCGUIRT, MA, RPA

SUMMARY OF PROFESSIONAL EXPERIENCE

Fifteen years of professional academic and cultural resources management experience in western North America, Hawai'i, Central America, and Eastern Europe. Former regulator and present planner with expert knowledge of Section 106 of the National Historic Preservation Act of 1966 (NHPA). Thorough knowledge of the California Environmental Quality Act of 1970, Section 110 of the NHPA, and the US Army Corps of Engineers' Appendix C. Working knowledge of the National Environmental Policy Act of 1969, Native American Graves Protection and Repatriation Act of 1990, and the Archaeological Resources Protection Act of 1979. Expert in developing and coordinating historic preservation solutions that comply with complex Federal, state, and local regulatory environments for large energy, transportation, and telecommunications projects. Expert technical skills in geoarchaeology, mapping and spatial analysis, archaeological survey and excavation, and material culture analysis.

EDUCATION

MASTER OF ARTS, Anthropology, University of Texas at Austin
May 1996

BACHELOR OF ARTS, Anthropology and Archaeological Studies, University of Texas at Austin
December 1990

PROFESSIONAL AFFILIATIONS

Register of Professional Archaeologists
Society for American Archaeology
Society for California Archaeology
National Trust for Historic Preservation
California Preservation Foundation

HONORARY AFFILIATIONS

Honor Society of Phi Kappa Phi

RECENT PROFESSIONAL EMPLOYMENT

ENERGY PLANNER II, California Energy Commission, Sacramento, California
November 2007 to present

Develop environmental impact analyses of the potential effects that the construction and operation of proposed thermal power plants may have on significant cultural resources. Apply applicable Federal, State, and local statutes and regulations, as they relate to the consideration of cultural resources. Design and execute cultural resource impact analyses that are appropriate to the specific regulatory context for each proposed project. Gather and evaluate information on projects and on cultural resources in project areas. Develop and maintain agency and public relationships to acquire the most useful data and to elicit input in the development of California Energy Commission conditions

of certification. Succinctly convey, orally in different public forums and in different written technical formats, the results of cultural resource impact analyses and proposed conditions of certifications meant to mitigate adverse impacts to significant cultural resources. Periodic reviews of licensees' actions to ensure compliance with extant conditions of certification. Oversight of consultants' who are preparing cultural resource impact analyses.

ASSOCIATE STATE ARCHAEOLOGIST, Office of Historic Preservation, California Department of Parks and Recreation (California State Parks), Sacramento, California
May 2001 to November 2007

Regulator, in the California Office of Historic Preservation (OHP), of the Advisory Council on Historic Preservation's (Advisory Council) process implementing Section 106 of the National Historic Preservation Act (NHPA). Conducted among the most complex Section 106 reviews, and participated in, and often guided, the consultations of which those reviews were a part. Formally advised other OHP units and the California State Historical Resources Commission on the appropriate disposition and treatment of archaeological resources in the context of other State and Federal historic preservation programs that OHP either administers or in which OHP participates. Worked out of class for two consecutive, six-month terms as a Senior State Archeologist, from December 2004 through December 2005, supervising the Project Review Unit for the State Historic Preservation Officer (SHPO). As the Acting Chief of Project Review, managed and trained a staff of eight professionals and one clerical assistant to conduct, on behalf of the SHPO, the review of all Federal agency actions in the State of California under 36 CFR Part 800, the Advisory Council's Section 106 regulation.

ENVIRONMENTAL SPECIALIST III, Jones & Stokes, Sacramento, California
February 1999 to May 2001

Designed, conducted, and managed short- and long-term archaeological projects in California, Nevada, and New Mexico to comply with Sections 106 and 110 of the NHPA. Prepared proposals. Assisted with client contract negotiations. Conducted archaeological record searches and archival research. Directed Phase I pedestrian inventory surveys and test excavations for Phase II evaluations. Analyzed material culture assemblages. Prepared technical reports and regulatory compliance documents including National Register property and district evaluations, and monitoring and discovery plans. Represented clients in consultations with federal and state agencies, and coordinated and managed clients' compliance with federal cultural resource regulations and the cultural resource regulations of California, Nevada, and New Mexico.

ASSISTANT ANTHROPOLOGIST, Bernice Pauahi Bishop Museum, Honolulu, Hawai`i
August 1996 to June 1998

Assisted with archaeological project design, preparation of proposals, and client contract negotiations, directed Phase I pedestrian inventory surveys, test excavations for Phase I subsurface inventory surveys, test excavations for property evaluations, and data recovery excavations, and assisted with preparation of technical reports on short-term cultural resource management contracts. Analyzed field records, prepared site

reports and synthetic report chapters, and analyzed and prepared reports on lithic assemblages for Phases I–III of a long-term federal highway project (Interstate Route H–3). Conducted research in Hawaiian archaeology, and delivered public and professional presentations of that research. Advised on the integration of geoarchaeological methods and techniques into cultural resource management field efforts, and on geoarchaeological interpretations of extant field records, and designed and conducted geoarchaeological components of fieldwork for short–term cultural resource management contracts.

RECENT PROFESSIONAL DEVELOPMENT

CULTURAL RESOURCE AND ENVIRONMENTAL LAW

Successful CEQA Compliance: An Intensive Two-Day Seminar
Sacramento, California, University of California, Davis, Continuing and Professional Education, Terry Rivasplata and Maggie Townsley
June 2009

ACHP - FHWA Advanced Seminar: Reaching Successful Outcomes in Section 106 Review
Vancouver, Washington, Advisory Council on Historic Preservation, Don Klima and Carol Legard; Federal Highway Administration, Mary Ann Naber
October 2007

NEPA Compliance and Cultural Resources
Portland, Oregon, National Preservation Institute, Joe Trnka
October 2007

Section 106: How to Negotiate and Write Agreements
Sacramento, California, National Preservation Institute, Claudia Nissley
November 2004

Consultation with Indian Tribes on Cultural Resource Issues
Sacramento, California, National Preservation Institute, Thomas F. King and Reba Fuller
September 2003

Section 106: How to Negotiate and Write Agreements
The Presidio, San Francisco, California, National Preservation Institute, Thomas F. King
May 2002

Introduction to CEQA
Sacramento, California, University of California, Davis, Continuing and Professional Education, Ken Bogdan and Terry Rivasplata
July 2000

TECHNICAL ARCHAEOLOGY

Introduction to Historic Site Survey, Preliminary Evaluation, and Artifact ID
West Sacramento, California, California Department of Transportation, Julia Huddleson, Anmarie Medin, Judy Tordoff, and Kimberly Wooten; California Department of Parks and Recreation, Glenn Farris, Larry Felton, and Pete Schulz
September 2006

Principles of Geoarchaeology for Transportation Projects (Course No. 100246) Sacramento, California, California Department of Transportation, Graham Dalldorf, Glenn Gmoser, Jack Meyer, Stephen Norwick, Adrian Praetzellis, and William Silva October 2006

INFORMATION TECHNOLOGY AND CULTURAL RESOURCE MANAGEMENT

GIS: Practical Applications for Cultural Resource Projects
Sacramento, California, National Preservation Institute, Deidre McCarthy September 2006

RECENT PAPERS AND REPORTS

BASTIAN, BEVERLY E. AND MICHAEL D. MCGUIRT

2009 **Cultural Resources**. In *Final Staff Assessment, Canyon Power Plant, Application for Certification (07-AFC-9), Orange County* (CEC-700-2009-008-FSA, September 2009), edited by Siting, Transmission and Environmental Protection Division, California Energy Commission, pp. 4.3-1–4.3-51. Siting, Transmission and Environmental Protection Division, California Energy Commission, Sacramento. On file with the California Energy Commission, Sacramento.

BLOSSER, AMANDA, MICHAEL D. MCGUIRT, AND BEVERLY E. BASTIAN

2008 **Cultural Resources**. In *Staff Assessment, Orange Grove Project, Application for Certification (08-AFC-4), San Diego County* (CEC-700-2008-009, November 2008), edited by Siting, Transmission and Environmental Protection Division, California Energy Commission, pp. 4.3-1–4.3-43. Siting, Transmission and Environmental Protection Division, California Energy Commission, Sacramento. On file with the California Energy Commission, Sacramento.

DARCANGELO, JENNIFER, JOHN SHARP, MICHAEL D. MCGUIRT, ANDREA GALVIN, AND CLARENCE CAESAR

2004 ***Section 106 for Experienced Practitioners: Consulting with the California SHPO*** *(GEV4111)*. Course taught on 8 September 2004 in Oakland to California Department of Transportation cultural resources personnel and private sector cultural resource consultants (8 hours).

DARCANGELO, JENNIFER, JOHN SHARP, MICHAEL D. MCGUIRT, AND ANDREA GALVIN

2005 ***How to Consult with the California SHPO***. Workshop presented on 23 April 2005 at the 39th Annual Meeting of the Society for California Archaeology, Sacramento, California (6 hours).

JONES & STOKES

1999a ***Cultural Resource Inventory Report for Williams Communications, Inc. Fiber Optic Cable System Installation Project, Wendover, Nevada to the California State Line***. Volume 1: Draft Report. July. (JSA 98-358.) Sacramento, California. Prepared for Williams Communications, Inc., Tulsa, Oklahoma.

1999b ***Cultural Resources Report for the Williams Communications, Inc. Interstate 80 Fiber Optic Cable System Installation Project***. Volume I. September. (JSA 98-358.) Submitted to Williams Communications, Inc., Tulsa, Oklahoma. On file with the State Historic Preservation Office, Carson City, Nevada.

1999c ***Archaeological Site Avoidance and Monitoring Plans for Williams Communications' Fiber Optic Cable Installation In the Union Pacific Railroad Right-of-Way, Doña Ana County to Hidalgo County, New Mexico***. October. (JSA98-379.) Sacramento, California. Prepared for Williams Communications, Inc., Tulsa, Oklahoma.

2001 ***Final Phase II Cultural Resource Evaluation for the Kramer Mining District, Edwards AFB, Kern and San Bernardino Counties, California***. Volume I. November. Sacramento, California. On file with the Base Historic Preservation Officer, Edwards AFB, California.

LEBO, SUSAN A. AND MICHAEL D. MCGUIRT

1997 ***Geoarchaeology at 800 Nuuanu: Archaeological Inventory Survey of Site 50-80-14-5496 (TMK1-7-02:02), Honolulu, Hawai`i***. Department of Anthropology, Bishop Museum, Honolulu. (100 pp.) Submitted to Bank of Hawaii, Honolulu. On file with the State Historic Preservation Division, Honolulu.

1998a ***Assessments of Stone Architecture: a Case Study from North Hālawa Valley, O`ahu***. Paper presented at the 11th Annual Hawaiian Archaeology Conference of the Society for Hawaiian Archaeology, Kailua-Kona, Hawai`i.

1998b ***Pili Grass, Wood Frame, Brick, and Concrete: Archaeology at 800 Nuuanu***. Department of Anthropology, Bishop Museum, Honolulu. (142 pp.) Submitted to Bank of Hawaii, Honolulu. On file with the State Historic Preservation Division, Honolulu.

LENNSTROM, HEIDI A., P. CHRISTIAAN KLIEGER, MICHAEL D. MCGUIRT, AND SUSAN A. LEBO

1997 ***Archaeological Reconnaissance of Pouhala Marsh, `Ewa District, O`ahu***. Department of Anthropology, Bishop Museum, Honolulu. (14 pp.) Submitted to Ducks Unlimited, Inc., Rancho Cordova, California. On file with the State Historic Preservation Division, Honolulu.

MCGUIRT, MICHAEL D.

1996 ***The Geoarchaeology and Palynology of an Early Formative Pithouse Village in West-Central New Mexico***. Unpublished M.A. thesis, Department of Anthropology, University of Texas at Austin.

1998 **50-80-10-2010, 50-80-10-2016, 50-80-10-2088, and 50-80-10-2134**. In *Activities and Settlement in an Upper Valley: Data Recovery and Monitoring Archaeology in North Hālawa Valley, O`ahu*, vols. 2a and 2b, edited by Department of Anthropology, Bishop Museum, pp. 1–3, 1–44, 1–5, and 1–46. Department of Anthropology, Bishop Museum,

Honolulu. Submitted to State of Hawaii, Department of Transportation, Honolulu. On file with the State Historic Preservation Division, Honolulu.

2002 **Committee Reports, OHP Liaison**. *SCA Newsletter* 36(3):4–5.

2004 **Committee Reports, OHP Liaison**. *SCA Newsletter* 38(2):7, 38(3):6–8.

2006 **Preservation Archaeology**. In *California Statewide Historic Preservation Plan: 2006–2010*, edited by Marie Nelson, pp. 8–15. California Department of Parks and Recreation's Office of Historic Preservation, Sacramento. Submitted to the National Park Service, Washington, D.C. On file at the California Office of Historic Preservation, Sacramento.

2008 **Dealing with Multi-element Cultural Resources under Section 106**. In *Historic Properties Are More Than Meets the Eye: Dealing with Historical Archaeological Resources under the Regulatory Context of Section 106 and CEQA*. Session presented on 25 April 2008 at the *33rd Annual California Preservation Conference* of the California Preservation Foundation in Napa, California, moderated by Michelle Messinger and Michael D. McGuirt (1 1/2 hours).

MCGUIRT, MICHAEL D., AMANDA BLOSSER, AND BEVERLY E. BASTIAN

2009 **Cultural Resources**. In *Final Staff Assessment, Beacon Solar Energy Project, Application for Certification (08-AFC-2), Kern County* (CEC-700-2009-005-FSA, August 2009), edited by Siting, Transmission and Environmental Protection Division, California Energy Commission, pp. 4.3-1–4.3-131. Siting, Transmission and Environmental Protection Division, California Energy Commission, Sacramento. On file with the California Energy Commission, Sacramento.

MCGUIRT, MICHAEL D. AND LESLIE H. HARTZELL

1997 **50-80-10-2139 and 50-80-10-2459**. In *Imu, Adzes, and Upland Agriculture: Inventory Survey Archaeology in North Hālawa Valley, O`ahu*, vols. 2c and 2d, edited by Department of Anthropology, Bishop Museum, pp. 1–17 and 1–5. Department of Anthropology, Bishop Museum, Honolulu. Submitted to State of Hawaii, Department of Transportation, Honolulu. On file with the State Historic Preservation Division, Honolulu.

1998 **Chapter 1: Introduction**. In *Activities and Settlement in an Upper Valley: Data Recovery and Monitoring Archaeology in North Hālawa Valley, O`ahu*, vol. 1, edited by Department of Anthropology, Bishop Museum, pp. 1–14. Department of Anthropology, Bishop Museum, Honolulu. Submitted to State of Hawaii, Department of Transportation, Honolulu. On file with the State Historic Preservation Division, Honolulu.

MCGUIRT, MICHAEL D. AND SHANNON P. MACPHERRON

1998 **50-80-10-2137**. In *Activities and Settlement in an Upper Valley: Data Recovery and Monitoring Archaeology in North Hālawa Valley, O`ahu*, vol. 2b, edited by Department of Anthropology, Bishop Museum, pp. 1–86. Department of Anthropology, Bishop

Museum, Honolulu. Submitted to State of Hawaii, Department of Transportation, Honolulu. On file with the State Historic Preservation Division, Honolulu.

MCGUIRT, MICHAEL AND SARAH C. MURRAY

2008 **Cultural Resources**. In *Preliminary Staff Assessment, Ivanpah Solar Electric Generating System, Application for Certification (07-AFC-5), San Bernardino County* (CEC-700-2008-013-PSA, December 2008), edited by Siting, Transmission and Environmental Protection Division, California Energy Commission, pp. 5.3-1–5.3-73. Siting, Transmission and Environmental Protection Division, California Energy Commission, Sacramento. On file with the California Energy Commission, Sacramento.

MCGUIRT, MICHAEL D. AND DEBORAH I. OLSZEWSKI

1997 **50-80-10-2256**. In *Imu, Adzes, and Upland Agriculture: Inventory Survey Archaeology in North Hālawa Valley, O`ahu*, vol. 2d, edited by Department of Anthropology, Bishop Museum, pp. 1–9. Department of Anthropology, Bishop Museum, Honolulu. Submitted to State of Hawaii, Department of Transportation, Honolulu. On file with the State Historic Preservation Division, Honolulu.

MIKESELL, STEPHEN, MICHAEL MCGUIRT, AND TRISH FERNANDEZ

2007 **Introduction to the White Papers in State Historical Resources Commission Archaeology Committee White Papers**. *SCA Newsletter* 41(1):18–21.

SHARP, JOHN, MICHAEL D. MCGUIRT, JENNIFER DARCANGELO, AND ANDREA GALVIN

2004 ***How to Consult with the California SHPO***. Workshop presented on 18 March 2004 at the 38th Annual Meeting of the Society for California Archaeology, Riverside, California (4 hours).

DECLARATION OF
Geoffrey Lesh

I**, Geoffrey Lesh** declare as follows:

1. I am presently employed by the California Energy Commission in the **Engineering Office** of the Siting, Transmission and Environmental Protection Division as a **Mechanical Engineer.**

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on the **Hazardous Materials Management Section and the Worker Safety and Fire Protection Section** for the **Ivanpah Solar Energy Project** based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

   I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated:_____ Signed:_____

At: Sacramento, California

Geoffrey Lesh, P.E.
Mechanical Engineer

WORK HISTORY

California Energy Commission Mechanical Engineer 2002 - Current
• Review and analyze applicants' plans for safe management of hazardous materials, fire prevention, and worker safety.

Self-Employed Independent Investor 2000 - 2002
• Wrote market analysis computer software.

Read-Rite Corp Wafer Engineering Manager 1994 - 2000
• Designed and developed wafer manufacturing processes for computer data storage systems. Managed team of engineers and technicians responsible for developing wet and dry chemical processes for manufacturing, including process and safety documentation.
• Managed process and equipment selection for manufacturing processes.
• Processes included vacuum processed metals and ceramics, grinding-polishing, plating, etching, encapsulation, process troubleshooting, and SPC reporting.

Dastek Corp (Komag Joint Venture Start-up) Wafer Engineering Manager 1992 - 1994
• Developed wafer processes for new technology recording head for hard disk drives.
• Managed team of engineers and technicians.
• This position included start-up of wafer fab, including line layout, purchase, installation, and startup of new process equipment, etc.

