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Abengoa Solar Inc.
Mojave Solar Project
09-AFC-5

Applicant's Opening Testimony

Submitted to the
California Energy Commission

Submitted by

Abengoa Solar Inc.

June 1, 2010

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1.0 PROJECT DESCRIPTION AND FACILITY DESIGN

1.1 Introduction

A. Name: Frederick Redell, PE

B. Qualifications: Mr. Redell's qualifications are as noted in his resume contained in Appendix A.

C. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

- Application for Certification,(Volumes 1, 2, 3 – Appendices J, K, L, M, N, O [Exhibit 1]
- Application for Certification, Volume 4, Data Adequacy Supplement [Exhibit 2]
- Power Purchase Agreement [Exhibit 44]
- Applicant's Written Response to Data Request Set 1A, Responses 20, 22, 34 – 37, 61, 62, 65, 67, 68, 70, 77, 81, 82 [Exhibit 3]
- Applicant's Written Response to Data Request Set 1B (nos. 1-86), Responses 54 – 61 [Exhibit 4]
- Applicant's Supplemental Written Response to Data Request Set 1A (nos. 1-93), Responses 78, 79, and 80 [Exhibit 5]
- Applicant's Supplemental Written Response to Data Request Set 1A (1-93) for Air Quality and Public Health, Responses 5, 30, 36, 83 [Exhibit 11]
- Applicant's Replacement Written Response to Visual Resources Data Request Set 1B, Item 74 and Information Requested by Tom Packard [Exhibit 10]
- Applicant's Letter regarding Transmission Interconnection dated February 5, 2010 [Exhibit 45]
- Interconnection Optional Study by CAISO dated January 14, 2010 [Exhibit 18]
- Applicant's Second Supplemental Written Response to Data Request Set 1A (1-93) for Air Quality and Public Health, [Contribution to] Responses 10, 12, 14, 15, 30, and 83 [Exhibit 13]
- Applicant's Revised Second Supplemental Written Response to Data Request Set 1A (1-93) for Air Quality and Public Health [Exhibit 19]
- Applicant's Response to CURE Data Request Set #1[Exhibit 23]
- Applicant's Comments on Staff Assessment [Exhibit 26]
- One-Line Diagram of Interconnection to Lockhart Substation [Exhibit 33]

To the best of my knowledge, all of the facts contained in this Section of the Applicant's testimony (including all referenced documents) are true and correct. To the extent this testimony contains opinions, such opinions are my own based upon my professional judgment. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

1.2 Summary of Testimony

A. Project Overview

Mojave Solar LLC (herein "MSLLC" or "Applicant"), is proposing to construct, own and operate the Mojave Solar Project (herein "MSP" or "Project"). MSLLC is a Delaware limited liability company. Abengoa Solar Inc. (ASI), a Delaware corporation, specializes in solar technologies and is the sole member of MSLLC. The Project is a solar electric generating facility proposed on approximately 1,765 acres in unincorporated San Bernardino County, California approximately nine miles northwest of Hinkley, CA. The site is largely fallow agricultural land specifically sited and configured to minimize environmental impacts. This land was originally sited as Solar Electric Generating Stations (SEGS) XI and XII and is located next to the existing SEGS VIII and IX facilities.

The Project will implement well-established parabolic trough technology to solar heat a heat transfer fluid (HTF). This hot HTF will generate steam in solar steam generators (SSGs), which will expand through a steam turbine generator (STG) to produce electrical power.

The Project will have a combined nominal electrical output of 250 megawatts (MW) net from twin, independently-operable solar fields, each feeding a 125-MW net power island. The plant sites, identified as Alpha (the northwest portion of the Project area) and Beta (the southeast portion of the Project area), will be 884 acres and 800 acres respectively and joined at the transmission line interconnection substation. An additional 81 acres shared between the plant sites will be utilized for receiving and discharging offsite drainage improvements. Start of commercial operation is planned for 2013, subject to timing of regulatory approvals and Applicant achievement of Project equipment procurement and construction milestones.

The sun will provide 100 percent (%) of the power supplied to the Project through solar-thermal collectors; no supplementary fossil-based energy source (e.g., natural gas) is proposed for electrical power production. However, each power island will have a natural-gas-fired auxiliary boiler to provide equipment freeze protection and HTF freeze protection. The auxiliary boiler will supply steam to HTF heat exchangers as needed during offline hours to keep the HTF in a liquid state when ambient temperatures fall below its freezing point of 54 degrees Fahrenheit (□F). Each power island will also have a diesel engine-driven firewater pump for fire protection and a diesel engine-driven backup generator for power plant essentials.

The Project is proposing interconnection to connect to the Kramer-Cool Water 230-kV transmission line which is owned by Southern California Edison (SCE), and located adjacent to the southern border of the Project. The Interconnection System Impact Study (ISIS) has been completed in coordination with the California Independent System Operator (CAISO) and is located in Appendix N. The Interconnection Facilities Study (IFS) has also been completed detailing options for the on-the-ground system-wide improvements necessary to interconnect the project. As a separate process, SCE will lead the permitting effort for the transmission improvements beyond the Project-specific interconnection to the statewide system. All Project-related transmission facilities are within the Project.

The Project proposes to use wet cooling towers for power plant cooling and owns adjudicated groundwater rights for this purpose. This onsite groundwater is brackish. The Mojave Water Agency (MWA) administers the adjudication and manages water rights for all users through the Watermaster. Water for cooling tower makeup, process water makeup, and other industrial uses such as Solar Collector Array (SCA) washing will be supplied from onsite groundwater wells drawing from these water rights and will also be used to supply potable water for employee use (e.g., drinking, showers, sinks, and toilets). A packaged water treatment system will be used to treat the water to meet potable standards since the source is brackish. No offsite backup cooling water supply is planned; the use of multiple onsite water supply wells, redundancy in the well equipment, and reserve water storage will provide an inherent backup in the event of outages affecting one of the onsite supply wells. The aquifer has been characterized as prolific and studies indicated that the health of the basin will not degrade during the life of the Project. The Soil and Water Resources Section of the Applicant's testimony describes these studies.

A sanitary septic system and onsite leach field will be used to dispose of sanitary wastewater on each power island. Project cooling water blowdown will be piped to lined, onsite evaporation ponds for each plant area. The ponds will be sized to retain all solids generated during the life of the plant. However, if required for maintenance, dewatered residues from the ponds could be sent to an appropriate offsite landfill as non-hazardous waste.

Natural gas for the Project's ancillary purposes, such as the auxiliary boilers, space heating, and the like will be supplied by a Southwest Gas Corporation (SGC) owned pipeline that runs to the Project boundary near the Alpha power island. No offsite pipeline facilities are proposed as a part of this Project. SGC was contacted and studied the demand requested and indicates that sufficient capacity exists to supply the Project. Confirmation from SGC is included in Appendix O of the AFC.