Komag, Inc Alloy Development Manager 1989 - 1992
• Developed new vacuum-deposited recording alloys
• Responsible for planning and carrying-out tests, designing experiments, analyzing results, managing test lab conducting materials characterizations.
• Extensive process modeling and data analysis.

Verbatim Corp (Kodak) Process Development Manager 1983 - 1989
• Mechanical engineering for computer disk manufacturing, including product, process, and equipment including metal-ceramic-plastic processes for optical disk development.
• Production processes included plating, metal evaporation, reactive sputtering, laser-based photolithography, injection molding.
• Steering Committee Member, *Center for Magnetic Recording Research, UC San Diego*
• Steering Committee Member, *Institute for Information Storage Technology, University of Santa Clara*

IBM Corp Mechanical/Process Engineer 1977 - 1983
• Product development for photocopiers and computer tape-storage systems.

EDUCATION

Stanford University, Master of Science Degree	Materials Science and Engineering
UC-Berkeley, Bachelor of Science Degree (Double Major)	Mechanical Engineering, Materials Science and Engineering
University of Santa Clara, Graduate Certificate	Magnetic Recording Engineering
Registered Professional Engineer, California	Mechanical #M32576 Metallurgical #MT1940

PUBLICATIONS

All-Solid Lithium Electrodes with Mixed-Conductor Matrix, J. Electrocchem. Soc. **128**, 725 (1981).

Proc. Symp. on Lithium Batteries, H.V. Venkatasetty, Ed., Electrochem Soc (1981), p. 467.

PATENTS

Method of Preparing Thermo-Magneto-Optic Recording Elements, US Pat# 4,892,634 (assigned to Eastman Kodak Co.)

DECLARATION OF
Rick Tyler

I, **Rick A. Tyler**, declare as follows:

1. I am presently employed by the California Energy Commission in the Siting Office of the Energy Facilities Siting Division as a Senior Mechanical Engineer**.**

2. A copy of my professional qualifications and experience were included in the FSA, and is incorporated by reference herein.

3. I supervised the preparation of Staff Testimony on Hazardous Materials Management, Worker Safety / Fire Protection and Public Health for the Ivanpah Project based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: October 26, 2009 Signed: _____

At: Sacramento, California

RESUME

RICK A. TYLER
Senior Mechanical Engineer
CALIFORNIA ENERGY COMMISSION

EXPERIENCE

Oct. 2001- Oct 2004 (Part Time)

Corporate President, Chairman, and CEO Professional Engineers in California Government (PECG) 2002, **Section Director** 2003-2004, 2008-2009 PECG Board of Directors

As President / CEO of the Professional Engineers in California Government, I served as the Chairman of the Board and Chief Executive Officer of this 13,000 member organization representing engineers employed by the State of California. In this capacity I was 1) the primary interface between the Corporate Board and the consultant organization that conducted most of the day to day business of the organization 2) the Chairman responsible for conducting quarterly board meetings and 3) responsible for ensuring that the member stake holders received good value for their investment. During my tenure on the corporate board we obtained the best contract negotiated in more than 20 years. This was achieved during a period of extreme economic constraints for, our employer, the State of California. I believe that this achievement was the direct result of my focus on the organization's primary mission and my success in keeping the organization on task.

As Section Director I represented the interests of the stakeholders in one of the 17 local sections represented on the PECG Board. This experience gave me a keen understanding of corporate board dynamics and how interactions between individual directors having conflicting priorities affects board function.

My experiences on the PECG Board of Directors provided me with a clear understanding of corporate board structure, function, and leadership as well as extensive knowledge of labor relations functions. It also provided me with a first hand understanding of the need for a clear vision and strong corporate governance which I provided during my tenure.

June 2000- Present (Full Time)

California Energy Commission – **Senior Mechanical Engineer (energy facility permitting)** Systems Assessment and Facilities Siting Division

Responsible for planning, organizing and directing the work of the Facility Safety Unit within the Systems Assessment and Facilities Siting Division's, Engineering Office. This unit evaluates the adequacy of proposed and ongoing safety management practices associated with hazardous material handling, worker safety and fire protection at very large conventional and alternative/renewable energy power facilities certified by the California Energy Commission. Responsible for quality and timeliness of all work conducted by employees and contractors performing work for this unit, including engineering analysis, products such as expert witness testimonies, compliance verifications, and conducting accident evaluations and investigations.

Jan. 1998-
June 2000
(Full Time)

California Energy Commission - **Associate Mechanical Engineer (energy facility siting)** Energy Facility Siting and Environmental Protection Division

Responsible for review of Applications for Certification (applications for permits) for large power plants including the review of handling practices associated with the use of hazardous and acutely hazardous materials, loss prevention, safety management practices, design of engineered equipment and safety systems associated with equipment involving hazardous materials use, evaluation of the potential for impacts associated with accidental releases and preparation and presentation of expert witness testimony and conditions of certification. Review of compliance submittals regarding conditions of certifications for hazardous materials handling, including Risk Management Plans Process Safety Management.

April 1985-
Jan. 1998
(Full Time)

California Energy Commission - **Health and Safety Program Specialist (energy facility siting)** ; Energy Facility Siting and Environmental Protection Division.

Responsible for review of Public Health Risk Assessments, air quality, noise, industrial safety, and hazardous materials handling of Environmental Impact Reports on large power generating and waste to energy facilities, evaluation of health effects data related to toxic substances, development of recommendations regarding safe levels of exposure, effectiveness of measures to control criteria and non-criteria pollutants, emission factors, multimedia exposure models. Preparation of testimony providing Staff's position regarding public health, noise, industrial safety, hazardous materials handling, and air quality issues associated with proposed power plants. Advise Commissioners, Management, other Staff and the public regarding issues related to health risk assessment of hazardous materials handling. Present expert witness testimony at regulatory hearings.

Nov. 1977-
April 1985
(Full Time)

California Air Resources Board – **Mechanical Engineer (regulatory compliance)** last four years at Associate level

Responsible for testing to determine pollution emission levels at major industrial facilities; including planning, supervision of field personnel, report preparation and case development for litigation; evaluate, select and acceptance-test instruments prior to purchase; design of instrumentation systems and oversight of their repair and maintenance; conduct inspections of industrial facilities to determine compliance with applicable pollution control regulations; improved quality assurance measures; selected and programmed a computer system to automate data collection and reduction; developed regulatory procedures and the instrument system necessary to certify and audit independent testing companies; prepared regulatory proposals and other presentations to classes at professional symposia and directly to the Air Resources Board at public hearings. As a representative, of the State I coordinated efforts with federal, local, and industrial representatives.

EDUCATION

B.S., Mechanical Engineering, California State University, Sacramento.

KNOWLEDGE OF

Knowledge of; corporate governance, Roberts Rules of Order, corporate

organization, structure and bylaws, business plan development, management supervision, organizational failure, contract management, process safety management, CEQA, statistics, instrumentation, technical writing, toxicology, risk assessment, loss prevention, environmental chemistry, hazardous materials management, technical management of chemical process safety, noise measurement, regulations and framework of toxic substances control and workplace safety, and presentation expert witness testimony.

PUBLICATIONS, PROFESSIONAL PRESINTATIONS, AND ACCOMPLISHMENTS

Authored staff reports published by the California Air Resource Board and presented papers regarding continuous emission monitoring at symposiums

Authored a paper entitled "A Comprehensive Approach to Health Risk Assessment", presented at the New York Conference on Solid Waste Management and Materials Policy.

Authored a paper entitled "Risk Assessment A Tool For Decision Makers" at the Association of Environmental Professionals AEP Conference on Public Policy and Environmental Challenges.

Conducted a seminar at University of California, Los Angeles for the Doctoral programs in Environmental Science and Public Health on the subject of "Health Risk Assessment".

Authored a paper entitled "Uncertainty Analysis -An Essential Component of Health Risk Assessment and Risk Management" presented at the EPA/ORNL expert workshop on Risk Assessment for Municipal Waste Combustion: Deposition, Uncertainty, and Research Needs.

Presented a talk on off-site consequence analysis for extremely hazardous materials releases. Presented at the workshop for administering agencies conducted by the City of Los Angeles Fire Department.

Evaluated, provided analysis and testimony regarding public health and hazardous materials management issues associated with the permitting of more than 20 major power plants throughout California.

Developed Departmental policy, prepared policy documents, regulations, staff instruction, and other guidance documents and reference materials for use in evaluation of public health and hazardous materials management aspects of proposed power plants.

Project Manager, overseeing contract work totaling more than $500,000.

DECLARATION OF
AMANDA STENNICK

I**, AMANDA STENNICK** declare as follows:

1. I am presently employed by the California Energy Commission in the Environmental Protection Office of the Siting, Transmission, and Environmental Protection Division as a Planner II.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **LAND USE** for the **Ivanpah Solar Generating Projects (ISEGS)**, based on my independent analysis of the Application for Certification, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: September 29, 2009

Signed: _____

At: Sacramento, California

AMANDA STENNICK - ENVIRONMENTAL PLANNER

Education

B.A., Urban and Economic Geography, University of California, Davis, 1986

Ms. Stennick is an environmental planner with more than 22 years experience in land use, socioeconomic, and public policy analysis for power plants and energy infrastructure, and industrial and residential development projects in California. Ms. Stennick has extensive professional planning experience in both the public and private sectors; her expertise includes NEPA and CEQA document preparation, land use analysis and regulatory requirements for Williamson Act cancellations, assessment of land use alternatives, socioeconomic and public policy analysis, and environmental justice analysis. A partial list of projects where she has written assessments or managed the preparation of environmental documents is provided below.

Land Use Assessment for Energy Projects

Ivanpah Solar Project (FSA/EIS)
Blythe Transmission Line (FSA/EIS)
Analysis of service district boundaries (LAFCO/San Diego County) Orange Grove Energy Project
Land use and Williamson Act analysis for Panoche Energy Center, Starwood Power Project, Pastoria Energy Facility, Hydrogen Energy California
Land use and California Coastal Act consistency analysis for Humboldt Bay Repowering
City of Pittsburg Trans Bay Cable Project
LNG facility, Port of Long Beach, CA.

Environmental Justice Analysis

2001, 2003, and 2005 Environmental Performance Report for CEC
San Francisco Energy Cogeneration Project, Morro Bay Power Plant Project, El Segundo Power Redevelopment Project

Infrastructure Projects

Project Manager for EIR/EA for the Mammoth County Water District. Analyzed impacts resulting from lake water transfers and maintenance of in-stream flows in the Mammoth Lakes Basin; prepared land use, socioeconomics, recreation, and public services and utilities sections of EIR/EA.

Project Manager for Effluent Treatment Plant EIR for Simpson Paper Company (Humboldt County). Prepared land use, socioeconomics, recreation, public services and utilities, cumulative impacts sections, and mitigation monitoring.

Project Manager for Folsom/SAFCA Reoperation. Determined parameters of project description with respect to water modeling, project geographic boundaries, and agency jurisdictional boundaries; ensured compliance with federal, state, and local plans and policies.

Project Manager. Yolo County Powerline Ordinance. Developed land use policies and mitigation measures for placement of powerlines and substations in Yolo County.

Project Manager and principal author for Energy Component of the Public Services and Facilities Element of the Sacramento County General Plan.

Redevelopment and Residential Projects

Project Manager: EIR for a Planned Development, General Plan Amendment, and rezone request for a 504-acre Business and Industrial Park expansion for the Port of Sacramento. Prepared work scope and budget for Public Improvements Plan and Specific Plan for an 80-acre Mixed Use/Water Related development, including a Mitigation Monitoring Plan and Statement of Overriding Considerations for the City of West Sacramento. With CDFG, developed regional approach to mitigation for project-impacted endangered species.

Project Manager : EIR for the Wildhorse Residential/Recreational Planned Development, (Davis, CA). Prepared land use, project alternatives, cumulative impacts sections; determined project alternatives based on traffic models and allowable housing densities.

Professional and Continuing Education

California Environmental Quality Act (UC Davis, 1988)
Subdivision Map Act (UC Davis, 1989)
Fiscal Impact Analysis (UC Davis, 1991)
APA Conference (San Francisco, 1994)
Environmental Justice Conference (UC Berkeley, 1994)
California Environmental Quality Act (California Energy Commission, 1998)
Roundtable on Environmental Justice US/Mexico Border 1999
Local Agency Formation Commission - LAFCO (UC Davis, 2000) 2000
Geographic Information System – GIS (UC Davis, 2005)
Mapping Your Community: GIS and Community Analysis (Sacramento, CA, 2006)
Conservation Strategies, Easements, and the Williamson Act (Valley Springs, CA, 2008)
Tribal Energy in California; Law Seminars International (Cabazon, CA, 2009)

DECLARATION OF
Steve Baker

I, Steve Baker, declare as follows:

1. I am presently employed by the California Energy Commission in the Engineering Office of the Siting, Transmission and Environmental Protection Division as a Senior Mechanical Engineer.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on **Noise and Vibration**, and supervised preparation of the staff testimony on **Power Plant Efficiency, Power Plant Reliability**, **Facility Design** and **Geology and Paleontology**, for the Ivanpah Solar Electric Generating System Project based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated:_____ Signed:_____

At: Sacramento, California

STEVE BAKER, P.E.
Senior Mechanical Engineer

Experience Summary

Thirty-five years experience in the electric power generation field, including mechanical design, QA/QC, construction/startup and business development/licensing of nuclear, coal-fired, hydroelectric, geothermal and windpower plants; and engineering and policy analysis of thermal power plant regulatory issues.

Education

- California State University, Long Beach--Master of Business Administration
- California State Polytechnic University, Pomona--Bachelor of Science, Mechanical Engineering
- Registered Professional Engineer (Mechanical), California — No. M27737 expires 6/30/2010

Professional Experience

1990 to Present--Senior Mechanical Engineer, Facilities Siting Division - California Energy Commission

Technical lead person for the analysis of generating capacity, reliability, efficiency, noise, geology, paleontology and the mechanical, civil/structural and geotechnical engineering aspects of power plant siting cases. Key contributor to Commission's investigation into market impediments to the deployment of advanced high-efficiency generating technologies.

1987 to 1990--Generation Systems/Facility Design Unit Supervisor, Siting & Environmental Division - California Energy Commission

Responsible for supervising the analysis of generating capacity, reliability, efficiency, safety, and mechanical, civil/structural, and geotechnical engineering aspects of power plant siting cases.

1981-1986--Operations Manager, Alternate Energy - Santa Fe Pacific Realty Corporation

Participated in and supervised identification, evaluation and feasibility analysis, licensing and permitting of hydroelectric, geothermal, windpower and biomass power projects.

1974-1981--Mechanical Engineer, Quality Engineer - Bechtel Power Corporation and Bechtel National, Inc.

Wrote equipment specifications, drew flow diagrams and P&ID's, performed system design and safety analysis for nuclear power plants and nuclear fuel processing plant. Wrote and implemented QA/QC procedures for nuclear power plant. Participated in construction/startup of large coal-fired power plant.

DECLARATION OF
Alvin J. Greenberg, Ph.D.

I**, Alvin J. Greenberg, Ph.D.** declare as follows:

1. I am presently a consultant to the California Energy Commission, Energy Facilities Siting and Environmental Protection Division.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on the **Public Health** section for the **Ivanpah Solar Electric Generating System** based on my independent analysis of the amendment petition, supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: _____ Signed: _____

At: Sacramento, California

Risk Science Associates

121 Paul Dr., Suite A, San Rafael, Ca. 94903-2047
415-479-7560 fax 415-479-7563
e-mail agreenberg@risksci.com

Name & Title: **Alvin J. Greenberg, Ph.D., FAIC, REA, QEP**
Principal Toxicologist

Dr. Greenberg has had over two decades of complete technical and administrative responsibility as a team leader in the preparation of human and ecological risk assessments, air quality assessments, hazardous materials handling and risk management/prevention, infrastructure vulnerability assessments, occupational safety and health, hazardous waste site characterization, interaction with regulatory agencies in obtaining permits, and conducting lead surveys and studies. He has particular expertise in the assessment of dioxins, lead, diesel exhaust, petroleum hydrocarbons, mercury, the intrusion of subsurface contaminants into indoor air, and the preparation and review of public health/public safety sections of EIRs/EISs. Dr. Greenberg's expertise in risk assessment has led to his appointment as a member of several state and federal advisory committees, including the California EPA Advisory Committee on Stochastic Risk Assessment Methods, the US EPA Workgroup on Cumulative Risk Assessment, the Cal/EPA Peer Review Committee of the Health Risks of Using Ethanol in Reformulated Gasoline, the California Air Resources Board Advisory Committee on Diesel Emissions, the Cal/EPA Department of Toxic Substances Control Program Review Committee, and the DTSC Integrated Site Mitigation Committee. Dr. Greenberg is the former Chair of the Bay Area Air Quality Management District Hearing Board, a former member of the State of California Occupational Health and Safety Standards Board (appointed by the Governor), and former Assistant Deputy Chief for Health, California OSHA. And, since the events of 9/11, Dr. Greenberg has been the lead person for developing vulnerability assessments, power plant security programs, and conducting safety and security audits of power plants for the California Energy Commission and has assisted the CEC in the assessment of safety and security issues for proposed LNG terminals. In addition to providing security expertise to the State of California, Dr. Greenberg was the Team Leader and main consultant to the State of Hawaii on the updating of their Energy Emergency Preparedness Plan.

Years Experience: 26

Education:

B.S. 1969 Chemistry, University of Illinois Urbana

Ph.D. 1976 Pharmaceutical/Medicinal Chemistry, University of California, San Francisco

Postdoctoral Fellowship 1976-1979 Pharmacology/Toxicology, University of California, San Francisco

Postgraduate Training 1980 Inhalation Toxicology, Lovelace Inhalation Toxicology Research Institute, Albuquerque, NM

Professional Registrations:

Board Certified as a Qualified Environmental Professional (QEP)
California Registered Environmental Assessor - I (REA)
Fellow of the American Institute of Chemists (FAIC)

Professional Affiliations:

Society for Risk Analysis
Air and Waste Management Association
American Chemical Society
American Association for the Advancement of Science
National Fire Protection Association

Technical Boards and Committee Memberships - Present:

Squaw Valley Technical Review Committee
(appointed 1986)

Technical Boards and Committee Memberships - Past:

July 1996 – March 2002
Member, Bay Area Air Quality Management District Hearing Board
(Chairman 1999-2002)
September 2000 – February 2001
Member, State Water Resources Control Board Noncompliant Underground Tanks Advisory Group
January 1999 – June 2001
Member, California Air Resources Board Advisory Committee on Diesel Emissions
January 1994 - September 1999
Vice-Chairman, State Water Resources Control Board Bay Protection and Toxic Cleanup Program Advisory Committee
September 1998
Member, US EPA Workgroup on Cumulative Risk Assessment
April 1997 - September 1997
Member, Cal/EPA Private Site Manager Advisory Committee
January 1986 - July 1996
Member, Bay Area Air Quality Management District Advisory Council
(Chairman 1995-96)
January 1988 - June 1995
Member: California Department of Toxic Substance Control Site Mitigation Program Advisory Group
January 1989 - February 1995
Member: Department of Toxics Substances Control Review Committee, Cal-EPA

October 1991 - February 1992
Chair: Pollution Prevention and Waste Management Planning Task Force of the Department of Toxics Substances Control Review Committee, Cal-EPA

September 1990 - February 1991
Member: California Integrated Waste Management Board Sludge Advisory Committee

September 1987 - September 1988
ABAG Advisory Committee on Regional Hazardous Waste Management Plan

March 1987 - September 1987
California Department of Health Services Advisory Committee on County and Regional Hazardous Waste Management Plans

January 1984 - October 1987
Member, San Francisco Hazardous Materials Advisory Committee

March 1984 - March 1987
Member, Lawrence Hall of Science Toxic Substances and Hazardous Materials Education Project Advisory Board

Jan. 1, 1986 - June 1, 1986
Member, Solid Waste Advisory Committee, Governor's Task Force on Hazardous Waste

Jan. 1, 1983 - June 30, 1985
Member, Contra Costa County Hazardous Waste Task Force

Sept. 1, 1982 - Feb. 1, 1983
Member, Scientific Panel to Address Public Health Concerns of Delta Water Supplies, California Department of Water Resources

Present Position

January 1983- present
Owner and principal with Risk Sciences Associates, a Marin County, California, environmental consulting company specializing in multi-media human health and ecological risk assessment, air pathway analyses, hazardous materials management-infrastructure security, environmental site assessments, review and evaluation of EIRs/EISs, preparation of public health and safety sections of EIRs/EISs, and litigation support for toxic substance exposure cases.

Previous Positions

Jan. 2, 1983 - June 12, 1984
Member, State of California Occupational Safety and Health Standards Board (Cal/OSHA), appointed by the Governor

Aug. 1, 1979 - Jan. 2, 1983
Assistant Deputy Chief for Health, California Occupational Safety and Health Administration

Feb. 1, 1979 - Aug. 1, 1979

Administrative Assistant to Chairperson of Finance Committee, Board of Supervisors, San Francisco

Jan. 1, 1976 - Feb. 1, 1979
Research Pharmacologist and Postdoctoral Fellow, Department of Pharmacology and Toxicology, School of Medicine, University of California, San Francisco

Jan. 1, 1975 - Dec. 31, 1975
Acting Assistant Professor, Department of Pharmaceutical Chemistry, University of California, San Francisco

Experience

General

Dr. Greenberg has been a consultant in Hazardous Materials Management and Security, Human and Ecological Risk Assessment, Occupational Health, Toxicology, Hazardous Waste Site Characterization, and Toxic Substances Control Policy for over 26 years. He has broad experience in the identification, evaluation and control of health and environmental hazards due to exposure to toxic substances. His experience includes Community Relations Support and Risk Communication through experience at high-profile sites and presentations at professional society meetings.

He has considerable experience in the review and evaluation of exposure via the air pathway - particularly to emissions from power plants, refineries, and diesel exhaust - and a thorough knowledge of the regulatory requirements through his experience at Cal/OSHA, the BAAQMD Hearing Board, as a consultant to the California Energy Commission, and in preparing such assessments for local government and industry. He has assessed exposures to diesel exhaust during construction and operations of stationary and mobile sources and has testified at evidentiary hearings numerous times on this subject.

He is presently assisting the California Energy Commission in assessing the risks to workers and the public of proposed power plants and LNG terminals in the state. His experience in hazard identification, exposure assessment, risk assessment, occupational safety and health, emergency response, and Critical Infrastructure Protection has made him a valuable part of the CEC team addressing this issue. He has reviewed and commented on the DEIS/DEIR for the proposed SES LNG Port of Long Beach terminal, focusing on security issues for the CEC and on safety matters for the City of Long Beach. He has presented technical information and analysis to the State of California Interagency LNG Working Group on thermal radiation public exposure criteria and safety/security at an east coast urban LNG terminal. (Both presentations are confidential owing to the nature of the material.) He has conducted numerous evaluations of the safety and hazards of natural gas pipelines for the CEC and has presented his findings and recommendations at public meetings and evidentiary hearings.

He served for over five years as the Vice-chair of the California State Water Resources Control Board Advisory Committee convened to address toxic substances in sediments in bays, rivers, and estuaries. He has been a member of the Squaw Valley Technical Review Committee since 1986 establishing chemical application management plans at golf courses to protect surface and

groundwater quality. He has also conducted numerous ecological risk assessments and characterizations, including those for marine and terrestrial habitats.

Dr. Greenberg has extensive experience in data collection and preparation of human and ecological risk assessments on numerous military bases and industrial sites with Cal/EPA DTSC and RWQCB oversight. He has also been retained to provide technical services to the Cal/EPA Department of Toxic Substances Control (preparation of human health risk assessments) and the Office of Environmental Health Hazard Assessment (review and evaluation of air toxics health risk assessments and preparation of profiles describing the acute and chronic toxicity of toxic air contaminants). He has also conducted several surveys of sites containing significant lead contamination from various sources including lead-based paint, evaluated potential occupational exposure to lead dust and fumes in industrial settings, prepared numerous human health risk assessments of lead exposure, and prepared safety and health plans for remedial investigation of lead contaminated soils. Dr. Greenberg is also a recognized expert on the requirements of California's Proposition 65 and has served as an expert on Prop. 65 litigation.

Liquefied Natural Gas (LNG)

Dr. Greenberg assisted the CEC in the preparation of the "background" report on the risks and hazards of siting LNG terminals in California ("LNG in California: History, Risks, and Siting" July 2003) and consulted for the City of Vallejo on a proposed LNG terminal and storage facility at the former Mare Island Naval Shipyard. He has also conducted an evaluation and prepared comments on the risks, hazards, and safety analysis of the DEIS/DEIR for the City of Long Beach on a proposed LNG terminal at the Port of Long Beach (POLB) and conducted an analysis on vulnerability and critical infrastructure security for the CEC on this same proposed LNG terminal. He currently advises the CEC on the POLB LNG proposal on risks, hazards, human thresholds of thermal exposure, vulnerability, security, and represented the CEC at a U.S. Coast Guard briefing on the Waterway Suitability Assessment that included the sharing of SSI (Sensitive Security Information). He has presented technical information and analysis to the State of California LNG Interagency Working Group on thermal radiation public exposure criteria and safety/security at an east coast urban LNG terminal. (Both presentations are confidential owing to the nature of the material.) He has conducted numerous evaluations of the safety and hazards of natural gas pipelines for the CEC and has presented his findings and recommendations at public meetings and evidentiary hearings.

Infrastructure Security

Since 2002, Dr. Greenberg has been trained by and is working with the Israeli company SB Security, LTD, the most experienced and tested security planning and service company in the world. Since the events of 9/11, Dr. Greenberg has been the lead person for developing vulnerability assessments and power plant security programs for the California Energy Commission (CEC). In taking the lead for this state agency, Dr. Greenberg has interfaced with the California Terrorism Information Center (CATIC) and provided analysis, recommendations, and testimony at CEC evidentiary hearings regarding the security of power plants within the state. These analyses include the assessment of Critical Infrastructure Protection, threat assessments, criticality assessments, and the preparation of vulnerability assessments and off-site consequence analyses addressing the use, storage, and transportation of hazardous materials, recommendations for security to reduce the threat from foreign and domestic terrorist activities, perimeter security, site access by personnel and vendors, personnel background checks,

management responsibilities for facility security, and employee training in security methods. Dr. Greenberg is the lead person in developing a model power plant security plan, vulnerability assessment matrix, and a security training manual for the CEC. The model security plan is used by power plants in California as guidance in developing and implementing security measures to reduce the vulnerability of California's energy infrastructure to terrorist attack. He has testified at several evidentiary hearings for the CEC on power plant security issues. He also leads an audit team conducting safety and security audits at power plants throughout California that are under the jurisdiction of the CEC. In addition to providing security expertise to the State of California, in August 2004, a team of experts led by Dr. Greenberg was awarded an 18-month contract by the State of Hawaii to update and improve the state's Energy Emergency Preparedness Plan and make recommendations for increased security of critical energy infrastructure on this isolated group of islands.

Air Pathway Analysis

Dr. Greenberg has prepared numerous Air Pathway Analyses and human health risk assessments, evaluating exposure at numerous locations in California, Hawai'i, Oregon, Minnesota, Michigan, and New York. He is experienced in working with Region IX EPA, the State of California DTSC, and the Hawai'i Department of Health Clean Air Branch in the application of both site-specific and non site-specific health risk assessment criteria.

Examples

Human Health Risk Assessment for the Open Burn/Open Detonation Operation at McCormick Selph, Inc., Hollister, Ca. (June 2003)

Air Quality and Human Health Risk Assessment for the Royal Oaks Industrial Complex, Monrovia, Ca. (January 2003)

Human Health Risk Assessment and Indoor Vapor Intrusion Assessment for the former Pt. St. George Fisheries Site, Santa Rosa, Ca. (October 2002)

Human Health Risk Assessment for the former Sargent Industries Site, Huntington Park, Ca. (July 2001)

Ballard Canyon Air Pathway Analysis and Human Health Risk Assessment, Santa Barbara County, Ca. (September 2000)

Health Risk Assessment Due to Diesel Train Engine Emissions, Oakland, Ca. (June 1999)

The Avila Beach Health Study Phase 1: Reconnaissance Sampling Findings, Conclusions, and Recommendations. (July 1997) Volume 1: Baseline Human Health Risk Assessment. (May 1998)

The Avila Beach Health Study Phase 1, Volume 2: Environmental Monitoring. (May 1998)

Health Risk Assessment and Air Pathway Analysis for the Ballard Canyon Landfill, Santa Barbara County, Ca. (March 1999)

Human Health Risk Assessment, Teledyne Ryan Aeronautical, McCormick Selph Ordnance. Hollister, California. (December 1996)

Initial Phase Human Health Risk Assessment, Teledyne Inc., San Diego, Ca. (October 1996)

Human Health Risk Assessment for Current and Proposed Expanded Class II and Class III Operations at the Altamont Sanitary Landfill, Alameda County, Ca.
(March, 1993)

Focused Ecological Risk Characterization, Hawaiian Electric Company, Keahole Generating Station Expansion, Hawai'i (June 1993)

Human Health Risk Assessment for the Proposed Palima Point Space Launch Complex, prepared for the Hawai'i Office of Space Industry (April 1993)

Ecological Risk Assessment for the Proposed Palima Point Space Launch Complex, prepared for the Hawai'i Office of Space Industry (March 1993)

Human Health Risk Assessment Due to Emissions from a Medical Waste Incinerator, prepared for Kauai Veterans Memorial Hospital, Kauai, Hawai'i (1994)

Cancer Risk Assessment for the H-Power Generating Station, Campbell Industrial Park, Oahu, Hawai'i (1988)

Hazardous Materials Assessments, Waste Management Assessments, Worker Safety and Fire Protection Assessments, and Public Health Impacts Assessments

Dr. Greenberg also has significant experience as a consultant and expert witness for the California Energy Commission providing analysis, recommendations, and testimony in the areas of hazardous materials management, process safety management, waste management, worker safety and fire protection, and public health impacts for proposed power plant/cogeneration facilities. These analyses include the evaluation and/or preparation of the following:

- Off-site consequence analyses of the handling, use, storage, and transportation of hazardous materials,
- Risk Management Plans (required by the Cal-ARP) and Business Plans (required by H&S Code section 25503.5),
- Safety Management Plans (required by 8 CCR section 5189),
- Natural gas pipeline safety,
- Solid and hazardous waste management plans,
- Phase I and II Environmental Site Assessments,
- Construction and Operations Worker Safety and Health Programs,
- Fire Prevention Programs,
- Human health risk assessment from stack emissions and from diesel engines, and
- Mitigation measures to address PM exposure, including diesel particulates

Examples

- San Francisco Energy Reliability Project, San Francisco, Ca. 2004-present. Hazardous materials management, worker safety/fire protection, waste management, public health
- Inland Empire Energy Center, Romoland, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- Malburg Generating Station Project, City of Vernon, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- Blythe II, Blythe, Ca. 2002-3. hazardous materials, worker safety/fire protection,
- Palomar Energy Center, Escondido, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- Cosumnes Power Project, Rancho Seco, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- Tesla Power Project, Tesla, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- San Joaquin Valley Energy Center, San Joaquin, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management
- Morro Bay Power Plant, Morro Bay, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management
- Potrero Power Plant Unit 7, San Francisco, Ca., 2001-2: hazardous materials, worker safety/fire protection
- El Segundo Power Redevelopment Project, El Segundo, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management
- Rio Linda Power Project, Rio Linda, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Pastoria II Energy Facility Expansion, Grapevine, Ca., 2001: hazardous materials, worker safety/fire protection
- East Altamont Energy Center, Byron, Ca., 2001-2: hazardous materials, worker safety/fire protection
- Magnolia Power Project, Burbank, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Russell City Energy Center, Hayward, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management
- Woodbridge Power Plant, Modesto, Ca., 2001: hazardous materials, worker safety/fire protection, waste management
- Colusa Power Plant Project, Colusa County, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Valero Refinery Cogeneration Project, Benicia, Ca., 2001: hazardous materials, worker safety/fire protection
- Ocotillo Energy Project, Palm Springs, Ca., 2001: hazardous materials, worker safety/fire protection
- Gilroy Energy Center Phase II Project, Gilroy, Ca., 2001-2: hazardous materials, worker safety/fire protection
- Los Esteros Critical Energy Facility, San Jose, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Roseville Energy Facility, Roseville, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health

- Spartan Power, San Jose, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Inland Empire Energy Center, Romoland, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- South Star Cogeneration Project, Taft, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Tesla Power Plant, Eastern Alameda County, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Tracy Peaker Project, Tracy, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Henrietta Peaker Project, Kings County, Ca., 2001: hazardous materials, worker safety/fire protection, waste management, public health
- Central Valley Energy Center, San Joaquin, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Cosumnes Power Plant, Rancho Seco, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Los Banos Voltage Support Facility, Western Merced County, Ca., 2001-2: waste management, public health
- Palomar Energy Project, Escondido, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Metcalf Energy Center, San Jose, Ca., 2000-1: hazardous materials
- Blythe Power Plant, Blythe, Ca., 2000-1: hazardous materials
- San Francisco Energy Co. Cogeneration Project, San Francisco, Ca., 1994-5: hazardous materials
- Campbell Soup Cogeneration Project, Sacramento, Ca., 1994: hazardous materials
- Proctor and Gamble Cogeneration Project, Sacramento, Ca., 1993-4: hazardous materials
- San Diego Gas and Electric South Bay Project, Chula Vista, Ca., 1993: hazardous materials
- SEPCO Project, Rio Linda, Ca., 1993: hazardous materials
- Shell Martinez Manufacturing Complex Cogeneration Project, Martinez, Ca., 1993: hazardous materials and review and evaluation of EIR
- SFERP Project, San Francisco, Ca. 2004 – 2006. hazardous materials, worker safety/fire protection, waste management, public health

Occupational Safety and Health/Health and Safety Plans/Indoor Air Quality

Dr. Greenberg has significant experience in occupational safety and health, having directed the development, adoption, and implementation of over 50 different Cal/OSHA regulations, including airborne contaminants (>450 substances), lead, asbestos, confined spaces, and worker-right-to-know (MSDSs). He has conducted numerous occupational health surveys and has extensive experience in the sampling and analysis of indoor air quality at residences, workplaces, and school classrooms. He is currently the team leader conducting safety and security audits at power plants throughout California for the California Energy Commission. Safety issues audited include compliance with regulations addressing several safety matters, including but not limited to, confined spaces, lockout/tagout, hazardous materials, and fire prevention/suppression equipment.

Examples

Review and Evaluation of Public and Worker Safety Issues at the proposed SES LNG Facility, Port of Long Beach. prepared for the City of Long Beach. (November 2005)

Confidential safety and security audit reports for 18 power plants in California. prepared for the California Energy Commission. (January 2005 through March 2006)

Report on the Accidental release and Worker Exposure to Anhydrous Ammonia at the BEP I Power Plant, Blythe, Ca. prepared for the California Energy Commission. (October 2004)

Investigation of a Worker Death in a Confined Space, La Paloma Power plant. prepared for the California Energy Commission. (July 2004)

Preliminary Report on Indoor Air Quality in Elementary School Portable Classrooms, Marin County, Ca. (December 1999)

Health Risk Assessment Due to Diesel Train Engine Emissions, Oakland, Ca. (June 1999)

Air Pathway Analysis for the Ballard Canyon Landfill. Submitted to the County of Santa Barbara, (March 1999)

Review and Evaluation of the Health Risk Assessment for Outdoor and Indoor Exposures at the Former Golden Eagle Refinery Site, Carson, Ca. (May 1998)

The Avila Beach Health Study Phase 1: Reconnaissance Sampling Findings, Conclusions, and Recommendations. (July 1997) Volume 1: Baseline Human Health Risk Assessment. (May 1998)

The Avila Beach Health Study Phase 1, Volume 2: Environmental Monitoring. (May 1998)

Phase 2 Human Health Risk Assessment, Teledyne Inc., San Diego, Ca. (February 1997)

Determination of Occupational Lead Exposure at a Tire Shop in Placerville, Ca. (April 1993)

Development of an Environmental Code of Regulations for Hazardous Waste Treatment Facilities on La Posta Indian Tribal lands, San Diego County, Ca. (August 1992)

Sampling and Analysis Plan, Health and Safety Plan, Site Characterization of Lead Oxide Contaminated Areas, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (September 2, 1988)

Sites with RWQCB and/or DTSC Oversight

Dr. Greenberg has specific experience in assessing human health and ecological risks at contaminated sites at the land/water interface, including petroleum contaminants, metals, mercury, and VOCs at several locations in California including Oxnard, Richmond, Avila Beach, Mare Island Naval Shipyard, San Diego, Hollister, San Francisco, Hayward, Richmond, the Port of San Francisco, and numerous other locations. He has used Cal/EPA methods, US EPA

methods, and ASTM Risk Based Corrective Action (RBCA) and Cal/Tox methodologies. He is extremely knowledgeable about SWRCB and SF Bay RWQCB regulations on underground storage tank sites and with ecological issues presented by contaminated sediments including sediment analysis, toxicity testing, tissue analysis, and sediment quality objectives. Dr. Greenberg served on the State Water Resources Control Board Bay Protection and Toxic Cleanup Program Advisory Committee from 1994 until the end of the program in 1999.