B. Project Objectives

The Project is expected to supply renewable energy to the California energy market. The objectives of the Project are as follows:

- To help achieve the State of California renewable energy objectives and to support the state's electric utility requirements with the long term production of renewable electric energy,
- To safely and economically construct, operate and maintain an efficient, reliable, and environmentally-sound power generating facility,
- To develop a Project using up-to-date and improved versions of an already-proven renewable energy technology, minimizing technical risk and improving the financial viability of the Project,
- To maximize the renewable energy from a site with an excellent solar resource, appropriate slope and grading, availability of water rights and availability of transportation and other infrastructure in order to minimize the cost of renewable energy for consumers,
- To reduce or eliminate potentially significant adverse environmental impacts by locating away from sensitive noise and visual receptors and sensitive species,
- To electrically interconnect to suitable electrical transmission while minimizing environmental impacts associated with interconnection and minimizing cost, and
- To develop a site with close proximity to natural gas infrastructure in order to minimize environmental impacts and cost.

C. Facilities

Chapter 2.0 of the AFC (Project Description) accurately describes the proposed facility design and Appendix J of the AFC details the Engineering Design Criteria. All plant facilities will be designed, constructed, and operated in accordance with applicable laws, ordinances, regulations and standards (LORS).

As described previously, the Project consists of two plant areas, the Alpha and the Beta plants, each with their own parabolic trough solar fields and 125 MW (net) power generation capabilities. Project facilities include

- Two separate power island areas, one each for the Alpha and Beta Plant areas,
- Construction laydown and solar collector assembly building locations,
- Solar collector fields
- Two-5-acre evaporation ponds for each Plant area,
- Bioremediation/landfarm unit for each Plant area,
- Onsite transmission and interconnection facilities with interconnection location adjacent to Beta area,
- Onsite gas pipeline facilities with connection point to existing pipeline adjacent to site,
- Drainage improvements to convey offsite storm water around the Project,

- Groundwater well locations near each power island, used for water supply, and
- Access Roads.

Each power island is largely identical. Major components of each Alpha and Beta power island include:

- Solar steam generators (SSG) and associated heat exchangers,
- One steam turbine-generator (STG) and condenser,
- Electrical switchyard with step-up transformer and auxiliary transformer,
- One wet cooling tower,
- One natural-gas-fired auxiliary boiler (to provide steam for freeze-protection),
- Steam-fed HTF freeze protection heat exchangers,
- HTF expansion vessels and HTF expansion/storage tanks,
- Firewater pump and pump house with associated diesel fuel tank,
- One raw water storage tank,
- One combined service water and firewater storage tank,
- Various water treatment storage tanks,
- Demineralized water storage tank, and
- Ancillary equipment.

D. Process Description and Technology

The proposed collector fields are made up of two large fields of single-axis-tracking parabolic trough solar collectors: the Alpha solar field and the Beta solar field. These collectors are modular in nature and comprise many parallel rows of solar collectors, aligned on a north-south axis. Each solar collector has a linear, parabolic-shaped reflector that focuses the sun's radiation on a specially designed linear receiver known as an HCE, located at the focus of the parabola.

The collectors track the sun from east to west during the diurnal cycle to ensure that the maximum amount of the sun's radiation is continuously focused on the HCE. The Heat Transfer Fluid (HTF) is heated to approximately 740 □F as it circulates through the HCEs and returns to a series of heat exchangers where the fluid is used to generate steam in the SSG system at the power island, providing steam to the Plant's STG.

Each solar field encompasses approximately 710 acres of the plant sites and utilizes solar trough technology similar to the nine existing SEGS units but with design improvements to enhance performance.

The HTF is expected to be Therminol™ VP-1, Dowtherm A, or equivalent. These synthetic oils are special high-temperature oils with an excellent operating history and are

widely used in solar thermal and other high-temperature heat transfer applications. However, freeze protection is required because the HTF can freeze at 54°F.

To accommodate the volumetric change that occurs when heating the HTF to the operating temperature, expansion vessels and tanks are required. Nitrogen will be used to provide a blanket on the headspace of the expansion vessels and tanks. The nitrogen blanket prevents oxidation and contamination of the HTF by reducing its exposure to atmospheric air. In the expansion vessels, the nitrogen also assists with meeting the net positive suction head requirements for the HTF pumps. HTF expansion tanks are at a lower pressure and temperature than expansion vessels to minimize HTF loss if venting is required during daily cyclical operations. It is anticipated that there will be eight expansion vessels and two expansion tanks on each power island.

Solar Steam Generators (SSGs) are designed differently than conventional gas-fired boilers in that they are "fired" with hot HTF instead of hot combustion gases. The design uses natural circulation steam drums with shell-and-tube evaporators. The SSG system includes heat exchangers for preheating the condensate, for steam production, for superheating the steam, and for reheating steam.

For each power island, steam from the SSGs is sent to the Steam Turbine-Generator (STG). The steam expands through the STG turbine blades to drive the steam turbine, which in turn drives the generator. The Project's STGs are expected to be two-casing, reheat type with multiple feedwater heater extraction points and axial low-pressure exhaust.

The Project's STGs will tie into a 230-kV onsite switchyard for each power island. Each 230-kV onsite switchyard will be a 230-kV single-breaker design. Each onsite switchyard connects to the interconnection substation on the Project site.

Power for each Plant's auxiliaries will be supplied at 13.8 kV from one non-redundant three-winding auxiliary power transformers (APT). Each APT is connected to the 15kV medium voltage switchgear via a 15 kV/1600 A non-segregated bus duct.

In the event of power loss by the APT, an emergency diesel engine-driven generator will supply power to the 15-kV switchgear for proper shutdown of the plant, under a load-shedding scheme.

Each proposed Plant is equipped with a (direct current) DC power supply system consisting of a bank of 125-VDC batteries, a 125-VDC battery charger, metering, ground detectors, and distribution panels. The DC power supply system will provide power for critical control circuits, power for control of the 13.8-kV, 4.16-kV and 480-V switchgear, and power for DC emergency backup systems. Proposed emergency backup systems include DC lighting and DC lube-oil and seal-oil pumps for the STG.

An essential-service AC system (120 V, single-phase) will provide power to essential instrumentation, critical equipment loads, safety systems, and equipment protection systems that require uninterruptible AC power. The essential-service AC system and the DC power supply system will both be designed to ensure that critical safety and equipment protection control circuits are always energized and able to function in the event of unit trip or loss of AC power.

E. Water Supply and Treatment

The Project's estimated water requirements are presented in the following table. They include the average, peak and annual usage for each Plant site; and are based on the modeled annual gross production. The "Estimated Maximum Annual Use" is for equipment design while the "Estimated Annual Use" is the expected quantity of water required for each plant. The various water uses will include makeup for the circulating water system and cooling tower, makeup for the SSG, water for Solar Collector Assembly washing, service water, potable water, and fire protection water.

Water Use (for Each Plant Site)

Water Use	Average Rate (Gallons/Minute)	Peak Rate (Gallons/Minute)	Estimated Annual Use (Acre-Feet)	Estimated Maximum Annual Use (Acre-Feet)
Plant Operation	667	1,093	850	1,077
Potable Water	3.1	3.1	5, max	5

Process and cooling water needs of the Project will be met by use of groundwater pumped from wells on the plant site. Water for domestic use by employees will also be provided by onsite groundwater treated to potable water standards by a packaged treatment unit. New water supply wells will need to be installed to provide the reliability needed during plant operations. These wells will draw from the adjudicated water rights owned by the Project developer.