Dr. Greenberg experience on many of these contaminated sites has been as a consultant to local governments, state agencies, and citizen groups. He assisted the City and County of San Francisco in developing local ordinance requiring soil testing (Article 20, Maher ordinance) and hazardous materials use reporting (Article 21, Walker ordinance). He served as the City of San Rafael's consultant to provide independent review and evaluation of the site characterization and remedial action plan prepared for a former coal gasification site. He was a consultant to a citizen group in northern California regarding exposure and risks due to accidental releases from a petroleum refinery and assisted in the assessment of risks due to crude petroleum contamination of a southern California beach. He has prepared a number of risk assessments addressing crude petroleum, diesel and gasoline contamination, including coordinating site investigations, environmental monitoring, and health risk assessment for the County of San Luis Obispo regarding Avila Beach subsurface petroleum contamination. That high-profile project lasted for over one year and Dr. Greenberg managed a team of experts with a budget of $750,000. Another high-profile project included the preparation of an extensive comprehensive human and ecological risk assessment for the Hawaii Office of Space Industry on rocket launch impacts and transportation/storage of rocket fuels at the southern end of the Big Island of Hawaii. Dr. Greenberg's risk assessments were part of the EIS for the project. Dr. Greenberg also worked on another high-profile project conducting Air Pathway Analysis of off-site and on-site impacts from landfill gas constituents, including indoor and outdoor air measurements, air dispersion modeling, flux chamber investigations, and health risk assessment for the County of Santa Barbara. Dr. Greenberg has conducted RI/FS work, prepared health risk assessments, evaluated hazardous waste sites and hazardous materials use at numerous locations in California, Hawaii, Oregon, Minnesota, Michigan, and New York. He has considerable experience in the development of clean-up standards and the development of quantitative risk assessments for site RI/FS work at CERCLA sites, as well as site closures, involving toxic substances and petroleum hydrocarbon wastes. He is experienced in working with both Region IX EPA and the State of California DTSC in negotiating clean-up standards based on the application of both site-specific and non site-specific health and ecological based clean-up criteria. He has significant experience in the development of site chemicals of concern list, quantitative data quality levels, site remedial design, the site closure process, the design and execution of data quality programs and verification of data quality prior to its use in the decision making process on large NPL sites.

Examples

The Avila Beach Health Study Phase 1: Reconnaissance Sampling Findings, Conclusions, and Recommendations. (July 1997) Volume 1: Baseline Human Health Risk Assessment. (May 1998)
The Avila Beach Health Study Phase 1, Volume 2: Environmental Monitoring. (May 1998)

Health Risk Assessment and Air Pathway Analysis for the Ballard Canyon Landfill, Santa Barbara County, Ca. (March 1999)

Screening Human Health Risk Assessment, Calculation of Soil Clean-up Levels, and Aquatic Ecological Screening Evaluation, Galilee Harbor, Sausalito, Ca. (May 1998)

Health Risk Assessment Due to Diesel Train Engine Emissions, Oakland, Ca. (June 1999)

Health Risk Assessment for Residual Mercury at the Deer Creek Facility, 3475 Deer Creek Road, Palo Alto, California. (July 1997)

Phase 2 Human Health Risk Assessment, Teledyne Inc., San Diego, Ca. (February 1997)

Human Health Risk Assessment, Teledyne Ryan Aeronautical, McCormick Selph Ordnance. Hollister, California. (December 1996)

Initial Phase Human Health Risk Assessment, Teledyne Inc., San Diego, Ca. (October 1996)

Human Health Risk Assessment, Ecological Screening Evaluation, and Development of Proposed Remediation Goals for the Flair Custom Cleaners Site, Chico, California (January 1996)

Human Health Risk Assessment for the X-3 Extrudate Project at Criterion Catalyst, Pittsburg, Ca. (November 1994)

Screening Health Risk Assessment and Development of Proposed Soil Remediation Levels at Hercules Plant #3, Culver City, Ca. (July 1993)

Ecological Screening Evaluation for the Altamont Landfill, Alameda County, Ca. (June, 1993)

Focused Ecological Risk Characterization, Hawaiian Electric Company, Keahole Generating Station Expansion, Hawaii (June 1993)

Human Health Risk Assessment for the Proposed Palima Point Space Launch Complex, prepared for the Hawaii Office of Space Industry (April 1993)

Ecological Risk Assessment for the Proposed Palima Point Space Launch Complex, prepared for the Hawaii Office of Space Industry (March 1993)

Human Health Risk Assessment for Current and Proposed Expanded Class II and Class III Operations at the Altamont Sanitary Landfill, Alameda County, Ca.
(March, 1993)

Screening Health Risk Assessment for the Proposed Expansion of the West Marin Sanitary Landfill, Point Reyes Station, Ca.
(March, 1993)

Health Risk Assessment for the Proposed Expansion of the Forward, Inc. Landfill, Stockton, Ca. (September 14, 1992)

Health Risk Assessment for the Rincon Point Park Project, San Francisco, Ca. Prepared for Baseline Environmental Consulting and the San Francisco Redevelopment Agency. (August 10, 1992)

Health Risk Assessment for the South Beach Park Project, San Francisco, Ca. Prepared for Baseline Environmental Consulting and the San Francisco Redevelopment Agency. (August 10, 1992)

Screening Health Risk Assessment and Development of Proposed Soil and Groundwater Remediation Levels, Kaiser Sand and Gravel, Mountain View, Ca. Prepared for Baseline Environmental Consulting (January 30, 1992)

Development of Proposed Soil Remediation Levels for the Marine Corps Air-Ground Combat Center, 29 Palms, California (May 30, 1991)

Preliminary Health Risk Assessment for the City of Pittsburg Redevelopment Agency, Pittsburg, California (May 29, 1991)

Military Bases

Dr. Greenberg has experience in conducting assessments at DOD facilities, including RI/FS work, preparation of health risk assessments, evaluation of hazardous waste sites and hazardous materials use at the following Navy sites in California: San Diego Naval Base; Marine Corps Air-Ground Combat Center, 29 Palms; Mare Island Naval Shipyard, Vallejo; Treasure Island Naval Station, San Francisco, Hunters Point Naval Shipyard, San Francisco, and the Marine Corps Logistics Base, Barstow. He worked with the U.S. Navy and the U.S. EPA in the implementation of Data Quality Objectives (DQO's) at MCLB, Barstow.

Examples

Review and Evaluation of the Remedial Investigation Report and Human Health Risk Assessment for the U. S. Naval Station at Treasure Island, Ca. (June 1999)

Screening Health Risk Assessment for the Proposed San Francisco Police Department's Helicopter Landing Pad at Hunters Point Shipyard, San Francisco, Ca. (September 1997)

Development of Proposed Soil Remediation Levels for the Marine Corps Air-Ground Combat Center, 29 Palms, California (May 30, 1991)

Health Risk Assessment for the Chrome Plating Facility, Mare Island Naval Shipyard, Vallejo, California (October 24, 1988)

Background Levels and Health Risk Assessment of Trace Metals present at the Naval Petroleum Reserve No.1, 27R Waste Disposal Trench Area, Lost Hills, California (August 12, 1988)

RCRA Facility Investigation (RFI) Work Plan of Lead Oxide Contaminated Areas, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (August 14, 1989)

Hazardous Waste and Solid Waste Audit and Management Plan, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (July 3, 1989)

Water Quality Solid Waste Assessment Test (SWAT) Proposal RCRA Landfill, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (October 31, 1988)

Waste Disposal Facilities, Waste Haulers, Waste Recycling Facilities Report, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (September 22, 1988)

Sampling and Analysis Plan, Health and Safety Plan, Site Characterization of Lead Oxide Contaminated Areas, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (September 2, 1988)

Air Quality Solid Waste Assessment Test (SWAT) Proposal, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (August 25, 1988)

Mercury Contamination

Dr. Greenberg has prepared and/or reviewed several human health and ecological risk assessments regarding mercury contamination in soils, sediments, and indoor surfaces. Dr. Greenberg served on the State Water Resources Control Board Bay Protection and Toxic Cleanup Program Advisory Committee from 1994 until the end of the program in 1999.

Examples

Review and evaluation of a human health risk assessment of ingestion of sport fish caught from San Diego Bay and which contain tissue levels of mercury and PCBs (November 2004 – present)

Screening Human Health Risk Assessment, Calculation of Soil Clean-up Levels, and Aquatic Ecological Screening Evaluation, Galilee Harbor, Sausalito, Ca. (May 1998)

Health Risk Assessment for Residual Mercury at the Deer Creek Facility, 3475 Deer Creek Road, Palo Alto, California. (July 1997)

Human Health Risk Assessment Due to Emissions from a Medical Waste Incinerator, prepared for Kauai Veterans Memorial Hospital, Kauai, Hawai'i (1994)

DECLARATION OF
Testimony of Negar Vahidi

I**, Negar Vahidi,** declare as follows:

1. I am presently employed by Aspen Environmental Group, a contractor to the California Energy Commission, Systems Assessment and Facilities Siting Division, as a **Senior Project Manager/Senior Socioeconomics Technical Specialist**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Socioeconomics** for the **Ivanpah Solar Electric Generating Station Project** based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: September 24, 2009 Signed: _____

At: Agoura Hills, California

NEGAR VAHIDI
Senior Associate

ACADEMIC BACKGROUND

Master of Public Administration, University of Southern California, 1993
B.A., Political Science, University of California, Irvine, 1991

Ms. Vahidi is a planner with more than nine years experience in socioeconomic, land use, and public policy analysis for major infrastructure, development, flood control, and institutional projects throughout the State of California. Her expertise lies in demographic data assessment and technical studies, identification and categorization of existing land uses, policy consistency analysis and policy development, evaluation of physical socioeconomic and land use impacts, and development of land use alternatives. A brief list of relevant projects for which she has conducted socioeconomic and land use assessments, or managed the preparation of the environmental document, is provided below:

Land Use Assessment for Industrial Projects:

- Pacific Pipeline EIS/SEIR Project
- Alturas Transmission Line EIR/S Project
- Santa Fe Pacific Pipeline EIR Project
- Six Flags Substation and Power Line Project
- Calnev Substation and Power Line Project
- Yellowstone Pipeline Reroute EIS Project
- CPUC Hydroelectric Plant Divestiture Project - ongoing

Environmental Studies

- MTA Mid-City/Westside Corridor Study
- St. Francis Medical Hospital Focused EIR
- Santa Monica College Parking Structure B EIR
- Berkeley Manor Condominium Technical Reports
- Huntington Beach Waterfront Development Project Section 108 Loan Guarantee Funds EA
- Imperial Beach Shore Protection EIR/EIS
- U.S. Food and Drug Administration Laboratory EIR/EIS
- National Guard Armory Building EA
- EA for Area Lighting, Fencing, and Roadways at the International Border
- Border Patrol Checkpoint Station EA

Specific Plans, Residential and Mixed-Use Development, and Redevelopment Projects

- Wes Thompson Ranch Development Project EIR
- Cabrillo Plaza Specific Plan EIR
- Culver City Redevelopment Plan and Merger EIR
- Dana Point Headlands Specific Plan EIR
- Seaview Court Condominiums IS/MND
- Pico Union Block 6 Residential Development Revised EIR
- Four-Story Hotel IS/MND, City of Santa Monica
- Santa Monica College Parking Structure B Replacement EIR
- Huntington Beach Blocks 104/105 Redevelopment Project EIR
- Berkeley Manor Condominiums EIR
- Santa Monica North Main St. Mixed-Use Development Project EIR

Water and Wastewater Facilities

- San Antonio Dam EIS
- Whitewater/Thousand Palms Flood Control Project
- San Antonio Creek Bridges Project at Vandenberg Air Force Base
- Lower Santa Ana River Operations and Maintenance EA

Resource Management

- Upper Newport Bay Environmental Restoration Project
- Rio Salado Environmental Restoration EIS

Miscellaneous Studies
- Pacific Pipeline Mitigation Monitoring, Compliance and Reporting Program
- Technical Support to NEPA Lawsuit
- Industry-wide Survey for the South Coast Air Quality Management District

Professional Affiliations
- American Planning Association, Los Angeles Chapter Board Member

DECLARATION OF
Testimony of Scott Debauche

I**, Scott Debauche,** declare as follows:

1. I am presently employed by Aspen Environmental Group, a contractor to the California Energy Commission, Systems Assessment and Facilities Siting Division, as a **Socioeconomics Technical Specialist**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Socioeconomics** for the **Ivanpah Solar Electric Generating Station Project** based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: September 24, 2009 Signed: _____

At: Agoura Hills, California



SCOTT DEBAUCHE

Environmental Planner

ACADEMIC BACKGROUND

B.S., Urban & Regional Planning, University of Minnesota, 1994

PROFESSIONAL EXPERIENCE

Mr. Debauche is an environmental planner with 14 years of experience preparing a variety of federal and State of California environmental, planning, and analytical documents for large-scale infrastructure and development projects. Mr. Debauche brings the experience of specializing in the integration and completion of NEPA and CEQA documentation joint documentation. Mr. Debauche specializes in evaluating Transportation/Traffic, Noise, Socioeconomics and Environmental Justice, Air Quality, Alternatives analysis, and public and community involvement programs.

Aspen Environmental Group — 2001 to present

- **TANC Transmission Project (TTP) EIR/EIS, several Northern California Counties.** Mr. Debauche is currently serving as the Technical Specialist in charge of preparation of the EIR/EIS Transportation/Traffic and Socioeconomics CEQA/NEPA analysis. The Transmission Agency of Northern California (TANC) and Western Area Power Administration (Western), an agency of the U.S. Department of Energy (DOE), are the CEQA lead agency and NEPA lead agency, respectively. The TTP generally would consist of new and upgraded 500 kilovolt (kV) and 230 kV transmission lines, substations, and related facilities generally extending from northeastern California near Ravendale in Lassen County to the California Central Valley through Sacramento and Contra Costa Counties and westward into the San Francisco Bay Area.
- **Alta Wind Project EIR, Kern County, CA.** Mr. Debauche is the Technical Specialist for Transportation/Traffic, Noise, and Air Quality for this EIR. The applicant, Alta Windpower Development, LLC, proposes to develop the Alta-Oak Creek Mojave Project (proposed project or project) for the commercial production of up to 800 Megawatts (MW) of electricity from wind turbines. The proposed project would result in construction of up to 350 wind turbine generators, their ancillary facilities and supporting infrastructure located on three distinct land areas comprising a total of approximately 10,750 acres located approximately 3 miles west of State Route (SR) 14 (Antelope Valley Freeway) and 3 miles south of SR-58 in the Willow Springs area of eastern Kern County.
- **Littlerock Reservoir Sediment Removal Project EIS/EIR, Palmdale, CA.** Mr. Debauche is the Technical Specialist for Transportation/Traffic, Noise, and Socioeconomics for this joint EIS/EIR evaluating the impacts of sediment removal alternatives for the Littlerock Reservoir and Dam on USFS Angeles National Forest (NEPA Lead Agency) lands in Los Angeles County. The project involves impacts to the arroyo toad, extensive coordination with USFWS for a Section 7 consultation, incorporation of new Forest Service Plan updates and requirements into the analysis, preparation of the Forest Service required BE/BA, and analysis of compliance with federal conformity requirements. Aspen is currently working on the Administrative Draft EIR/EIS and assisting the PWD with portions of their Proposition 50 grant application to the DWR.

- **Baldwin Hills Oil Field Community Standards District EIR Review and Ordinance Preparation, Culver City, CA.** Mr. Debauche served as the Technical Specialist for the City of Culver City reviewing the Los Angeles County Baldwin Hills Oils Field Community Standards District EIR Noise analysis evaluating the impacts of expanding the existing Baldwin Hills oil field. Once completed, Mr. Debauche then prepared the Noise section of the newly enacted City of Culver City Community Standards District overlay zone restricting noise generation by the Baldwin Hills Oil Field on the residents of Culver City.
- **Long Beach LNG Import Project, Long Beach, CA.** Under contract to the City of Long Beach, Aspen was tasked to review the Draft EIS/EIR for the proposed construction and operation of this onshore Liquified Natural Gas facility to be located at the Port of Long Beach. Mr. Debauche reviewed the document for technical adequacy and assisted the City in preparing written comments for the following sections of the EIS/EIR: Transportation/Traffic and Noise.
- **Sunset Substation and Transmission and Distribution Project CEQA Documentation, Banning, CA.** Mr. Debauche served as the Technical Specialist for Transportation/Traffic, Noise, Socioeconomics, and Alternatives evaluation for this EIR. The City of Banning proposes to construct the Sunset Substation and supporting 33-kilovolt (kV) transmission line that would interconnect with the City's existing distribution system. The purpose of this new substation and transmission is to relieve the existing overloads that are occurring within the City's electric system and to accommodate projected growth in the City.

California Public Utilities Commission (CPUC). Under Aspen's environmental services contract with the CPUC, Mr. Debauche has prepared environmental analysis sections of environmental reports analyzing large-scale infrastructure projects. His project experience with the CPUC includes the following:

- **Tehachapi Renewable Transmission Project (TRTP) EIR/EIS, Kern, Los Angeles, and San Bernardino Counties, CA.** For this EIR/EIS prepared by USFS, Angeles National Forest and CPUC, Mr. Debauche is currently serving as the Technical Specialist for Noise and Alternatives evaluation for SCE's proposal to construct, use, and maintain a series of new and upgraded high-voltage electric transmission lines and substations to deliver electricity generated from new wind energy projects in eastern Kern County. Approximately 46 miles of the project would be located in a 200- to 400-foot right-of-way on National Forest System land (managed by the Angeles National Forest) and approximately three miles would require expanded right-of-way within the Angeles National Forest. The proposed transmission system upgrades of TRTP are separated into eight distinct segments: Segments 4 through 11. Segments 1 (Antelope-Pardee) and Segments 2 and 3 (Antelope Transmission Project) were evaluated in separate CEQA and NEPA documents as described below.
- **Devers–Palo Verde 500 kV Transmission Line Project EIS/EIR, southern California/western Arizona.** For this EIR/EIS prepared by U.S. Bureau of Land Management and CPUC, Mr. Debauche served as the Technical Specialist for Transportation/Traffic, Noise, Socioeconomics, and Alternatives evaluation for SCE's proposed 250-mile transmission line project from the Palo Verde Nuclear power plant in Arizona to the northern Palm Springs area in California. Major issues of concern include EMF and visual impacts on property values, impacts on the area's vast recreational resources and tribal lands, and the development and evaluation of several route alternatives, including the Devers-Valley No. 2 Route Alternative, which eventually was approved by the CPUC.
- **Antelope-Pardee 500 kV Transmission Line Project EIS/EIR, Los Angeles County, CA.** For this EIR/EIS prepared by USFS, Angeles National Forest and CPUC, Mr. Debauche served as the Technical Specialist for Transportation/Traffic, Noise, Socioeconomics, and Alternatives evaluation for SCE's proposed 25-mile transmission line project from the Antelope Substation in the City of Lancaster, through the ANF, and terminating at SCE's Pardee Substation in Santa Clarita. Major issues of concern included impacts to biological, recreational, and cultural resources within Forest lands, EMF and visual impacts on property values, impacts on residences in the urbanized southern regions of the route, and the development and evaluation of several route alternatives.
- **MARS EIR/EIS, Monterey, CA.** Mr. Debauche served as the technical specialist in charge of preparing the Environmental Justice analysis for this EIR/EIS, which would evaluate the effects associated with the

installation and operation of the proposed Monterey Accelerated Research System (MARS) Cabled Observatory Project (Project) proposed by Monterey Bay Aquarium Research Institute (MBARI)[NEPA Lead Agency]. The goal of the Project was to install and operate, in State and Federal waters, an advanced cabled observatory in Monterey Bay that would provide a continuous monitoring presence in the Monterey Bay National Marine Sanctuary (MBNMS) as well as serve as the test bed for a state-of-the-art regional ocean observatory, currently one component of the National Science Foundation (NSF) Ocean Observatories Initiative (OOI). The Project would provide real-time communication and continuous power to suites of scientific instruments enabling monitoring of biologically sensitive benthic sites and allowing scientific experiments to be performed. The environmental justice analysis evaluated the potential for any disproportionate project impacts to both land-based populations and fisheries workers. The CEQA Lead Agency was CSLC.

- **El Casco System Project EIR, Riverside, CA.** Mr. Debauche served as the Technical Specialist for Transportation/Traffic, Noise, Socioeconomics, and Alternatives evaluation for this EIR prepared for the CPUC to evaluate SCE's application for a Permit to Construct (PTC) the El Casco System Project. The Proposed Project would be located in a rapidly growing area of northern Riverside County, which includes the Cities of Beaumont, Banning, and Calimesa. A 115 kV subtransmission line begins at Banning Substation and extends westward toward the proposed El Casco Substation site within the existing Banning to Maraschino 115 kV subtransmission line and Maraschino–El Casco 115 kV subtransmission line ROWs. Major issues of concern include impacts to existing and residential land uses, which have led to the development of a partial underground alternative and a route alternative different than the project route proposed by SCE (the Applicant). The 1,200-page Draft EIR was released for a 45-day public review and comment on December 12, 2007, and evaluates project alternatives at the same level of detail as the Proposed Project analysis.
- **Antelope Transmission Project, Segments 2 & 3 EIR, Los Angeles and Kern Counties, CA.** For this EIR being prepared by the CPUC, Mr. Debauche served as the Technical Specialist for Transportation/Traffic, Noise, Socioeconomics, and Alternatives evaluation. The proposed Project includes both Segment 2 and Segment 3 of the Antelope Transmission Project, and involves construction of new transmission line infrastructure from the Tehachapi Wind Resource Area in southern Kern County, California, to SCE's existing Vincent Substation in Los Angeles County, California. The Tehachapi Wind Resource Area is one of the State's greatest potential sources for the generation of wind energy. A variety of wind energy projects are currently in development for this region. Major issues of concern include EMF and visual impacts on property values, impacts on residences and agricultural resources, and the development and evaluation of several substation and route alternatives.
- **Diablo Canyon Power Plant (DCPP) Steam Generator Replacement Project EIR, San Luis Obispo County, CA.** Mr. Debauche served as the Technical Specialist for Socioeconomics and Alternatives evaluation of this EIR. The EIR addressed impacts associated with the replacement of the eight original steam generators (OSGs) at DCPP Units 1 and 2 due to degradation from stress and corrosion cracking, and other maintenance difficulties. The Proposed Project would be located at the DCPP facility, which occupies 760 acres within PG&E's 12,000-acre owner-controlled land on the California coast in central San Luis Obispo County.
- **SDG&E Miguel Mission Substation Draft EIR.** The major part of the Proposed Project would include the installation of a new, bundled 230 kV circuit between Miguel and Mission Substations, which would be located entirely within SDG&E's existing 35-mile ROW. Mr. Debauche prepared social science analysis for the Initial Study, as well as the Draft EIR Project Description and several key environmental sections.
- **PG&E's Proposed Divestiture of Hydroelectric Assets Project EIR.** Mr. Debauche prepared several key sections of the Draft EIR, including Socioeconomics and Hazardous Materials analysis.
- **Viejo System Project IS/MND, Orange County, CA.** Mr. Debauche served as the Technical Specialist for Transportation/Traffic, Noise, Socioeconomics, and Alternatives evaluation for the project's CEQA documentation, including and Initial Study, prepared on behalf of the CPUC to evaluate Southern California Edison's (SCE) Application for a Permit to Construct the Viejo System Project, which was in SCE's forecasted demand of electricity and goal of providing reliable electric service in southern Orange County. The Viejo System Project would serve Lake Forest, Mission Viejo, and the surrounding areas. Components of the project included, construction of the new 220/66/12 kilovolt (kV) Viejo Substation, installation of a new 66 kV subtransmission line within an existing SCE right-of-way, replacement of 19

double-circuit tubular steel poles with 13 H-frames structures, and minor modification to other transmission lines. Major issues of concern include visual impacts of transmission towers, EMF effects, and project impacts on property values.

- **Looking Glass Networks Fiber Optic Cable Project IS/MND, northern and southern California.** As part of Aspen's ongoing contract with the CPUC for review of Telecommunications projects, this document encompasses and evaluation of project impacts and network upgrades in the San Francisco Bay Area and the Los Angeles Basin Area. Prepared the socioeconomic analysis for this comprehensive CEQA document reviewing the potential impacts of hundreds of miles of newly proposed fiber optic lines throughout northern and southern California, including Los Angeles and Orange Counties.

California Energy Commission (CEC), Technical Assistance in Application for Certification Review. In response to California's power shortage, Aspen is assisting the California Energy Commission in evaluating the environmental and engineering aspects of new power plant applications throughout the State. As part of this effort, Mr. Debauche works as a technical specialist for Transportation/Traffic, Socioeconomics and Environmental Justice, and Alternatives analyses for the following power plant projects:

- **Carlsbad Energy Center Project, Carlsbad, CA.** Technical Specialist for both the Transportation/Traffic and Alternatives Staff Assessment for Carlsbad Energy Center, LLC's Application for Certification (AFC) to build the Carlsbad Energy Center Project (CECP), which will consist of a 558 MW gross combined-cycle generating facility configured using two units with one natural-gas-fired combustion turbine and one steam turbine per or unit. Issues of concern include major incompatibilities with local LORS, and cumulative impacts from widening of I-5.
- **GWF Tracy Combined Cycle Power Plant, San Joaquin County, CA.** Technical Specialist for the Transportation/Traffic Staff Assessment for GWF's proposal to modify the existing TPP, a nominal 169-megawatt (MW) simple-cycle power plant, by converting the facility into a combined-cycle power plant with a nominal 145 MW, net, of additional generating capacity.
- **GWF Henrietta Peaker Project, Kings County, CA.** Technical Specialist for the Transportation/Traffic Staff Assessment for GWF's proposal to modify the existing Henrietta Power Plant. New once-through steam generators (OTSGs) will be installed to allow the plant to be operated in its current simple-cycle configuration with no steam generation but with the selective catalytic reduction (SCR) and oxidation catalyst in operation, or to operate as a combined-cycle power plant generating an additional 25 MW of power with new proposed emission limits.
- **CPV Vaca Station Power Plant, Solano County, CA.** Technical Specialist for the Transportation/Traffic Staff Assessment for CPV Vacaville, LLC (CPVV) filed an Application for Certification (08-AFC-11) seeking authority to construct and operate the CPV Vaca Station (CPVV) project, a natural gas-fired, combined-cycle electrical generating facility rated at a nominal generating capacity of 660 megawatts (MW). The CPVV is proposed for a 24-acre site located at the intersection of Lewis and Fry roads in a rural area within the city limits of Vacaville, Solano County.
- **Kings River Conservation District Community Peaker Power Plant, Fresno County, CA.** Technical Specialist for the Transportation/Traffic Staff Assessment for the Kings Rivers Conservation District, who filed a Small Power Plant Exemption for the King River Conservation District Peaking Power Plant. The proposed 97-megawatt natural gas-fired plant will be located south of the City of Fresno and near the community of Malaga in Fresno County.
- **Lodi Energy Center, Lodi, CA.** Technical Specialist for the Socioeconomics Staff Assessment for a combined-cycle nominal 225-megawatt (MW) power generating facility.
- **Ivanpah Solar Electric Generating System Project, San Bernardino County, CA.** Technical Specialist for the Socioeconomics Staff Assessment/BLM EIS for a 400-megawatt solar thermal electric power generating system. The project's technology would include heliostat mirror fields focusing solar energy on power tower receivers producing steam for running turbine generators. Related facilities would include administrative buildings, transmission lines, a substation, gas lines, water lines, steam lines, and well water pumps. The proposed project would be developed entirely in the Mojave Desert region of San Bernardino County, California.

- **Canyon Power Plant, Anaheim, CA.** Technical Specialist for the Socioeconomics Staff Assessments for a nominal 200 megawatt (MW) simple-cycle plant, using four natural gas-fired combustion turbines and associated infrastructure proposed by Southern California Public Power Authority (SCPPA). This project is a peaking power plant project located within the City of Anaheim, California.
- **Valero Cogeneration Project, Benicia, CA.** Technical Specialist for the Socioeconomics Staff Assessments for a proposed cogeneration facility at the Valero Refinery in Benicia. Issues addressed included impacts on public services and other project-related population impacts such as school impact fees.
- **Rio Linda/Elverta Power Project, Sacramento, CA.** Technical Specialist for the Socioeconomics Staff Assessments for a 560-megawatt natural gas power plant in the northern Sacramento County. Issues of importance included environmental justice and impacts on property values.
- **Magnolia Power Project, Burbank, CA.** Technical Specialist for the Socioeconomics Staff Assessments for this nominal 250-megawatt natural gas combined-cycle fired electrical generating facility to be located at the site of the existing City of Burbank power plant. Environmental justice issues and potential impacts on local economy and employment were evaluated.
- **Avenal Energy Project, Kings County, CA.** Technical Specialist for the Socioeconomics Staff Assessments for a 600-megawatt combined cycle electrical generating facility, and associated linear facilities.
- **Inland Empire Energy Center, Riverside County, CA.** Technical Specialist for the Socioeconomics Staff Assessments for a 670-megawatt natural gas-fired, combined-cycle electric generating facility and associated linear facilities including, a new 18-inch, 4.7-mile pipeline for the disposal of non-reclaimable wastewater, and a new 20-inch natural gas pipeline. The project would be located on approximately 46-acres near Romoland, within Riverside County.
- **Coastal Plant Study.** Technical Specialist for the Socioeconomics Staff Assessments for a possible modernization, re-tooling, or expansion of California's 25 coastal power plants including the Encina Power Plant and the San Onofre Nuclear Power Plant.

Los Angeles Department of Water and Power (LADWP). Responsible for conducting the analyses of the technical and social science issue areas for a variety of EISs and EAs as part of two environmental services contracts. Delivery orders have included:

- **River Supply Conduit (RSC) Upper Reach Project EIR, Los Angeles and Burbank, CA.** Mr. Debauche served as the Technical Specialist for Transportation/Traffic, Noise, Socioeconomics, and Alternatives evaluation for the CEQA document for this project. The RSC is a major transmission pipeline in the LADWP water distribution system. The existing RSC pipeline's purpose is to transport large amounts of water from the Los Angeles Reservoir Complex and local ground water wells to reservoirs and distribution facilities located in the central areas within of the City of Los Angeles. The LADWP proposed a new larger RSC pipeline to replace and realign the Upper and Lower Reaches of the existing RSC pipeline, which would involve the construction of approximately 69,600 linear feet (about 13.2 miles) of 42-, 48-, 60-, 66-, 72-, 84-, and 96-inch diameter welded steel underground pipeline.
- **Mulholland Pumping Station and Lower Hollywood Reservoir Outlet Chlorination Station Project IS/MND, Los Angeles, CA.** Under Aspen's on-going environmental services contract with the City of Los Angeles Department of Water and Power (LADWP), Mr. Debauche served as the Technical Specialist for Transportation/Traffic, Noise, Socioeconomics, and Alternatives evaluation for preparation of CEQA documentation for this project. LADWP proposed to replace the existing historic pumping/chlorination station building as well as the existing lavatory and unoccupied Water Quality Laboratory buildings with a new single structure pumping/chlorination station within the LADWP's Hollywood Reservoir Complex located in the Hollywood Hills section of the City Los Angeles. These improvements were required due to the age and deterioration of the facility and the potential risk of seismic damage to existing structures. An Initial Study was prepared in support of a City of Los Angeles General Exemption.
- **Taylor Yard Water Recycling Project (TYWRP) IS/MND, Los Angeles and Glendale, CA.** Mr. Debauche served as the Technical Specialist for Transportation/Traffic, Noise, Socioeconomics, and Alternatives evaluation for preparation of CEQA documentation for this project. LADWP proposed to construct the TYWRP in order to provide recycled water produced by the Los Angeles–Glendale Water Reclamation Plant (LAGWRP) to the Taylor Yard. An important part of the City of Los Angeles' expanding emphasis on water conservation is the concept that water is a resource that can be used more

than once. Because all uses of water do not require the same quality of supply, the City has been developing programs to use recycled water for suitable landscaping and industrial uses. The project is located in the southernmost part of the City of Glendale and northeastern part of the City of Los Angeles. The IS/MND was adopted in the Summer of 2007.

- **DC Electrode Project IS/MND, Los Angeles, CA.** Mr. Debauche served as the Technical Specialist for Transportation/Traffic, Noise, Socioeconomics, and Alternatives evaluation for preparation of CEQA documentation for this project. LADWP proposed to construct a new electrode distribution line from West Los Angeles to the Pacific Ocean stopping point in Malibu, CA up the Pacific Coast Highway.
- **District Cooling Plant Project, Los Angeles IS/MND, CA.** Mr. Debauche served as the Technical Specialist for Transportation/Traffic, Noise, Socioeconomics, and Alternatives evaluation for preparation of CEQA documentation for this project. LADWP proposed to construct a District Cooling Plant and Distribution System (proposed project) in order to provide a centralized system for producing chilled water for use by area users, which are generally large commercial, governmental, industrial and institutional buildings who generate their own chilled water utilizing individual chiller plants for space cooling and air-conditioning.

U.S. Army Corps of Engineers, Los Angeles District. Responsible for conducting the analyses of the social science issue areas for a variety of EISs and EAs as part of two environmental services contracts. Delivery orders have included:

- **Northeast Phoenix Drainage Area Alternatives Analysis Report, Phoenix and Scottsdale, AZ.** Worked with preparation of an alternatives analysis report that evaluated the potential environmental impacts associated with channel and detention basin alternatives to control flooding problems resulting from fast rate of development in the northeast Phoenix area.
- **Murrieta Creek Flood Control and Environmental Restoration Project**. Mr. Debauche served as a technical writer of an Environmental Assessment and Mitigation Monitoring plan for Phase 1 of a flood control and restoration project in Riverside County.

California Department of Water Resources. Responsible for conducting the environmental analyses for CEQA compliance as part of two environmental services contracts. Delivery orders have included:

- **Piru Creek Stabilization and Restoration Project.** The California Department of Water Resources (CDWR) proposes to repair erosion damage at a series of three locations downstream of Pyramid Dam and seismically retrofit the Pyramid Dam access bridge that crosses Piru Creek. Mr Debauche served as technical writer of the Initial Study for this project.

Los Angeles Unified School District (LAUSD), Los Angeles County, CA. Deputy Program manager and Technical writer for several CEQA documents (EIRs and IS/MNDs) being prepared as part of Aspen's ongoing services contract with the LAUSD to help approve school projects that would meet existing overcrowded conditions in the greater Los Angeles area. Projects have included:

- **New School Construction Program EIR.** Serves as a technical writer for social science issues, including socioeconomics, and population and housing for this Program EIR being prepared for the LAUSD. The LAUSD 2020 Program would provide student seats throughout the LAUSD via a combination of the addition of portable classrooms to existing campuses, modernization and reconfiguration of existing campuses, and the construction of new schools. Mr. Debauche prepared the Noise, Socioeconomic, and Alternative Evaluation of this EIR.
- **East Valley Middle School No. 2 EIR.** Served as a key technical writer for this middle school project proposed to be located at the previous Van Nuys Drive-In site. The EIR focused on impacts associated with air quality, hazards and hazardous materials, noise, land use and planning, and traffic and transportation. Major issues of concern included traffic and noise generated by school operation activities. The EIR included LAUSD design standards and measures employed to minimize environmental impacts.
- **Mt. Washington Elementary School Multi-Purpose Room Addition Project IS/MND.** Served as Deputy Program Manager for this project proposed the development of a multi-purpose room facility, including a library, auditorium, and theater, to the existing Mt. Washington Elementary School campus located in Los Angeles. The surrounding residential community had concerns regarding the proposed

project's impacts on aesthetics, traffic, air quality, and noise. Of particular concern, was impacts generated due to the after-hours use of the multi-purpose room facility by civic and community groups.