On both the Alpha and Beta plant sites, raw water and service water storage tanks will provide enough storage capacity for interruption of water supply to the facility of approximately one to two days. A portion of the service water storage tank will be dedicated to the plant's fire protection water system.

Based upon sampling of an existing on-site well, the quality of ground water that will be supplied by the wells to the Project is brackish. A summary is provided in the following table, and complete water information is discussed in the Soil and Water Resources testimony.

Water Quality Data in the Project Area

Parameter	Result [1]
Chloride (Cl^-)	580-690 milligrams/liter (mg/l)
Total Dissolved Solids (TDS)	1500-1700 parts per million (ppm)

[1] Concentrations based on testing data gathered during a 7-day pumping test and over the months of August to November 2008. Sample well is an existing agricultural well located near the center of the Project area and constructed to a depth similar to that expected for supplying water to the Project.

The raw water, circulating water, process water, and SCA washing water all require onsite treatment and this treatment varies according to the quality required for each of these uses.

The groundwater will be pumped to the raw water storage tank and a biocide (sodium hypochlorite) is used to treat the water. When transferred to the service water tank the water is again treated with the biocide if needed. This water is used directly in the cooling tower as make-up water.

To conserve water, the lower TDS reverse osmosis (RO) reject streams will be recycled back to the Service Water storage tank for reuse in the cooling tower. Additionally, a clear well will be used and when the discharge exceeds the treatment system demand, the clear well discharge will be released to the cooling tower to further conserve water.

In order to reduce overall water consumption and sizing of evaporation ponds, service water will first be used as makeup to the cooling tower and circulating water system.

Water will cycle approximately 5 – 6 times through the cooling tower before it is blown down. The blowdown from the circulating water/cooling tower system will be processed with various processes, including clarification and reverse osmosis (RO), prior to reuse to make SCA washing and steam system makeup water. Before becoming process wastewater, the ground water will have been recycled over 38 times prior to ultimately being discharged to the evaporation ponds for final dewatering. The residual solids will remain in the evaporation pond for the duration of the plant life.

1.3 Proposed Licensing Conditions

The General Conditions Section of the SA for the project filed by the CEC recommends that 14 Conditions of Certification be adopted to address general conditions including compliance monitoring and closure plan issues: COMPLIANCE-1 through COMPLIANCE-14. These are acceptable to the Applicant.

The Facility Design Section of the Staff Assessment (SA) for the project recommends that Conditions of Certification be adopted to address Facility Design. These conditions include GEN-1 through GEN-8, CIVIL-1 through CIVIL-4, STRUC-1 through STRUC-4, MECH-1 through MECH-3, and ELEC-1. These Conditions of Certification will ensure compliance with the applicable federal, state, and local laws, ordinances, regulations, and standards (LORS) relating to the civil, structural, mechanical, and electrical design aspects of the plant facilities.

The Applicant has reviewed the Staff's proposed Conditions of Certification related to Facility Design, and accepts them all.

1.4 Correlation to SA, SSA and Hearing Topics

- Staff Assessment, Sections 1, 3, 8
- Supplemental Staff Assessment Part A, Section 1
- Supplemental Staff Assessment Part B, Sections 1 and 3
- Executive Summary, Project Description, General Conditions, Facility Design, Power Plant Efficiency, and Power Plant Reliability

2.0 AIR QUALITY

A. GENERAL

2A.1 Introduction

A. Name: Gregory S. Darvin

B. Qualifications: I am a Meteorologist with over sixteen years of consulting experience conducting air quality permitting and modeling assessments for new and modified industrial energy-related sources. I have a B.A. degree in Geography and am a M.S. Candidate in Atmospheric Science. My qualifications are summarized more completely in the attached resume (Appendix A).

C. Purpose: This testimony addresses air quality issues associated with the Abengoa Mojave Solar Project.

D. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

- Application for Certification, Volume 1, Section 5.2 [Exhibit 1]
- Application for Certification, Volume 2, Appendix C [Exhibit 1]
- Application for Certification, Volume 4, Data Adequacy Supplement, p. 1-2 [Exhibit 2]
- Applicant's Written Response to CEC Data Request Set 1 (1-93), dated November 23, 2009, Responses to Requests 1-28 and 32-39 [Exhibit 3]
- Applicant's Supplemental Written Response to CEC Data Request Set 1A (1-93), dated January 11, 2010, Revised and Initial Responses to Requests 5, 13, 15, 18, 19, 29, 30, 31, 36 [Exhibit 11]
- Applicant's Second Supplemental Written Response to CEC Data Request Set 1A (1-93), dated February 2, 2010, Revised and Initial Responses to Requests 3, 6, 8, 10, 12, 13, 14, 15, 16, 17, 18, 19, 23, 25, 30 [Exhibit 13]
- Applicant's Revised Second Supplemental Written Response to CEC Data Request Set 1A (1-93), dated February 25, 2010, Revised and Supplemental Response to Request 30 [Exhibit 19]
- Applicant's Comments to Staff Assessment [Exhibit 26]
- Revised Mojave Solar 1-hour NO2 Modeling Assessment, dated May 3, 2010 [Exhibit 32]
- Authority to Construct Permit Application, July 2009 [Exhibit 39]

To the best of my knowledge, all of the facts contained in this testimony (including all referenced documents) are true and correct. To the extent this testimony contains opinion, such opinion is my own. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

2A.2 Summary of Testimony

A. Affected Environment

The proposed Project site is located in western San Bernardino County, east of the Kern County line, approximately 18 miles west-northwest of Barstow, California. The site is a mix of open desert and agricultural land, located in the western desert region of the county. The Four Corners area (intersection of Hwy 58 and Hwy 395) lies approximately 11 miles south-southwest of the project site. The site is flat, gently rising in elevation from the northeast to the west and southwest, with an elevation of approximately 2,070 feet above mean sea level**.** Table-1 presents the state and federal air quality attainment status for the project area and shows that the project area has a non-attainment status for both ozone and particulate matter (P_{M10}). Federal and state laws and regulations do not require that Abengoa mitigate the potential effect of the project's emission of these pollutants and their precursor pollutants. However, implementation of mitigation techniques recommended by the CEC and proposed Conditions of Certification will insure that the project impacts are less than significant.

Table Air-1. State and Federal attainment status for San Bernardino County.

Pollutant	Federal Attainment Status	State Attainment Status
Oxides of Nitrogen (NO_X)	Attainment/Unclassified	Attainment
Carbon Monoxide (CO)	Attainment/Unclassified	Attainment
Sulfur Dioxide (SO_2)	Attainment/Unclassified	Attainment
Ozone (O_3) 1-hour	Not Applicable	Non Attainment
Ozone (O_3) 8-hour	Non Attainment	Non Attainment
Particulate Matter (PM10)	Non Attainment	Non Attainment
Particulate Matter (PM2.5)	Attainment/Unclassified	Non Attainment
Lead	Attainment/Unclassified	Attainment/Unclassified

The attainment status of the project area partly defines whether the area will be subject to Federal Prevention of Significant Deterioration (PSD) or New Source Review (NSR) permitting requirements. The potential emissions from the project will also define whether a project is subject to PSD or NSR. These federal permitting requirements are essentially the same with the exception that the NSR program requires the application of the Lowest Achievable Emission Rate control technologies to be installed on the project and the PSD program requires less stringent Best Available Control Technology. Based on the project emissions and non attainment status for ozone and particulate matter, the NSR permitting requirements will apply.