- **Canoga Park New Elementary School IS/MND.** Served as technical writer for this elementary school project proposed to be developed on a parcel of land owned by the non-profit organization, New Economics For Women (NEW). This "turn-key" project consisted of a Charter Elementary School to be developed by NEW and sold to the LAUSD for operation. It was later decided that NEW would lease the school back and run it as a charter school. Issues of concern included, pedestrian safety, traffic, air quality, noise, and land use.
- **Hughes Magnet Span School IS/MND.** Served as a technical writer for socioeconomics, hydrology, public services and utilities, and recreational impacts for the proposed re-opening of the existing Hughes Middle School as a Magnet Span School serving up to 1,620 District 6th though 12th grade students. The re-opening of the Hughes Middle School would require the relocation of the existing uses of the campus. The existing Enadia Way Elementary School and Platt Ranch Elementary School would be re-opened for the relocation of these uses.
- **Wonderland Elementary School Portable Classroom Additions IS/MND.** Served as the technical writer of an IS/MND for a proposed addition to the Wonderland Avenue Elementary School, located in the City of Los Angeles. Ms. Walker is responsible for overall coordination and scheduling of the project's environmental review, communications with the LAUSD, senior technical review of all documents produced, presentation during the project's public scoping meetings and hearings, and assurance of public noticing. Served as technical writer of the IS/MND.
- **Pio Pico Elementary School Playground Expansion IS/MND**. Completed a Notice of Preparation, Initial Study, and Administrative Draft EIR for the expansion of a playground at the existing Pio Pico School in the LAUSD. The playground was proposed on five residential properties. One of the residences is a potentially significant historical resource because of its association with an African-American woman journalist, Fay M. Jackson. This project was cancelled by the LAUSD after completion of the administrative draft report. Served as technical writer of the IS/MND.
- **Fairfax Senior High School Portable Classroom Addition IS/MND**. Served as technical writer of the IS/MND for the addition of portable classrooms at the school. Major issue areas covered were noise, hydrology, and geotechnical analysis.
- **Polytechnic Senior High School Portable Classroom Addition IS/MND**. Served as technical writer of the IS/MND for the addition of portable classrooms at the school. Major issue areas covered were noise, hydrology, and geotechnical analysis.
- **Washington Senior High School Portable Classroom Addition IS/MND**. Served as technical writer of the IS/MND for the addition of portable classrooms at the school. Major issue areas covered were noise, hydrology, and geotechnical analysis.

EIP Associates 1998 to 2001

MTA Mid Cities/Westside Transit Corridor Study EIS/EIR. Was a key writer of the EIS/EIR for this 3-phase (including prepared the Major Investment Study (MIS), the Environmental Impact Statement (EIS), and an evaluation of the urban design implications of transit interventions on selected routes) study intended to address current and long range traffic congestion in the central and westside areas of the Los Angeles Basin. Three east/west corridors and a range of transit alternatives ranging including Rapid Bus, light rail, and heavy rail are being evaluated. In addition to preparing several issue area chapters of this comprehensive joint EIS/EIR, Mr. Debauche assisted with the Environmental Justice Analysis (per Executive Order 12898), the Section 4(f) Parklands discussion, and the land use and socioeconomics sections of the EIS/EIR.

Wes Thompson Ranch Development Project EIR. Served as project writer for this hillside residential development in the City of Santa Clarita. Issues of concern included seismic and air quality impacts associated with the excavation of 2 million cubic yards of soil, the project's non-compliance with the City's hillside ordinance for innovative design, and traffic generated by project-related population growth in the area. Four different site configuration alternatives were developed as part of the EIR analysis. Other

issues of concern included sensitive biological resources, the potential for hydrological impacts due to disturbance of the hillside, and cultural resources. As the technical writer for socioeconomics, noise, hazardous materials, air quality, and public services, Mr. Debauche conducted analysis and prepared these environmental sections as well as the project description, alternatives screening and development, traffic assistance, and cumulative scenario for:

City of Santa Monica Environmental Assessments. Was key writer of several environmental assessment documents for housing, commercial, institutional, and mixed-use developments in compliance with CEQA. As the technical writer for socioeconomics, noise, hazardous materials, air quality, and public services, Mr. Debauche conducted analysis and prepared these environmental sections as well as the project description, alternatives screening and development, traffic assistance, and cumulative scenario for:

- **Seaview Court Condominiums IS/MND.** This comprehensive Initial Study/Mitigated Negative Declaration included six technical reports including traffic, cultural resources, parking survey, shade and shadow analysis, and a geotechnical assessment to evaluate the level of severity of this development in the waterfront area of Santa Monica. Major issues of concern were; parking and project-generated traffic on adjacent narrow residential streets; visual obstruction and shading impacts of the proposed structure; liquefaction and seismic impacts to adjacent properties as result of the projsect's excavation for a subterranean parking garage; and the potential impacts of the project to impact the integrity of a historic district and the historic Seaview Walkway to the beachfront.
- **Four-Story Hotel IS/MND.** A comprehensive Initial Study/Mitigated Negative Declaration was prepared for this four-story hotel adjacent to St. John's Hospital in Santa Monica. Major issues of concern included project-generated traffic on surrounding multi-family residential uses and emergency access to the hospital.
- **Santa Monica College Parking Structure B Replacement EIR.** This focused EIR addressed issues related to traffic and neighborhood land use impacts associated with the addition of a 3-story parking structure in the center of the SMC campus. Major issues of concern included the potential for project-generated traffic to cause congestion at the school's main entrance on Pico Boulevard, and the potential for overflow traffic to impact the Sunset Community of single-family homes adjacent to the school.
- **North Main St. Mixed-Use Development Project EIR**. This EIR included evaluation of impacts resulting from the development of a mixed-use development in Santa Monica's "Commercial Corridor" on Main Street, with ground-floor residences and boutique commercial uses. Major issues of concern included traffic and parking impacts to Main Street and surrounding residential land uses, shade and shadow impacts, and neighborhood impacts.

Specific Plans and Redevelopment Projects. As the technical writer for socioeconomics, noise, hazardous materials, air quality, and public services, Mr. Debauche conducted analysis and prepared these environmental sections as well as the project description, alternatives screening and development, traffic assistance, and cumulative scenario for:

- **Cabrillo Plaza Specific Plan EIR in Santa Barbara.** This project consisted a mixed-use commercial development on Santa Barbara's waterfront on Cabrillo Boulevard. On-site uses included an aquarium, specialty retail, restaurants, and office space.
- **Culver City Redevelopment Plan and Merger EIR.** This programmatic EIR evaluated the impacts of the City's redevelopment of its redevelopment zones. A major land use survey and calculation of acreage of redevelopment lands was conducted as part of the EIR.
- **Dana Point Headlands Specific Plan EIR.** This EIR evaluated the development of coastal bluff in the City with hotel, single- and multi-family residential, and commercial uses. Major issues of concern included ground disturbance as a result of excavation, impacts to terrestrial and wildlife biology, recreation impacts to beachgoers, and project-generate population inducement.
- **Triangle Gateway Redevelopment Project EIR in Beverly Hills, CA.** This EIR evaluated the development of a supermarket, retail shops, and office space in the triangle gateway portion of

downtown Beverly Hills. Issues of concern evaluated by Mr. Debauche included traffic, land use, and impacts to on-site historic structures.

- **UCLA Campus Housing Expansion.** This EIR evaluated the development and expansion of campus housing within the UCLA campus. Issues of concern evaluated by Mr. Debauche included hazardous materials and population/housing.

CH2M Hill - Minneapolis, MN 1995 to 1998

- **Minneapolis/St. Paul International Airport Expansion EIS:** Mr. Debauche was a key writer of the EIS for this $4 million technical and environmental study, including the preparation of an Environmental Impact Statement (EIS), and an evaluation of the urban design implications of a proposed $800 million expansion of the existing MSP International airport, including transit and terminal modifications and the inclusion of a new perpendicular runaway. The studies included alternatives to the project and the long-term effects on the cities of Minneapolis and St. Paul. In addition to preparing several issue area chapters of this comprehensive EIS, Mr. Debauche assisted with the Environmental Justice Analysis (per Executive Order 12898), the Section 4(f) Parklands discussion, and the socioeconomics sections of the EIS. In addition, Mr. Debauche assisted with preparation of a technical report on airport noise effects on nearby housing and mitigation programs for the impacts of the proposed runway.
- **Minneapolis/St. Paul Wastewater Treatment Facility Expansion EIS:** Was a key writer of the EIS for expansion of the existing wastewater treatment facility serving the twin cities area. The studies included alternatives to the project and the long-term effects on the cities of Minneapolis and St. Paul. Mr. Debauche prepared several issue area chapters of this comprehensive EIS, including the Environmental Justice Analysis (per Executive Order 12898), and the socioeconomics sections of the EIS.

PROFESSIONAL ASSOCIATIONS

- American Planning Association (APA), Chapter Member

DECLARATION OF
Christopher B. Dennis, P.G.

I, **Christopher B. Dennis**, declare as follows:

1. I am presently employed by the California Energy Commission for the in the Environmental Office of the Siting, Transmission and Environmental Protection Division as an Engineering Geologist**.**

2. My professional qualifications and experience are attached hereto and incorporated by reference herein.

3. I helped prepare the Staff Testimony on **Soil and Water Resources** for the Ivanpah Solar Electric Generating System Project based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: September 24, 2009 Signed: _____

At: Sacramento, California

CHRISTOPHER B. DENNIS, P.G., J.D.

EXPERIENCE SUMMARY

Mr. Dennis is a licensed Professional Geologist within the State of California. His professional experience includes over 15 years of innovative technical and management experience in California. He has worked with a wide variety of soil, water, and waste management focused environmental issues and processes – compliance, investigation, remediation, and CEQA. He has worked with siting and compliance of power plants. He has been a portfolio manager for several major oil companies and the East Bay Municipal Utility District's (EBMUD) trench spoils program. He actively managed Unocal CERT, ExxonMobil, and ChevronTexaco pipeline, service station, bulk fueling, and terminal sites. He developed and received California. He is knowledgeable of California regulatory personnel, structure, and laws, and proficient in CEQA analysis and mitigation, risk assessment, site assessment, and remediation, environmental due diligence, and database/GIS development and management.

EDUCATION/REGISTRATION/CERTIFICATIONS

Pepperdine Law School, Certificate in Dispute Resolution, 1997
Whittier College of Law, J.D., 1996
California State University, Fullerton, B.S. Geology, 1989
Licensed Professional Geologist, State of California #7184
OSHA-SARA 40-Hour Hazardous Waste Activity Training 29 CFR 1910.120

PROFESSIONAL HISTORY

2007 to Current California Energy Commission, Engineering Geologist
2004 to 2007 Science Applications International Corporation, Senior Geologist
2004 to 2004 Bay Consulting Services, LLC, Principal
2001 to 2004 Cambria Environmental Technology, Inc., Senior Geologist
2000 to 2001 Alisto Engineering, Inc, Senior Geologist
1998 to 2000 TRC, Inc., Senior Geologist
1993 to 1995 GeoResearch, Inc., Project Manager
1990 to 1993 AeroVironment, Inc., Staff Geologist
1989 to 1990 Applied Geosciences, Inc., Technician

2007 to Current California Energy Commission, Sacramento, CA

Part of the Siting, Transmission, and Environmental Protection Division, focusing on siting and compliance for simple-cycle and combined cycle, solar, and hybrid power plants for the technical areas of water resources, water quality, soil resources, and waste management. Broad knowledge of regional and basin groundwater management issues, CEQA impact analysis and mitigation, effects of overdraft, issues of water quality, water conservation, water transfers, wind and water soil erosion, and large-scale grading and floods management issues. Also participating in the Quarterly Fuels and Energy Reporting (QFER) program and Environmental Policy Report. Overseeing the development of a database for the collection and management of the QFER data.

2004 to 2007 Science Applications International Corporation, Sacramento, CA

Chevron Various Sites, Northern California. Managed several former pipeline right-of-way and pump stations sites within the Central California region. Developed and implemented new

written field quality assurance/quality control procedures for the entire portfolio of sites. Developed and implemented an analytical laboratory evaluation plan. Managed the groundwater monitoring and sampling program for the portfolio. Initiated low-flow sampling and the use of pre-packed filter screens in boreholes to reduce turbidity in groundwater samples and attain low risk-assessment level detection limits. Initiated a crude oil remediation study for the portfolio that is proving to be a pivotal tool for closure of the pipeline sites. Submitted the first soil vapor survey workplan to the RWQCB for the portfolio and was given approval of that workplan without comment. Worked with a GIS team to incorporate all pertinent site data into a web-based GIS and geo-reference the GIS as appropriate. This portfolio required a significant amount of for-end planning and coordination. Developed and managed all sites budgets and billing.

2004 to 2004 Bay Consulting Services, LLC, Rocklin, CA

Chevron Various Sites, Northern California, 2004 to 2005. Completed several closure requests with Tier I/II risk analysis. Started and operated this experimental company for two months.

2001 to 2004 Cambria Environmental Technology, San Ramon and Rocklin, CA

Chevron Various Sites, Northern California. Responsible for a large portfolio (40 - 60+ active sites) of ChevronTexaco service station, bulk fueling, and terminal sites in Northern California, some of which were located in the sensitive Lake Tahoe area. Started Cambria's Rocklin office and grew that office to a staff of over 12 in less than a year through initiative and hard work. Helped develop and received State Underground Storage Tank (UST) Fund pre-approved for ~100 low-risk ChevronTexaco sites as part of a management transfer initiative. Through good regulatory communication, solid analysis, and hard work, closed over 30 sites in two years (half of one portfolio). Site closures were risk-based using both natural attenuation and active remediation approaches. Worked with Caltrans on a freeway (CA I-80) expansion project that required excavation and dewatering beneath a former Chevron site. Through a series of constructive meetings, built into the Caltrans request for bid, specifications for handling petroleum impacted excavated soils and water. The expansion project has proceeded as expected and planned. Liaison for the client and regulators. Developed and managed all sites budgets and billing.

East Bay Municipal Utility District Various Sites, Northern California. Brought to Cambria a three-year, $275K/yr maximum EBMUD contract. The contract focused on pre-trenching activity soil sampling/analysis for potential contaminant identification and on trench spoils sampling/analyses for soil disposal. Developed a small group of professionals to manage this portfolio. As part of this project, managed several EPA SW-846 statistical soil analysis projects at District landfill sites with volumes up to ~180,000 cubic yards of landfilled soil. Created and surveyed statistical grids on the landfills and characterized the soil for removal to Class III or Class II landfills. Conducted site investigations and quarterly groundwater monitoring projects. Liaison for the client and regulators. Developed and managed all sites budgets and billing.

2000 - 2001 Alisto Engineering, Lafayette, CA

Caltrans Various Sites, Northern California. Conducted statistical analyses of the soil from the shoulders of several Caltrans highways in Southern California. Performed the statistical analyses to determine lead hazard levels for use soil management planning in proposed construction corridors. The statistical analyses were performed on sample populations ranging from approximately 80 to 300. Liaison for the client and regulators. Developed and managed all sites budgets and billing.

Industrial Various Sites, Northern California. Conducted site investigations at several industrial sites in Northern California. Developed storm water pollution prevention plans (SWPPPs) for development projects in downtown San Jose and a Caltrans project along CA I-680. Liaison for the client and regulators. Developed and managed all sites budgets and billing.

1998 - 2000 TRC, Concord, CA

ExxonMobil Various Sites, Northern California. Responsible for a mid-size portfolio (15 - 20+ active sites) of ExxonMobil service station and bulk fueling sites in Northern California. Through good regulatory communication, solid analysis, and hard work, closed over 30 sites. Site closures were risk-based using both natural attenuation and active remediation approaches. For one bulk plant on the sensitive Napa River, secured a public recession of a RWQCB cleanup and abatement order and site closure for Mobil after two years of negotiations, technical presentations, and meetings. Conducted high vacuum, dual-phase extraction at several ExxonMobil sites. Liaison for the client and regulators. Developed and managed all sites budgets and billing.

Quick Stop Markets Various Sites, Northern California. Developed and managed a small portfolio of Quick Stop Market sites in Northern California. Saved the client thousands of dollars in lease fees by closing a site through solid regulatory negotiation and communication, and aggressive site assessment and remediation. The site was located a few blocks upgradient from Lake Merritt in Oakland. Conducted high vacuum, dual-phase extraction at several Quick Stop sites. Liaison for the client and regulators. Developed and managed all sites budgets and billing.

Miscellaneous Sites, Northern California. Team member of the Level 3 Communications environmental impact report (EIR) submittals, preparing geologic hazard evaluations. Conducted site investigations at several industrial sites in Northern California. Liaison for the client and regulators. Developed and managed all sites budgets and billing.

1993 - 1995 Project Manager, GeoResearch, Long Beach, CA

Project manager of a portfolio of active Unocal CERT sites. Frequently utilized mobile laboratories to assist in the placement of soil borings, vapor extraction, and groundwater wells. Conducted risk assessments, site assessments, tanks pulls, station demolitions, aquifer and vapor extraction tests, and remediation system designs and installations.

1990 - 1993 Staff Geologist, AeroVironment, Monrovia, CA

Project manager and project geologist for industrial sites and government projects. Team leader for documenting homestead well locations and archaeological and biological concerns at over 400 sites at Edwards AFB using GPS technology. Conducted groundwater sampling according to AFCEE protocols, and soil-vapor and geophysical surveys at Vandenberg AFB. Member of the design team of a mobile soil-vapor laboratory. Lead designer of an insitu soil-vapor sample collection system. Managed two teams for monitoring landfill vapor emissions and subsurface migration at active county operated landfills, and wrote the standard operating procedures, conducted field training, and prepared quarterly AQMD reports.

DECLARATION OF
Paul Marshall

I, Paul Marshall, declare as follows:

1. I am presently an employee of the California Energy Commission for the Siting Office of the Siting, Transmission and Environmental Protection Division as the Senior for the Water and Waste Unit**.**

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Soil and Water Resources** for the Ivanpah Solar Electric Generation System project based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: October 27, 2009 Signed: _____

At: Sacramento, California

Paul D. Marshall

EDUCATION

SAN DIEGO STATE UNIVERSITY, CALIFORNIA
Bachelor of Science Degree in Engineering Geology
Completed post-baccalaureate courses in Engineering Geology

FRESNO STATE UNIVERSITY, CALIFORNIA
Completed post-baccalaureate courses in Civil Engineering

LICENSES

California Registered Geologist, No. 5718
California Certified Engineering Geologist, No. 1817
California Certified Hydrogeologist, No. 468

EMPLOYMENT HISTORY

CALIFORNIA ENERGY COMMISSION
Siting, Transmission, and Environmental Protection Division – Supervisor, Soil, Water Resources, and Waste Management Unit/ January 2008 -Present
Supervise a multidisciplinary team of engineers and geologists responsible for analysis of potential environmental impacts from power plant construction and operation to soil and water resources and from waste management activities. Provide guidance and technical assistance to staff for complex analysis of power plant impacts on water supply, water quality, wastewater disposal, discharges to surface water and groundwater, development and utilization of groundwater, flood impacts and storm water management, and assessment of potential impacts on human health and the environment. Ensures staff work products are consistent with laws, regulations, and policies of the US EPA, US ACOE, SWRCB, RWQCB's, CDFG, DTSC, and other local ordinances. Contract with and direct the work of consultants conducting technical reviews of power plants. Schedule and confer with a multidisciplinary staff of planners, engineers, and scientists to ensure staff analyses are coordinated with other disciplines where there is overlap. Ensure product delivery in a timely manner. Hire and develop staff, complete probationary and performance reports, counsel and mentor staff. Take adverse actions when appropriate.

CALIFORNIA DEPARTMENT OF CONSERVATION
Office of Mine Reclamation – Supervisor, Compliance Unit/October 2006 – January 2008
Supervise a team of engineering geologists responsible for ensuring compliance with mine reclamation plans and specifications. Review and approve staff work conducted to ensure plans and specifications were adequate and enforceable. Direct staff responsible for enforcement actions and preparation of data and reports for presentation to the State Mining and Geology Board. Oversight of staff review of cost estimates for mine reclamation and conduct statewide workshops outlining requirements for mine reclamation cost estimates. Implement Lead Agency review and audit program.

STATE WATER RESOURCES CONTROL BOARD
Division of Financial Assistance – Chief, Project Implementation Unit/January 2001 – September 2006
Supervise a multidisciplinary team responsible for contract and project management associated with Prop 13, Prop 40, Prop 50, Water Bond 1986 and 1996, and the Federal Clean Water Act funding programs. Develop program policies and procedures for implementation and management of grant and loan programs and projects. Direct the work of staff and coordinate with state and federal agencies in the development of technical review criteria for selection of projects recommended for grant award. Direct the work of staff and contractors developing a Project Assessment and Evaluation Program used to evaluate program effectiveness. Provide guidance and technical support to stakeholders for project development. Represent SWRCB at public meetings and conduct training on program procedures. Ensure project integrity and compliance with State and Federal laws.

CALIFORNIA DEPARTMENT OF WATER RESOURCES

Division of Local Assistance - Senior Engineering Geologist/ July 2000 – January 2001

Manage multidisciplinary staff to identify and develop conjunctive water management programs throughout Southern California. Organize, guide, and support local stakeholder groups in development of conjunctive water management plans. Develop partnering opportunities with other local, state, and federal agencies to spread program benefits region-wide and implement CALFED goals and objectives. Write and review contract documents, task orders, grant applications, and provide input on program policy. Solicit and assist agencies with loan and grant applications for various Water Bond 2000 programs.

Division of Safety of Dams - Senior Engineering Geologist/October 1995 – June 2000

Serve as an engineering geology consultant to a staff of 47 design and field engineers performing regulatory oversight of dam construction and operation. Evaluate existing and proposed dam sites for geologic and seismic hazards; review and comment on geotechnical site assessments and construction plans and specifications; act as technical adviser to staff during construction; inspect and document geologic conditions. Communicate findings to staff, consultants, and owners through written reports, briefings, and meetings. Give presentations to DSOD Board of Consultants on development of state-of-the-art procedures. Develop information and monitor changes in the regional geologic environment.

Division of Local Assistance - Associate Engineering Geologist/November 1993 - October 1995

As a member of the Water Quality Assessment Program I independently performed surface and groundwater studies, and environmental site assessments for both DWR and federal and local government agencies. Negotiated contracts, authored task assignments, and oversaw the work of consultants. Authored reports with analysis of data from various types of exploration and sampling programs. Assembled a Department-wide Site Assessment Project Team and assisted in developing DWR policy for site assessments. Trained team members and gave staff presentations outlining program and team goals.

Division of Local Assistance - Associate Engineering Geologist/October 1992 - October 1993

Under the auspices of the Proposition 82 Water Conservation Bond Law of 1988, I directed the Department's technical, environmental, and economic review of ground water recharge and water supply loan applications. Performed independent technical review and certified feasibility and construction loan applications. Provided assistance to public water agencies regarding compliance with environmental and water rights regulations, and institutional and legal requirements for project development. Coordinated Department's technical review and comment on various CEQA documents.

KLEINFELDER, INC.

Project Geologist - 4 years

Worked in regional offices throughout Central and Southern California, Western Arizona and Southern Nevada performing geotechnical investigations and environmental site characterizations. Supervised field exploration activities throughout the Central Valley and Central Coast of California. Directed water resource, groundwater recharge, geotechnical, and environmental site characterization studies. Marketed clients, determined scope of services, and prepared cost proposals. Monitored project schedules and billing. Briefed clients and supervisors on project status. Authored reports providing geotechnical recommendations for various federal, state, municipal, and commercial projects. Inspected remediation and stabilization projects. Other responsibilities included compilation of data using spreadsheets and databases, conducting literature and aerial photograph review, and writing reports.

EARTH SYSTEMS, INC.

Staff Geologist - 3 years

Designed and supervised installation of monitoring well arrays, extraction wells, drains, dewatering, and slope monitoring equipment throughout central and southern California. Directed subsurface exploration using various drilling and geophysical techniques. Conducted liquefaction, fault rupture hazard, and coastal bluff stability studies. Conducted special inspections of excavations, deep foundations, reinforced earth, and concrete. Performed numerical analyses for slope stability, liquefaction, and earthquake ground motion studies. Authored reports containing cross-sections, maps, and graphs presenting various types of water resource and geotechnical data.

DECLARATION OF
JASON RICKS

I, Jason Ricks, declare as follows:

1. I am presently a consultant to the California Energy Commission for the Siting Office of the Energy Facilities Siting Division as a Traffic and Transportation Specialist.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the **Traffic and Transportation** section for the Ivanpah Solar Electric Generating System Project Final Staff Assessment based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 9-29-09

Signed: _____

At: Agoura Hills, California



JASON W. RICKS
Associate Environmental Scientist

ACADEMIC BACKGROUND
M.S. Environmental Public Health, Tulane University, New Orleans, LA, 1998
B.S. Biology, Alma College, Alma, MI, 1994

PROFESSIONAL EXPERIENCE

Mr. Ricks has over 10 years of professional environmental science and health and safety experience. He has spent the past five years working as a Project Manager and analyst for environmental reviews under CEQA and NEPA, working on over 30 infrastructure, public facility, and development projects. Mr. Ricks specializes in NEPA and CEQA project management and documentation with a particular focus in traffic and transportation, environmental contamination, and hydrology analysis

Aspen Environmental Group — 2006 to present

- **Tehachapi Renewable Transmission Project EIR/EIS.** Mr. Ricks is serving as the Issue Area Coordinator for physical science technical sections for a joint EIR/EIS for the California Public Utilities Commission (CPUC) and USDA Forest Service for an extensive series of transmission system upgrades spanning Kern, Los Angeles, and San Bernardino Counties. Mr. Ricks is preparing the traffic and transportation analysis and as well as managing the Physical Sciences team in analyzing potential impacts to air quality; noise; geology, soils, and paleontology; environmental contamination; hydrology; fire prevention and suppression; and traffic and transportation.
- **Antelope Segments 2 and 3, 500-kV Transmission Project.** Mr. Ricks conducted analysis and prepared the Traffic section of the EIR for the CPUC.
- **Antelope-Pardee 500-kV Transmission Project.** Mr. Ricks conducted analysis and prepared the Traffic section of the joint EIR/EIS for the California Public Utilities Commission (CPUC) and USDA Forest Service.
- **California Energy Commission (CEC), Technical Assistance in Application for Certification Review.** Aspen is assisting the CEC in evaluating the environmental and engineering aspects of new power plant applications throughout the State. As part of this effort, Mr. Ricks is serving as a technical specialist for traffic and transportation for several power plant projects:
  - **Carrizo Energy Solar Farm**. Mr. Ricks is preparing the traffic and transportation portion of the Staff Assessment for a new solar thermal power plant in Luis Obispo County.
  - **Chevron Power Plant Replacement Project.** Mr. Ricks conducted analysis and prepared the traffic portion of the Initial Study for the Chevron Power Plant Replacement Project at the existing Chevron Refinery in Richmond, CA.
  - **Chula Vista Energy Upgrade Project**. Mr. Ricks prepared the traffic and transportation portion of the Staff Assessment for upgrading and expanding an existing peaker plant.
  - **Humboldt Bay Repowering Project**. As technical senior, Mr. Ricks managed the analysis of the traffic portion of the Staff Assessment for replacement of a natural gas fired generator at the existing Humboldt Bay Power Plant.

- **Ivanpah Solar Electric Generating System**. Mr. Ricks prepared the traffic and transportation portion of the Staff Assessment for a new solar thermal power plant in west San Bernardino County.

PREVIOUS EXPERIENCE

Los Angeles Unified School District 2004 to 2006

As a CEQA Project Manager for the Los Angeles Unified School District (LAUSD), Mr. Ricks directed and oversaw the work of several teams of CEQA professionals to produce CEQA documentation for more than 12 new elementary and high school construction projects. He was responsible for evaluating proposals, directing and reviewing analysis of all CEQA documents (including review of technical traffic analyses), developing schedules, tracking and reporting project progress, and managing the budget for each project. He also organized and conducted all Scoping and Draft EIR community public meetings for each project.

Meredith and Associates 2002 to 2004

As an assistant Project Manager, Mr. Ricks: performed technical reviews of soil and groundwater investigations to support environmental litigation; developed Health and Safety Policy and Procedures for a local school district; and prepared Phase I environmental assessments.

Tetra Tech Inc. 2001 to 2002

As a Staff Scientist, Mr. Ricks: researched and wrote Phase I and Phase II environmental assessments, soil and ground water monitoring reports, and health and safety plans for environmental remediation projects; collected and analyzed quantitative soil and groundwater data; and coordinated, conducted, and supervised remediation fieldwork activities.

DECLARATION OF
Dr. Obed Odoemelam

I**, Obed Odoemelam** declare as follows:

1. I am presently employed by the California Energy Commission in the Environmental Protection Office of the Energy Facilities Siting Division as a Staff Toxicologist.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Transmission Line Safety and Nuisance** for the Ivanpah Solar Electric Generating System Project based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: _____ Signed: _____

At: Sacramento, California

RESUME

DR. OBED ODOEMELAM

EDUCATION:

1979-1981 University of California, Davis, California. Ph.D., Ecotoxicology

1976-1978 University of Wisconsin, Eau Claire, Wisconsin. M.S., Biology.

1972-1976 University of Wisconsin, Eau Claire, Wisconsin. B.S., Biology

EXPERIENCE:

1989
The Present: California Energy Commission. Staff Toxicologist.

Responsible for the technical oversight of staffs from all Divisions in the Commission as well as outside consultants or University researchers who manage or conduct multi-disciplinary research in support of Commission programs. Research is in the following program areas: Energy conservation-related indoor pollution, power plant-related outdoor pollution, power plant-related waste management, alternative fuels-related health effects, waste water treatment, and the health effects of electromagnetic fields. Serve as scientific adviser to Commissioners and Commission staff on issues related to energy conservation. Serve on statewide advisory panels on issues related to multiple chemical sensitivity, ventilation standards, electromagnetic field regulation, health risk assessment, and outdoor pollution control technology. Testify as an expert witness at Commission hearings and before the California legislature on health issues related to energy development and conservation. Review research proposals and findings for policy implications, interact with federal and state agencies and industry on the establishment of exposure limits for environmental pollutants, and prepare reports for publication.

1985-1989 California Energy Commission.

Responsible for assessing the potential impacts of criteria and noncriteria pollutants and hazardous wastes associated with the construction, operation and decommissioning of specific power plant projects. Testified before the Commission in the power plant certification process, and interacted with federal and state agencies on the establishment of environmental limits for air and water pollutants.

1983-1985 California Department of Food and Agriculture.

Environmental Health Specialist.

Evaluated pesticide registration data regarding the health and environmental effects of agricultural chemicals. Prepared reports for public information in connection with the eradication of specific agricultural pests in California.

DECLARATION OF
William D. Kanemoto

I, William Kanemoto, declare as follows:

1. I am presently under contract with Aspen Environmental Group to provide environmental technical assistance to the California Energy Commission. Under Contract No. 700-05-002, I am serving as a Visual Resource Specialist to provide Peak Workload Support for the Energy Facility Siting Program and for the Energy Planning Program.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the final staff testimony on Visual Resources for the Ivanpah Solar Electric Generating System Project based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions applicable to the vapor plume simulations and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: September 24, 2009 Signed 

At: Oakland, California

William Kanemoto

Visual Resource/Aesthetics Analyst

Academic Background:

M. Landscape Architecture, University of Michigan, Ann Arbor, 1982
B.A. Liberal Arts (Honors), University of California, Santa Cruz, 1973

Professional Experience:

Principal
William Kanemoto & Associates, Oakland, California, 1993 - Present

William Kanemoto is Principal of William Kanemoto & Associates, an environmental consulting practice specializing in visual analysis and computer visualization in the context of environmental review. In this capacity he has served as principal investigator for visual analysis and simulation on a wide range of major infrastructure and development projects, including the High Desert Power Project AFC, Port of Oakland Expansion EIS, Route 4 East/Pittsburg BART EIS, FMC Substation and Transmission Line PEA, and numerous other infrastructure and transportation projects. Mr. Kanemoto received recognition from the California Association of Environmental Professionals for visual analysis, computer simulation, animation, and video production for the Stanford Sand Hill Road Projects EIR, prepared by EIP Associates and judged 'Best State-Wide EIR of 1997'.

Associate Director
Environmental Simulation Laboratory,
Institute of Urban and Regional Development,
Center for Environmental Design Research
University of California, Berkeley, 1994 - 2000

Instructed graduate students in the College of Environmental Design, U.C. Berkeley, served as consultant on various major planning projects in the San Francisco Bay Area, and conducted design collaborations with counterparts at Keio University and ARK CyberUniversity in Tokyo, Japan via the Internet.

Principal Investigator/Project Manager
Dames & Moore, San Francisco/Oakland, California, 1988-1992

Served as principal investigator of numerous visual analyses of major infrastructure projects throughout the U.S., in Europe, and in Asia. Gained extensive familiarity with the application of a wide range of professionally accepted visual assessment techniques in the context of CEQA, NEPA, and related regulatory requirements of the CPUC, CEC, FERC, DOT, U.S. Forest Service, BLM, and other agencies.

Project Manager
LSA Associates, Pt. Richmond, California, 1987-1988

Project manager and planner on environmental impact reports for various residential and commercial development projects in northern California.

Environmental Planner
Holton Associates, Berkeley, California, 1984-1987

Preparation of various resource and regulatory studies including EIRs, FERC Exhibit E, Section 404 alternative analyses, riparian restoration studies, and cumulative impact methodology studies for EPRI and Sierra County, CA.

DECLARATION OF
Ellen Townsend-Hough

I, **Ellen Townsend-Hough** declare as follows:

1. I am presently employed by the California Energy Commission in the Environmental Siting Office of the Siting Transmission& Environmental Protection Division as an Associate Mechanical Engineer.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on Waste Management for the Ivanpah Solar Electric Generating Project based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated:_____ Signed:_____

At: Sacramento, California

Ellen Townsend-Hough

SUMMARY

I am a chemical engineer with 29 years of experience. My strengths are in analyzing and performing complex environmental engineering analyses, in areas such as Waste Management, Hazardous Materials Management, Worker Safety, and Water Resources. I perform inspections work involved in the design and construction of thermal electrical generating power plants. I have a working knowledge of the California Environmental Quality Act. I worked as a policy advisor to a California Energy Commissioner for three years. I am also an US Environmental Protection Agency Environmental Justice trainer.

PROFESSIONAL EXPERIENCE

Technical Analysis and Presentation

- Performs mechanical engineering analysis of designs for complex mechanical engineering analysis of designs for systems such as combustion chambers and steam boilers, turbine generators, heat transfer systems, air quality abatement systems, cooling water tower systems, pumps and control systems
- Provide an engineering analysis examining the likelihood of compliance with the design criteria for power plants and also examine site specific potential significant adverse environmental impacts
- Review and analyze compliance submittals in accordance with the California Environmental Quality Act, the Warren Alquist Act, the Federal Clean Air Act and the California and Federal Occupational Health and Safety Acts to assure compliance of projects
- Provides licensing recommendations and function as an expert witness in regulatory hearings.
- Provide public health impact analysis to assess the potential for impacts associated with project related air toxic/non-criteria pollutant emissions.
- Evaluate the potential of public exposure to pollutant emissions during routine operation and during incidents due to accidents or control equipment failure

Technical Skills

- Establish mitigation that reduces the potential for human exposure to levels which would not result in significant health impact or health risk in any segment of the exposed population.
- Assist with on-site audits and inspection to assure compliance with Commission decisions.
- Review and evaluate the pollution control technology applied to thermal power plants and other industrial energy conversion technologies.
- Work with the following software applications: WORD, Excel, and PowerPoint.