B. Construction Impacts

Construction will occur at the proposed project. Construction impacts to air quality will be in the form of fugitive dust and vehicle exhaust emissions. Fugitive dust emissions will result from construction equipment disturbing (excavating, grading, and dumping) soils on the proposed project site and from the movement of vehicles on unpaved soils. Vehicle exhaust emissions are associated with burning ultra low sulfur diesel and gasoline in the construction equipment, construction vehicles, and construction worker's automobiles traveling to and from the construction site. These construction impacts will be temporary and finite in duration with construction activities expected to be completed within 26 months.

C. Operational Impacts

Potential air quality impacts from power plant construction were determined by air dispersion modeling. This modeling used the estimated construction emissions and four years of hourly meteorological data from Lancaster, California. The air quality impacts associated with the construction of the power plant were below state and federal standards for all pollutants except PM10 and PM2.5. The maximum 24-hour PM10 concentration was modeled to be 226 ug/m^3 while the annual PM10 impact was calculated to be 40.3 ug/m^3, both of which are over the state and federal standards for this pollutant. The maximum 24-hour PM2.5 concentration was modeled to be 43 ug/m^3 while the annual PM2.5 impact was calculated to be 10.9 ug/m^3, of which only the 24-hour standard is exceeded. **Operations Impacts:** Potential air quality impacts from operations, including mobile on-site fugitive operations were determined by performing air dispersion modeling. The air modeling used worst-case pollutant emissions assumptions to calculate total air quality impacts. Four years of hourly meteorology from Lancaster were used in the analysis. The project operational air quality impacts are presented in Table 2. All modeled concentrations were less than significance for all attainment pollutant averaging periods. The project impacts for PM10 and PM2.5 are over the significance levels for both 24-hour and annual averaging periods, but the operational impacts will be mitigated to levels of insignificance and will thus not cause or contribute to the non-attainment status of the area.

Table 2 Operational Air Quality Impacts

Pollutant	Avg. Period	Maximum Concentration ($\mu g/m^3$)	Background ($\mu g/m^3$)	Total ($\mu g/m^3$)	Class II Significance Level ($\mu g/m^3$)	SIL ($\mu g/m^3$)	Ambient Air Quality CAAQS/NAAQS	
							($\mu g/m^3$)	($\mu g/m^3$)
NO_2[a]	1-hr	130	154	284	-	-	339	-
	NO_2 98th%Avg[a]	-	-	184.33[b]	-	-	-	188
	Annual	0.18	42	42.2	1	1	57	100
PM_{10}	24-hr	8.8	154	163	5	5	50	150
	Annual	2.3	38.4	40.7	1	1	20	
$PM_{2.5}$	24- hr	4.4	28	32.4	5	5	-	35
	Annual	0.7	10.4	11.1	1	1	12	15.0
CO	1- hr	76	4025	4101	2000	2000	23,000	40,000
	8- hr	7.8	1789	1797	500	500	10,000	10,000
SO_2	1- hr	0.25	94	94.3	-	-	655	-
	3- hr	0.18	23	23.2	25	25		1,300
	24- hr	0.07	13	13.1	5	5	105	365
	Annual	0.003	3	3.00	1	1	-	80

D. Cumulative Impacts

The project's cumulative impacts were estimated through air dispersion modeling. The project applicant, in consultation with the MDAQMD, confirmed that there are no projects within six miles from the AMS project site that are under construction or have received permits to be built or operate in the foreseeable future. Therefore, no cumulative impact assessment was necessary and no cumulative impacts are expected.

E. Mitigation

Applicant proposed mitigation for construction includes:

- The Applicant will have an on-site construction mitigation manager who will be responsible for the implementation and compliance of the construction mitigation program. The documentation of the ongoing implementation and compliance with the proposed construction mitigations will be provided on a periodic basis.
- All unpaved roads and disturbed areas in the Project and laydown construction sites will be watered as frequently as necessary to control fugitive dust. The

frequency of watering will be on a minimum schedule of every two hours during the daily construction activity period. Watering may be reduced or eliminated during periods of precipitation.

- On-site vehicle speeds will be limited to five mph on unpaved areas within the Project construction site.
- The construction site entrance(s) will be posted with visible speed limit signs.
- All construction equipment vehicle tires will be inspected and cleaned as necessary to be free of dirt prior to leaving the construction site via paved roadways.
- Gravel ramps will be provided at the tire cleaning area.
- All unpaved exits from the construction site will be graveled or treated to reduce track-out to public roadways.
- All construction vehicles will enter the construction site through the treated entrance roadways, unless an alternative route has been provided.
- Construction areas adjacent to any paved roadway will be provided with sandbags or other similar measures as specified in the construction SWPPP to prevent runoff to roadways.
- All paved roads within the construction site will be cleaned on a periodic basis (or less during periods of precipitation), to prevent the accumulation of dirt and debris.
- The first 500 feet of any public roadway exiting the construction site will be cleaned on a periodic basis (or less during periods of precipitation), using wet sweepers or air-filtered dry vacuum sweepers, when construction activity occurs or on any day when dirt or runoff from the construction site is visible on the public roadways.
- Any soil storage piles and/or disturbed areas that remain inactive for longer than 10 days will be covered, or shall be treated with appropriate dust suppressant compounds.
- All vehicles that are used to transport solid bulk material on public roadways and that have the potential to cause visible emissions will be covered, or the materials shall be sufficiently wetted and loaded onto the trucks in a manner to minimize fugitive dust emissions. A minimum freeboard height of two feet will be required on all bulk materials transport.

- Wind erosion control techniques (such as windbreaks, water, chemical dust suppressants, and/or vegetation) will be used on all construction areas that may be disturbed. Any windbreaks installed to comply with this condition will remain in place until the soil is stabilized or permanently covered with vegetation.
- Disturbed areas will be re-vegetated or covered with gravel or other dust suppressant material as soon as practical.

To mitigate exhaust emissions from construction equipment, the Applicant is proposing the following:

- The Applicant will work with the construction contractor to utilize to the extent feasible, U.S.EPA/Air Resources Board (ARB) Tier II/Tier III engine compliant equipment for equipment over 100 hp.
- Ensure periodic maintenance and inspections per the manufacturers specifications.
- Reduce idling time through equipment and construction scheduling.
- Use California low sulfur diesel fuels (<=15 ppmw S).

Additional staff proposed fugitive dust and tailpipe emissions from construction activities will be mitigated through additional fugitive dust control methods, use of Tier 2 and 3 off-road engines, and the implementation of an on-site construction mitigation manager. During certain stages of construction activities, local residences within the impact area will be offered temporary lodging. The implementation of CEC recommended mitigation measures is expected to limit and control the fugitive dust emissions to a level of insignificance.