Policy Advisor

- Provided policy, administrative and technical advice to the Commissioner Robert Pernell. My work with the Commissioner focused on the policy and environmental issues related to the Commission's power plant licensing, research and development and export programs.
- Track and provide research on varied California Energy Commission (CEC) programs. Prepare analysis of economic, environmental and public health impacts of programs, proposals and other Commission business items.
- Represent Commissioner's position in policy arenas and power plant siting discussions.

- Write and review comments articulating commission positions before other regulatory bodies including Air Resources Board, California Public Utilities Commission, and the Coastal Commission.

- Wrote speeches for the Commissioner's presentations.

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Writing

- Write letters, memos, negative declarations, environmental impact reports that require technical evaluation of mechanical engineering and environmental aspects of pollution control systems, environmental impacts, public health issues and worker safety.

EMPLOYMENT HISTORY

2002-Present	Associate Mechanical Engineer	California Energy Commission (CEC) Sacramento CA
1999-2002	Advisor to CEC Commissioner	CEC Sacramento CA
1989-1999	Associate Mechanical Engineer	CEC Sacramento CA
1992-1993	Managing Partner	EnvironNet Sacramento CA
1988-1989	Sales Engineering Representative	Honeywell Inc Commerce CA
`1987-1988	Chemical Engineer	Groundwater Technology Torrance CA
1985-1986	Technical Marketing Engineer	Personal Computer Engineers Los Angeles CA
1985-1985	Energy Systems Engineer	Southern California Gas Company Anaheim CA
1980-1985	Design Engineer	Southern California Edison Rosemead CA
1975-1980	Student Chemical Engineer	Gulf Oil Company Pittsburgh PA

EDUCATION

Bachelor of Science, Chemical Engineering
Drexel University, Philadelphia Pennsylvania

Continuing Education

Hazardous Material Management Certificate, University California Davis
Urban Redevelopment and Environmental Law, University of California Berkley
Analytical Skills, California Department of Personnel Administration (DPA) Training Center
Legislative Process/Bill Analysis, DPA Training Center
Federally Certified Environmental Justice Trainer

References furnished upon request.

DECLARATION OF

Patrick A. Pilling, Ph.D., P.E., G.E., D.GE.

I, **Patrick A. Pilling**, declare as follows:

1. I am presently employed as a subcontractor to Aspen Environmental Group, a contractor to the California Energy Commission, Systems Assessment and Facilities Siting Division, as a Geotechnical Engineer.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on **Geology and Paleontology**, for the **Ivanpah Solar Electric Generating System (ISEGS)** project based on my independent analysis of the Application for Certification, supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: September 24, 2009 Signed: _____

At: Reno, Nevada

Patrick A. Pilling, Ph.D., P.E., G.E., D.GE.
President

Education

- B.S. – Civil Engineering –1986 – Santa Clara University
- M.S. – Civil Engineering – 1991 – San Jose State University
- Ph.D. – Civil Engineering – 1997 – University of Nevada, Reno

Registrations

- P.E. – Civil – Nevada, California, Oregon, Arizona, Utah, Idaho
- P.E. – Geotechnical – California, Oregon
- D.GE. – Diplomate, Geotechnical Engineering – Academy of Geo-Professionals

Experience

1997 to Present: Black Eagle Consulting, Inc. Dr. Pilling acted as the Executive Vice President from 1997 until the end of 2007, and assumed the role of President of Black Eagle Consulting, Inc. in January 2008. Dr. Pilling maintains more than 20 years of construction, geotechnical, transportation, and mining engineering experience, and has supervised the engineering and construction of such projects throughout the western United States and South America. Dr. Pilling oversees daily office operations, including personnel and accounting issues, coordinating company marketing efforts, and performing project management, engineering and laboratory analyses, and report preparation on most projects. Over the past 8 years, Dr. Pilling has assisted the California Energy Commission (CEC) in reviewing geology and paleontology portions of Applications for Certification (AFC) for various power plants throughout the State of California. The power plants included:

Valero Cogeneration Project
Colusa Energy Project
Central Valley Energy Center
Blythe Energy Project Phase II
Tesla FPL Project
Eastshore Energy Center
Panoche Energy Center
Niland Gas Turbine Power Plant
Los Esteros Critical Energy Facility
Pico Power Project
Roseville Energy Center
Contra Costa Energy Project
Gilroy II Project
San Francisco Electric Reliability Project
Russell City Energy Center
Starwood Energy Center
Ivanpah Solar Plant
Marsh Landing Generating Station
Willow Pass Generating Station
Tracy Expansion
Lodi Energy Center
San Joaquin Solar 1 & 2
Vacaville CPV
Mariposa Energy Project

1996 to 1997: SEA, Incorporated; Senior Geotechnical Engineer. Dr. Pilling provided project coordination, management, supervision, and development, and performed field exploration, engineering analyses, and report preparation.

1990 to 1996: WESTEC; Project Manager. Mr. Pilling was responsible for general geotechnical analyses on most projects, as well as design, management, and permitting of heap leach and tailings storage facilities projects. His

experience varied from foundation design recommendations for small pump house structures to detailed liquefaction and seepage/slope stability analyses for large earthen embankments.

1986 to 1990: Case Pacific Company; Project Manager. Mr. Pilling provided cost estimating, project management, and contract negotiation on a wide variety of projects.

Affiliations

- American Concrete Institute: Concrete Field Testing Technician Grade I
- National Society of Professional Engineers
- Secretary/Treasurer - National Society of Professional Engineers, Northern Nevada Chapter
- American Society of Civil Engineers
- International Association of Foundation Drilling
- National Council of Examiners for Engineering and Surveying

Publications

Ashour, M., P. A. Pilling, and G. M. Norris, "Documentation of the Strain Wedge Model Program for Analyzing Laterally Loaded Isolated Piles and Pile Groups," Proceedings, 32nd Symposium on Engineering Geology and Geotechnical Engineering, Boise, Idaho, March 1997.

Ashour, M., P. A. Pilling, G. M. Norris, and H. Perez, "Development of a Strain Wedge Model Program for Pile Group Interference and Pile Cap Contribution Effects," Report No. CCEER-96-4, University of Nevada, Reno, 1996.

Ashour, M., Norris, G., and Pilling, P., "Lateral Loading of a Pile in Layered Soil Using the Strain Wedge Model," Journal of Geotechnical and Geoenvironmental Engineering, ASCE, Vol. 124, No. 4, April 1998, pp. 303-315.

Norris, G. M., M. Ashour, P. A. Pilling, and P. Gowda, "The Non-Uniqueness of p-y Curves for Laterally Loaded Pile Analysis," Proceedings, 31st Symposium on Engineering Geology and Geotechnical Engineering, Logan, Utah, March 1995, pp. 40-53.

Pilling, P. A., "The Response of a Group of Flexible Piles and the Associated Pile Cap to Lateral Loading as Characterized by the Strain Wedge Model," Doctoral Dissertation, University of Nevada, Reno, 1997.

Pilling, P.A., Ashour, M., and Norris, G., "Strain Wedge Model Hybrid Analysis of a Laterally Loaded Pile Group," Transportation Research Board Paper No. 01-0174, 2001.

Pilling, P. A. and P. V. Woodward, "Dependent Facility Closure in California," Proceedings, Mine Closure: Creating Productive Public and Private Assets, Sparks, Nevada, March 1995, pp. 315-326.

Pilling, P.A. and Beeston, H. E., "Expansion Testing of Clay Soils in Forensic Investigations," Proceedings, 33rd Symposium on Engineering Geology and Geotechnical Engineering, Reno, Nevada, March 1998, pp. 119-127.

Pilling, P.A., M. Ashour, and G.M. Norris, "Strain Wedge Model Hybrid Analysis of Laterally Loaded Pile Group," Journal of the Transportation Research Board, Transportation Research Record No. 1772, 2001, Paper No. 01-0174, pp. 115-121.

DECLARATION OF
SHAHAB KHOSHMASHRAB

I**, SHAHAB KHOSHMASHRAB**, declare as follows:

1. I am presently employed by the California Energy Commission in the **ENGINEERING OFFICE** of the Facilities Siting Division as a **MECHANICAL ENGINEER**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I participated in the preparation of the staff testimony on **Facility Design** for the **Ivanpah Solar Electric Generating System** based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: _____ Signed: _____

At: Sacramento, California

DECLARATION OF
SHAHAB KHOSHMASHRAB

I**, SHAHAB KHOSHMASHRAB**, declare as follows:

1. I am presently employed by the California Energy Commission in the **ENGINEERING OFFICE** of the Facilities Siting Division as a **MECHANICAL ENGINEER**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I participated in the preparation of the staff testimony on **Power Plant Efficiency** for the **Ivanpah Solar Electric Generating System** based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: _____ Signed: _____

At: Sacramento, California

DECLARATION OF
SHAHAB KHOSHMASHRAB

I**, SHAHAB KHOSHMASHRAB**, declare as follows:

1. I am presently employed by the California Energy Commission in the **ENGINEERING OFFICE** of the Facilities Siting Division as a **MECHANICAL ENGINEER**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I participated in the preparation of the staff testimony on **Power Plant Reliability** for the **Ivanpah Solar Electric Generating System** based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: _____ Signed: _____

At: Sacramento, California

Shahab Khoshmashrab
Mechanical Engineer

Experience Summary

Nine years experience in the Mechanical, Civil, Structural, and Manufacturing Engineering fields involving engineering and manufacturing of various mechanical components and building structures. This experience includes QA/QC, construction/licensing of electric generating power plants, analysis of noise pollution, and engineering and policy analysis of thermal power plant regulatory issues.

Education

- California State University, Sacramento-- Bachelor of Science, Mechanical Engineering
- Registered Professional Engineer (Mechanical), California

Professional Experience

2001-2004--Mechanical Engineer, Systems Assessment and Facilities Siting– California Energy Commission

Performed analysis of generating capacity, reliability, efficiency, noise and vibration, and the mechanical, civil/structural and geotechnical engineering aspects of power plant siting cases.

1998-2001--Structural Engineer – Rankin & Rankin

Engineered concrete foundations, structural steel and sheet metal of various building structures including energy related structures such as fuel islands. Performed energy analysis/calculations of such structures and produced structural engineering detail drawings.

1995-1998--Manufacturing Engineer – Carpenter Advanced Technologies

Managed manufacturing projects of various mechanical components used in high tech medical and engineering equipment. Directed fabrication and inspection of first articles. Wrote and implemented QA/QC procedures and occupational safety procedures. Conducted developmental research of the most advanced manufacturing machines and processes including writing of formal reports. Developed project cost analysis. Developed/improved manufacturing processes.

DECLARATION OF

Sudath Arachchige

I, Sudath Arachchige declare as follows:

I am presently employed by the California Energy Commission in the Engineering Office of the Systems Assessments and Facilities Siting Division as an Associate Electrical Engineer.

A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

I helped prepare the staff testimony on Transmission System Engineering for the Ivanpah Solar Electric Generating project based on my independent analysis and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed therein.

I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Date: October 20, 2009. Signed: Sudath Arachchige

At: Sacramento, California

Sudath Arachchige
1916 Ackleton Way
Roseville CA 95661-USA Phone 916-786-6468

EDUCATION:

Bachelor of Science in Electrical Engineering at California State University Fullerton

ATTAINMENTS:

Member of the Professional Engineers in California Government
Vice President Electrical Engineering Society-California State University Fullerton.

EXPERIENCE:

November-2001 to Present: - Associate Electrical Engineer, System Assessment and Facilities Siting Division, California Energy Commission.

Conduct and perform planning studies and contingency analysis including power flow, short-circuit, stability, and post-transient analysis to maintain reliable operation of the power system. Investigates and analyzes Grid Planning problems and provides appropriate information to Grid Planning Engineers. Develops automated computer programs and other advance analysis methods for comprehensive evaluation of the operational performance of the transmission system.

Understanding of regulatory and reliability guidelines, WECC and NERC planning and operation criteria, CPUC and FERC requirements. Review technical analyses for WECC/ISO/PTO transmission systems and proposed system additions; provide support and analyses associated with Reliability Must-Run (RMR) contracts and the Local Area Reliability Services (LARS) process; review new generation interconnection studies; provide congestion analyses; and provide support for regulatory filings.

June-1998 to November-2001: - Project Electrical Engineer, Design Electrical Engineering Section, Department of Transportation, California.

Electrical Engineering knowledge and skills in the design, construction and maintenance of California state work projects involving all the public work areas; contract administration, construction management, plan checking, field engineering and provide liaison with consultants, developers, and contractors. Plan review in facility constructions, highway lighting, sign lighting, rest area lighting, preparation of project reports, cooperative agreements, review plans for compliance of construction and design guide lines for national electrical code, standards and ordinance. Review process included breaker relay coordination, detail wiring diagrams, layout details, service coordination, load, conductor sizes, derated ampacity, voltage drop calculations, harmonic and flicker determination.

June-1993 to May-1998:- Substation Electrical Engineer, City of Anaheim, California.

Performed protective relay system application, design and setting determination in Transmission & Distribution Substation. Understanding of principles of selective

coordination system protection and controls for Electric Utility Equipment. Understanding of Power theory and Analysis of symmetrical components. Ability to review engineering plans, specifications, estimates and computation for Electrical Utility Projects. Practices of Electrical Engineering design, to include application of Electro-mechanical and solid state relays in Electrical Power Systems. Software skills in RNPDC (Fuse Coordination Program), Capacitor bank allocation program, and Load Flow Program. Design projects using CAD, Excel spread sheets including cost estimates, wiring diagrams, material specifications and field coordination.

Performed underground service design 12kV and 4kV duct banks; pole riser; getaway upgrade; voltage drop calculation, ampacity calculation and wiring diagrams. Design and maintence of substations in City Electrical Utility System. Upgrade Station Light and power transformers; upgrade capacitor banks; replacement of 12kV-4kV power circuits; Breakers at Metal Clad Switchgear. Design one-line diagrams; three line diagrams; grounding circuits; schematics; coordination of relay settings; conduit and material list preparation. Calculation of derated ampacity; inrush current, short circuit current and fault current.

DECLARATION OF
Mark Hesters

I**, Mark Hesters** declare as follows:

1. I am presently employed by the California Energy Commission in the **Strategic Transmission Planning Office** of the Siting, Transmission and Environmental Protection Division as a **Senior Electrical Engineer**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Transmission System Engineering**, for the **Ivanpah Solar Electric Generating System Project** based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated:_____ Signed:_____

At: Sacramento, California

Mark Hesters
Associate Electrical Engineer

Mark Hesters has fourteen years of experience in electric power regulation. He worked in the Engineering Office of the California Energy Commission's Energy Facilities Siting & Environmental Protection Division since 1998 providing analysis of California transmission systems and testimony on transmission systems in several Commission power plant certification processes. Prior to that Mark worked in the CEC's Electricity Analysis Office providing lead analysis on Southern California Edison resource issues and modeling support for all areas of California. He holds a B.S. degree from the University of California at Davis in Environmental Policy Analysis and Planning.

DECLARATION OF
STEVE MUNRO

I, Steve Munro, declare as follows:

1. I am presently employed by the California Energy Resources Conservation and Development Commission in the Siting Office of the Siting, Transmission and Environmental Protection Division as a Compliance Project Manager (Classification: Planner II - Energy Facility Siting).

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the and Compliance Monitoring and Closure Plan section for the Ivanpah Solar Electric Generating System Project based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated:_____ Signed:_____

At: Sacramento, California

WITNESS QUALIFICATIONS
STEVE MUNRO
Compliance Project Manager

EXPERIENCE SUMMARY

In my current position, I work as a project manager in the Compliance Program directing engineers, scientists and technical staff in tasks related to power plant project design, construction, operation, and associated environmental issues. These activities include negotiating agreements between power plant operators, public agencies, and community groups. I also direct staff engineers and scientists in the analysis and resolution of technical issues. Prior to working at the Energy Commission, I worked as a project manager and consultant in several other state agencies.

EXPERIENCE RECORD

July 1991 to present, California Energy Commission

Plan, organize, direct and schedule compliance-related activities of staff.

Plan, organize, direct and schedule the work of staff on petitions to amend the conditions of certification contained in Commission power plant decisions.

Prepare letters, memos and reports concerning amendments, and compliance issues and administration.

Organize and conduct workshops and meetings among the staff and between the staff, project licensees, other governmental agencies and members of the public to resolve and discuss issues, procedures, complaints and petitions for amendment involving compliance-related matters.

Assist technical staff in the drafting of compliance conditions to ensure that they are clearly written, effective, and verifiable.

Identify strategic, technical, and policy issues associated with amendments and compliance projects and make policy recommendations.

Arrange, organize, and conduct meetings, audits and on-site inspections to assure continued compliance with Commission requirements.

EDUCATION

B.A. – Degree in Economics, University of the Pacific.
Post-graduate courses in land use and project management at UC Davis.

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT
COMMISSION OF THE STATE OF CALIFORNIA
1516 NINTH STREET, SACRAMENTO, CA 95814
1-800-822-6228 – WWW.ENERGY.CA.GOV

APPLICATION FOR CERTIFICATION
FOR THE *IVANPAH SOLAR ELECTRIC GENERATING SYSTEM*

DOCKET NO. 07-AFC-5
PROOF OF SERVICE
(Revised 7/20/09)

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DECLARATION OF SERVICE

I, Maria Santourdian, declare that on November 4, 2009 , I served the Notice of Availability electronically and will file copies of the attached Ivanpah Solar Electric Generating System (07-AFC-5) Completion of FSA/DEIS dated October 2009. The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at:
[www.energy.ca.gov/sitingcases/ivanpah].

The documents have been sent to both the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit, in the following manner:

(*Check all that Apply*)

FOR SERVICE TO ALL OTHER PARTIES:

__X__ sent electronically to all email addresses on the Proof of Service list the Notice of Availability,

AND

FOR FILING WITH THE ENERGY COMMISSION:

__X__ ;posted to the Commission Website

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 07-AFC-5
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512
docket@energy.state.ca.us

I declare under penalty of perjury that the foregoing is true and correct.

Original Signature in Dockets
Maria Santourdjian