Federal and state laws and regulations do not require Abengoa to mitigate the operational air quality impacts as the emissions of these pollutants will be less than significant. Nevertheless, mitigation measures will be implemented to reduce the non-stationary source emissions through the use of new on-road and off-road vehicles that meet California emission standards in addition to the development of a site Operations Dust Control Plan in order to minimize fugitive dust emissions during operation and maintenance activities. The dust control plan includes the use of windbreaks, watering, dust suppressants, and limiting vehicle speeds. Additional mitigation measures include the use of Best Available Control Technology (BACT) on the HTF system which will minimize emissions of organic compounds by 99.9%. BACT will also be utilized on the auxiliary HTF heaters, emergency generator, fire pump engine, and the cooling tower which will limit PM10 emissions through the use of high efficiency drift eliminators. Additional staff proposed mitigation includes the use of new on-road and off-road

vehicles that meet California emission standards and additional fugitive dust control methods similar to those used for construction. All of these mitigation measures will reduce the project's operating emissions to less than significant.

2A.3 Proposed Licensing Conditions

The applicant agrees with and will abide by all of the proposed air quality conditions of certification.

2A.4 Correlation to SA, SSA, and Hearing Topics

- Staff Assessment, Section 5.1.
- Supplemental Staff Assessment, Part B, Section 5.1
- Air Quality

2.0 AIR QUALITY/PUBLIC HEALTH
B. HEAT TRANSFER FLUID RECOVERY SYSTEM

2B.1 Introduction

A. Name: Frederick Redell, PE

B. Qualifications: Mr. Redell's qualifications are as noted in his resume contained in Appendix A.

C. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

- Application for Certification, Volume 1, Section 2.0 [Exhibit 1]
- Applicant's Supplemental Written Response to CEC Data Request Set 1A (1-93) for Air Quality and Public Health, dated January 11, 2010, Response to Data Requests 30 and 31[Exhibit 11]
- Applicant's Second Supplemental Written Response to CEC Data Request Set 1A (1-93) for Air Quality and Public Health, dated February 2, 2010, Response to Data Request 30 (Revised) [Exhibit 13]

2B.2 Summary of Testimony

This testimony presents information related to the Project's heat transfer fluid (HTF) recovery system. The majority of the Applicant's testimony related to Air Quality and Public Health is presented elsewhere. This brief section is provided to enter into the record the Applicant's responses to Data Requests 30 and 31 from Set 1A, which are not specifically addressed in other sections of the Applicant's testimony.

Mr. Redell is adopting this testimony, which is based on information provided by Abengoa's Engineering, Procurement, and Construction contractor, who provided information on heat transfer fluid (HTF) system nitrogen venting for the Abengoa Mojave Solar project (09-AFC-5). This data was then used as inputs to Air Quality emissions calculations and health risk assessments.

Unusable low boilers (mainly benzene, phenol and toluene) and a small amount of useful heat transfer fluid (HTF) will be vented daily with the nitrogen breathing out of the HTF expansion and storage tanks. The uncontrolled daily low boilers generation was calculated based on the annual degradation rates obtained from both HTF manufacturers (Solutia and Dow).

Cleaning and control of the low boilers and HTF from nitrogen vents (breathing) from expansion/contraction of HTF was calculated using an ASPEN simulation of cooling/condensing of the HTF and low boilers from nitrogen vents, followed by an HTF recovery distillation system. These recovery processes reduce the potential mass of HTF released from 6,867 lbs/day to 5.1 lbs/day resulting in an overall volatile organic compound (VOC) control/recovery efficiency of about 99.9%.

Based on the above design considerations and system control efficiency, the project is not anticipating the need for any additional add-on VOC controls.

2B.3 Proposed Licensing Conditions

Please see the Air Quality and Public Health Sections for any Conditions of Certification relative to HTF venting.

2B.4 Correlation to SA, SSA and Hearing Topics

- Staff Assessment, Sections 5.1 and 5.7
- Supplemental Staff Assessment, Part A, Section 5.7
- Supplemental Staff Assessment, Part B, Section 5.1
- Air Quality
- Public Health

3.0 BIOLOGICAL RESOURCES

3.1 Introduction

A. **Name:** Lyndon Quon, Alice Karl, Philip Leitner, and Joshua Zinn.

B. **Qualifications:** The qualifications of the various authors are as noted in their resumes contained in Appendix A.

C. **Prior Filings:** In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

- Application for Certification, Volume 1[Exhibit 1]
- Application for Certification, Volume 2, Appendix F [Exhibit 1]
- Application for Certification, Volume 4, Data Adequacy Supplement and Attachments D1 and D2 [Exhibit 2]
- Applicant's Area of Critical Ecological Concern (ACEC) Mapping Corrections [Exhibit 35]
- Applicant's Written Response to Data Request Set 1A (1-93), Responses to Requests 48-74 [Exhibit 3]
- Applicant's Supplemental Response to Data Request Set 1A (1-93), Responses to Requests 49, 51-59, 69, 71-72 [Exhibit 5]
- Applicant's Response Re: Time-Sensitive Issues and Informational Needs [Exhibit 18]
- Draft Desert Tortoise Clearance and Relocation/Translocation Plan [Exhibit 21]
- Western Burrowing Owl Monitoring and Mitigation Plan [Exhibit 24]
- Applicant's Responses to CURE's Data Requests. Set 1, including the 2006 EDAW report titled *Harper Lake Specific Plan Biological Constraints Analysis* [Exhibit 23]
- Applicant's Comments on Staff Assessment [Exhibit 26]
- Biological Resources Appendix [Exhibit 29]
- Applicant's Draft Biological Assessment [Exhibit 30]
- AECOM's Golden Eagle Nest Survey Results [Exhibit 31]
- U.S. Army Corps of Engineers Determination Regarding Requirement for U.S. Army Corps of Engineers Permit [Exhibit 36]

- U.S. Army Corps of Engineers Approved Jurisdictional Determination Regarding Absence of Geographical Jurisdiction [Exhibit 37]
- Mitigation Site Assessment [Exhibit 38]

3.2 Summary of Testimony

A. Opening Statement

To the best of our knowledge, all of the facts contained in this testimony (including all referenced documents) are true and correct. To the extent this testimony contains opinions, such opinions are our own. We make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

B. Summary

3.2.B.1 Regional Overview

The Applicant is proposing to construct, own and operate the Mojave Solar Project (MSP or Project), a solar electric generating facility proposed on approximately 1,765 acres in unincorporated San Bernardino County, California, southwest of the western margin of Harper Dry Lake, approximately nine (9) miles northwest of the town of Hinkley. The site is largely fallow agricultural land specifically sited and configured to minimize environmental impacts. This land was originally sited as Solar Electric Generating Stations (SEGS) XI and XII and is located next to the existing SEGS VIII and IX facilities.

The Project Area, defined as the approximately 1,765 acres on which the proposed Abengoa Mojave Solar Project will be constructed (refer to AFC for boundaries of the Project Area) currently consists primarily of abandoned agricultural fields that had center-pivot-type irrigation systems, one of which is still in use for alfalfa production. Historically, land in and around the MSP has been used to produce alfalfa and for cattle ranching and dairy farming. Topography within the Project Area is generally flat with elevations ranging from approximately 2,105 feet at the southwest corner to approximately 2,025 feet at the northeast corner, near the margin of Harper Dry Lake. Several biological resource management areas exist near the MSP and include federally designated critical habitat for desert tortoise (*Gopherus agassizii*) (DT) located to the north, west, and south of the MSP, and the Superior-Cronese and Fremont-Kramer Desert Wildlife Management Areas (DWMAs), both of which were established to protect DT and their habitat. In addition to DT critical habitat and the Superior-Cronese and Fremont-Kramer DWMAs, an approximately 480-acre area in the southwestern portion of Harper Dry Lake is designated as an Area of Critical Ecological Concern (ACEC) in the U.S. Bureau of Land Management (BLM) California Desert Conservation Area Plan (CDCA Plan). Areas designated in the CDCA Plan as Mohave ground squirrel (*Spermophilus mohavensis*) (MGS) Conservation Areas occur on all sides of the Project Area, but are not coincident with any part of the Project Area.

Prior to conducting biological surveys, a review of existing data was conducted for the site and an area approximately 10 to 11 miles beyond the limits of the proposed Project. This review included a query of the California Natural Diversity Database (CNDDB), California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants, and the Natural Resources Conservation Service Web Soil Survey. Prior survey information for the site and surrounding areas was also reviewed, including the 2006 EDAW report titled *Harper Lake Specific Plan Biological Constraints Analysis*, the 2006 EREMICO report titled *Mohave Ground Squirrel Survey at the Proposed Harper Lake Dairy Park*, and the 2007 EREMICO report titled *Mohave Ground Squirrel Survey at the Proposed Solar Thermal Power Plant Site near Harper Lake*. These sources were assessed as part of the development of a target list of special status plant and animal species potentially occurring within the general vicinity of the Project site.

3.2.B.2 Wildlife Resources

Habitat assessments were based primarily on the 2006 EDAW constraints analysis report, which included habitat suitability analyses for the various target species and potentially jurisdictional waters. Additional field verification was conducted for federal and/or state-listed threatened or endangered target species, including the desert tortoise, and the Mohave ground squirrel, by noted experts Alice Karl, PhD, and Philip Leitner, PhD, respectively.

Biological surveys focusing on the target species were conducted for the site and adjacent areas. These surveys included protocol-level surveys for the desert tortoise and the western burrowing owl (*Athene cunicularia*) (WBO). Surveys currently are being conducted for the golden eagle (*Aquila chrysaetos*), pursuant to USFWS guidance, and for Swainson's hawk (*Buteo swainsoni*) (SWHA), based on a project-specific methodology accepted by the California Department of Fish and Game (CDFG). Focused surveys also were conducted for targeted rare plants, raptors, and other special status wildlife. Surveys for potentially jurisdictional waters were also conducted. These surveys followed either established survey protocols or guidance published by the USFWS or CDFG, or guidelines established by the U.S. Army Corps of Engineers (USACE), California Energy Commission (CEC), or California Native Plant Society (CNPS).

3.2.B.2.1 General Wildlife Species

General wildlife surveys were conducted concurrently with protocol wildlife surveys and vegetation mapping during May and June 2007, 2008, and 2009. A reconnaissance survey in and around the current Project Area was conducted in 2006. All incidental wildlife sign and observations were recorded and special status species were mapped using GPS units. All wildlife species observed or detected during Project surveys are included in Appendix F.1, Attachments 7 – 15 of the AFC.

3.2.B.2.2 Special Status Wildlife Species

Five (5) federally and/or state listed wildlife species were detected within the Project Area. These include the federally and state listed DT and the state listed SWHA,

American peregrine falcon (*Falco peregrinus*), willow flycatcher (*Empidonax trailli*), and MGS (EREMICO, 2007). All five (5) of these species, in addition to several other special status species, are discussed below and in Table Biological Resources-1.

Table Biological Resources-1.
Special Status Wildlife Species Potential Distribution and/or Suitable Habitat in the Project Area

Common Name ***Scientific Name***	**Sensitivity Status**[1]	**Anticipated Project Impacts**
Desert tortoise (DT) *Gopherus agassizii*	ESA: Threatened CESA: Threatened	Detected. DT individuals were not detected during 2009 surveys; however, in 2008, 35 DTs were encountered in the Survey Area, with six (6) observed on Zone of Influence (ZOI) transects for a total of 41 DT observations. No DTs were documented within the Project Area during 2007 or 2008 surveys. One female DT was observed twice near and within one of the ranches located in the Project Area during reconnaissance surveys in 2006 (EREMICO, 2006).
Mohave ground squirrel (MGS) *Spermophilus mohavensis*	CESA: Threatened	Detected. In 2007, one MGS was trapped (one [1] adult female; age approx. one [1] year) within the Project Area at the edge of an active alfalfa field in the northeast quarter of Section 32 during a reconnaissance survey (EREMICO, 2007).
Western burrowing owl (WBO) *Athene cunicularia*	CDFG: Species of Special Concern	Detected. In 2008, one WBO was observed within the Project Area. Also, one owl pellet was observed in the northwestern corner of the Project Area in 2008. In 2007, a pair of WBOs was observed; however, they were not observed during 2008 surveys. A reconnaissance survey conducted in 2006 (EREMICO, 2006) resulted in detection of four (4) WBOs within the Project Area.
Golden eagle *Aquila chrysaetos*	CDFG: Fully Protected	Detected. During 2007 winter raptor surveys of the Project Area, a golden eagle was observed perched on a transmission tower, to the southwest of the Project Area. During 2010 nesting season surveys, one active golden eagle nest and an inactive nest were documented over 10 miles north-northeast of the Project Area boundary.
American peregrine falcon *Falco peregrinus anatum*	CESA: Endangered CDFG: Fully Protected	Detected. One individual of this species was observed within the Project Area perched on a utility line north of the active agricultural field in August 2007. This individual was likely a transient or at most may use the area in the vicinity of the Survey Area as a peripheral and occasional part of its home range.

Common Name ***Scientific Name***	**Sensitivity Status[1]**	**Anticipated Project Impacts**
Swainson's hawk *Buteo swainsoni*	CESA: Threatened	Detected. One individual of this species was observed perched within the Project Area near the southern boundary in June 2007. Two other individuals were observed soaring above the one-mile buffer in August 2007.
Willow flycatcher *Empidonax traillii*	ESA: Endangered (only the *Empidonax traillii extimus* is federally listed) CESA: Endangered	Detected. One individual of this species was observed using a small stand of ornamental trees within the Project Area near the southern boundary in June 2007. Suitable breeding habitat for this species does not occur within the Project Area or the one-mile buffer; therefore, this individual was likely a migrant.
American white pelican *Pelecanus erythrorhynchos*	CDFG: Species of Special Concern	Detected. Remains of this species were found in August 2007, north of the Project Area within the one-mile buffer. The carcass was scavenged.
Northern harrier *Circus cyaneus*	CDFG: Species of Special Concern	Detected. Two individuals of this species were observed within the one-mile buffer, one in May 2007, and one in August 2007. This species was also detected during 2006 reconnaissance surveys (EREMICO, 2006; EDAW, 2006).
Western snowy plover *Charadrius alexandrinus nivosus* *Federal listing applies only to the Pacific coastal population.	CDFG: Species of Special Concern (nesting)	Low potential for this species to occur. This bird was reported as occurring on the southwestern edge of Harper Dry Lake in 1978, with an estimated count of 94 birds. Most individuals appeared to be displaying nesting behavior; one nest found with three (3) eggs. Since that time, the marsh area has become degraded due to loss of artificial water inputs from agricultural operations; therefore, habitat for this species is not present, and it is not expected that this species would utilize the Project Area as habitat.
Short-eared owl *Asio flammeus*	CDFG: Species of Special Concern	High potential for this species to occur. This species was detected within the Project Area during a reconnaissance survey conducted in 2006 (EREMICO, 2006). Suitable nesting habitat for this species occurs in the active agricultural field.
Loggerhead shrike *Lanius ludovicianus*	CDFG: Species of Special Concern	Detected. Suitable habitat for loggerhead shrike occurs throughout the Survey Area. Loggerhead shrikes were observed in the Project Area during 2007 and 2009. This species was also detected during 2006 reconnaissance surveys (EREMICO, 2006; EDAW, 2006).

Common Name *Scientific Name*	Sensitivity Status[1]	Anticipated Project Impacts
Yellow warbler *Dendroica petechia*	CDFG: Species of Special Concern	Detected. This species was observed within the Project Area during May 2007 surveys. Suitable breeding habitat for this species does not occur within the Project Area or the one-mile buffer; therefore, this individual was likely a migrant and was not mapped.
American badger *Taxidea taxus*	CDFG: Species of Special Concern	High potential for this species to occur. A badger den was detected within the Project Area during a reconnaissance survey performed in 2006 (EREMICO, 2006).

[1] ESA = Federal Endangered Species Act
CESA = California Endangered Species Act
CDFG = California Department of Fish and Game

Desert Tortoise

Survey and Assessment Methods

Based on the initial site configuration, and the habitat assessment in the 2006 constraints analysis report, desert tortoise surveys were conducted in the spring of 2007. DT surveys were conducted in April and May in 2007, 2008, and 2009, according to USFWS DT survey protocol (USFWS 1992) applicable at the time, which required surveys of all areas determined to have appropriate habitat for DT using belt transects less than or equal to 30 feet wide to afford 100-percent visual coverage. In addition, Zone of Influence (ZOI) transects were surveyed. A ZOI is defined as the area where DT on adjacent lands may be affected directly or indirectly by Project development (USFWS 1992). At a minimum, a single, 30-foot-wide ZOI transect is located at 100, 300, 600, 1,200, and 2,400 feet from and parallel to the edge of a Biological Resources Survey Area (BRSA) or Project Area[1] boundary. The BRSA is defined as the area in which the original Project concept was sited. All DT sign (shells and shell parts, scat, burrows, pallets, tracks, egg shell fragments, courtship rings, drinking sites, etc.) within the BRSA or Project Area and along ZOI transects require mapping. In addition to the five (5) ZOI transects required by USFWS protocol, two additional transects were walked at 3,960 feet and 5,280 feet from and parallel to the edge of the BRSA or Project Area boundary per CEC Draft Survey Guidelines. (CEC, 2007). In the spring of 2009, an additional desert tortoise survey was conducted for a specific subset of the Project Area, based on direction provided by CDFG biologist Becky Jones.

Surveyors slowly and systematically walked transects while visually searching for DT and sign. All DT sign detected within the Survey Area was mapped using GPS units and associated data were recorded onto field data sheets. Particular emphasis was placed on searching around the bases of shrubs and along the banks of shallow washes. The lakebed of Harper Dry Lake was not considered suitable DT habitat due to lack of food sources, moisture, and shade, and therefore was not surveyed; however, surveyors did visually scan the barren landscape for signs of life (animal or plant). In addition, other botanical and wildlife surveys were conducted in this area per the CEC Draft Survey Guidelines,

[1] The Project Area changed from 2007 to 2009; therefore, the locations of the ZOI transects were shifted accordingly to accommodate new Project boundaries. For example, the ZOI transects were located around the BRSA during surveys in 2007 and were located around the Project Area during surveys in 2008.

and any DT sign incidentally detected during those surveys was recorded.[4] DT size was estimated at middle carapace length (MCL) and DTs were visually evaluated for health. Carcasses were aged, measured (if possible), and classed using Dr. Alice Karl's *Key to Sign Classes* classification system (see Appendix C, Attachment 9). Height and width of DT burrow openings and length and depth of burrows were recorded. Sign of recent use of burrows was recorded and the burrows were classed using Dr. Karl's classification system. Scat was measured and classed using Dr. Karl's classification system.

In addition to the protocol-level surveys, the Applicant conducted a habitat suitability analysis of the Project Area. Although the Project is situated among areas identified as important for recovery and management of the DT ((DWMAs and federally designated DT critical habitat), the area occupied and immediately surrounded by the Project was excluded by those same resource agencies for DT recovery and management based on the standards used to designate the DWMAs and critical habitat..

While there are 430.6 acres of vegetation cover on the MSP site, the quality of this cover for use by DTs is so marginal that it likely does not support DT and would not aid species recovery or maintenance. The Project Area is an island of mostly agricultural uses that was farmed for several decades and is still partially farmed. At present, there are two solar energy generating projects operating immediately north of and adjacent to the Project (Harper Lake SEGS). All of the vegetation that would be lost as a result of the Project is highly fragmented by broad expanses of nonhabitat (the center pivot fields), residences, developments, and roads, and/or is regrowth over old farming operations.

Results

Surveys in 2006, 2007, 2008, and 2009 found almost no current use of the 430.6 acres potentially impacted by the Project (AECOM 2010).

> Western Portion of Alpha Site – Only one DT sign was observed in 2008 – a partial carcass was found in the far southwestern corner at the Project's border. No scat, DTs, or burrows were observed in this area in all other survey years.
>
> Far Eastern Portion of Alpha Site – One DT was observed in 2006 only. One full carcass of an immature DT, recently dead, and three (3) other groups of carcass parts were found in 2008, but no burrows or scat that would suggest current occupation. Two of these carcasses were found again in 2009.
>
> Beta Site and Middle Portion of Alpha Site – No evidence of current use was found in the center pivot corners or regrown parking area in the middle portion of the Alpha Site during all survey years. A carcass was found in the center pivot in 2007 and another carcass near the northern border of the Alpha Site in 2009. One old (white) scat was found in 2009 approximately 650 feet from the southern border of the Beta Site, indicating that a DT walked onto the barren, abandoned agricultural field within the last several years. Nine shell fragment groups were also found in 2009, at least seven (7) of which were only one to several fragments. Several showed broken bones, suggesting depredation or scavenging. Eight were estimated to be at least four (4) years old. This accumulation of data, without corroborating evidence of occupation of these areas, suggests that most of these carcasses or carcass parts were transported by predators or, in a couple of

cases, were DTs that entered the field during previous farming operations and were killed.

Southern Edge of Beta Site Located in Superior-Cronese Desert Wildlife Management Area - A very small portion of the Superior-Cronese DWMA is within the Project Area; however there will not be permanent impacts to this area; it will only be used temporarily, during the process of connecting the MSP to the existing Kramer-Coolwater 230-kV transmission lines. No DT observations or other DT sign were found within this small area during all survey years, although DT sign was found immediately south, outside of the Project Area.

The Applicant has redesigned the initial Project, such that none of the desert tortoise data points documented during the three protocol-level surveys would be encompassed by the Project Area boundary.

Mohave Ground Squirrel

Survey and Assessment Methods

Based on the existing MGS survey data collected in 2006, a survey was also conducted in 2007. These live trapping surveys were conducted following the protocol established by CDFG. In both 2006 and 2007, three trap grids were sampled, and the results were documented. Each grid was trapped for five (5) consecutive days, for three (3) periods, except for Grids 1 and 3 during the 2007 effort (which were trapped for only two (2) periods). In April 2008, Philip Leitner, PhD, conducted a habitat assessment to supplement the 2006 and 2007 MGS survey data. Dr. Leitner's analysis also included a review of the CNDDB and other records of MGS data within approximately five (5) miles of the Project Area. This analysis of MGS data was used to refine the Project Area boundary to minimize potential Project impacts to the species. No additional analysis was conducted for MGS during 2009, following discussions with CDFG.

Results

No MGS were captured during the 2006 trapping effort, and only one MGS was captured within the Project Area, at the southern boundary of the site, at the edge of an active alfalfa field during the 2007 surveys. Dr. Leitner's habitat assessment concluded that the Project Area would not support a resident MGS population, and that the suitable habitat adjacent to the Project Area, and the presence of one MGS in 2007, indicate that the species has the potential to be a transient, infrequent visitor to the site.

Western Burrowing Owl

Survey and Assessment Methods

General reconnaissance-level surveys were conducted in 2006, as part of a constraints level analysis. The reconnaissance survey consisted of windshield surveys, supplemented with meandering transects through multiple sites supporting representative vegetation communities and habitats across the Project Area and adjacent lands. Focused western burrowing owl (*Athene cunicularia)* (WBO) surveys were performed during summer 2007 and spring 2008 according to protocol established by the California Burrowing Owl Consortium (CBOC 1993) (CBOC Guidelines) and accepted by CDFG. In addition to the 500-foot buffer surrounding the Project Area, as required by CBOC Guidelines,

additional buffer transect surveys for WBO occurred out to one (1) mile from the Project Area boundary per CEC Draft Survey Guidelines (CEC, 2007).

WBO surveys are conducted under the CBOC Guidelines as follows: (1) Phase I, WBO habitat assessment, (2) Phase II, WBO burrow survey (includes searching for and taking GPS points of burrows and owls), (3) Phase III, WBO surveys, census, and mapping (during the breeding season, at dawn and dusk hours), and (4) Phase IV, WBO survey results summary report (a summary of all survey phases). Reports for each survey year are included in Appendix F.2, Attachments 13 and 14 of the AFC.

Results

During the 2006 reconnaissance survey, one (1) WBO was detected in the Project Area. During the 2007 protocol surveys, four (4) WBO were detected in the one-mile buffer area. WBO were also detected in the Project Area during other biological resource surveys in 2007, where a pair of WBO that had been previously observed. During WBO surveys in 2008, one (1) WBO was observed within the Project Area. Based on these results and in consultation with resource agencies, it was determined that additional surveys for WBO were not required in 2009.

Raptors (Birds of Prey)

Survey and Assessment Methods

Surveys for raptors with emphasis on detection of SWHA, American peregrine falcon, northern harrier and short-eared owl were conducted during in 2007. The one-mile buffer was evaluated for potential raptor habitat, according to the CEC Draft Survey Guidelines and was also scanned for raptors during driving surveys. All raptor and nonraptorial soaring bird species were identified and their locations were recorded using GPS units. Inactive and currently active nests were also noted and recorded using GPS. Reported observations of species from previous surveys were also noted and investigated during raptor surveys. See Appendix F.1 (Attachment 15) of the AFC, and the response to CURE Data Request Set 1, for detailed description of the 2007 raptor surveys.

During the raptor assessment, several raptor species were documented that did not have the status of federally or state listed, or status as a CDFG SSC, such as species designated by CDFG as Watch List species, including the Cooper's hawk (*Accipiter cooperi*), prairie falcon (*Falco mexicanus*), and merlin (*Falco columbarius*).

Subsequent to the submittal of the AFC, the Applicant agreed to conduct focused surveys for two additional raptor species, the golden eagle (*Aquila chrysaetos*) and SWHA. Both surveys currently are being conducted, using methodologies approved by USFWS and CDFG.

Helicopter-based golden eagle surveys currently are being conducted in accordance with the USFWS Interim Guidelines for Golden Eagle survey guidelines (USFWS 2010), to record and report occupancy (Phase 1) and productivity (Phase 2) of resident golden eagles including the documentation of individual activities, nests and territories on and surrounding the Project Area, and within an approximate 10-mile radius of the proposed project. Two helicopter surveys will be conducted. The first (Phase 1) was conducted on March 24, 2010 and the second (Phase 2) is scheduled for late May 2010.

In discussions with CDFG biologist Eric Weiss, it was determined that a SWHA survey methodology should be used based on modifications to the existing Swainson's Hawk Nesting Survey Guidelines for the Central Valley (Swainson's Hawk Technical Advisory Committee, May 31, 2000). AECOM biologists consulted Pete Bloom, a leading SWHA expert, to develop the modified survey methodology. Surveys for nesting SWHA currently are being conducted by driving paved and dirt roads at five (5) miles per hour throughout appropriate habitat within the Project Area and a 5-mile buffer surrounding the site. All raptor and corvid nests (e.g., ravens and crows) are being recorded and mapped using a Global Positioning System (GPS) during surveys. The first of two surveys occurred on April 29, 2010, and the second survey is anticipated to occur in mid-June, to ensure that the surveys occur during periods of SWHA peak nesting activity. These surveys are intended to address potential project effects on foraging and breeding habitat for the Swainson's hawk, per direction provided by CDFG.

Results

Survey results for raptors and other special status wildlife species that were detected or have the potential to occur within the Project Area and adjacent survey buffers (such as the desert tortoise ZOIs, CEC 1-mile buffer, etc.) are summarized in Table Biological Resources-1.

Golden Eagle. During the 2007 winter raptor survey, a golden eagle was documented perching on a transmission tower outside of the Project Area, southwest of the site. The 2010 nesting season golden eagle surveys currently are being conducted, with the first of two helicopter surveys completed on April 24, 2010. No nesting golden eagles were documented within the survey area, which included the Project Area and a 10-mile buffer extending beyond the Project Area boundary. However, one active golden eagle nest and an inactive nest were documented approximately 1,000 feet north-northeast of the Project Area, outside of the 10-mile survey area. The second survey is scheduled for May 2010.

Swainson's Hawk. Suitable nesting and foraging habitat for SWHA occurs within the Project Area in the form of large ornamental trees at occupied and abandoned residences and open active and fallow agricultural fields. A single SWHA was observed perched on a small shrub within the Project Area on June 20, 2007, during a raptor survey, and a pair of SWHAs was observed soaring over the Project Area on August 13, 2007, during a WBO survey. At least two (2) large, empty stick nests were also found within the one-mile buffer; however, no birds were seen using these nests and the bird species that bred using these nests cannot be determined. The first of two (2) focused SWHA nesting season surveys, conducted on April 29, 2010, did not document any SWHA individuals or nests within the Project Area or the 5-mile survey buffer beyond the Project Area boundary. Although the final nesting season survey has not been completed, the preliminary survey results indicated that SWHA does not nest within or adjacent to the Project Area.

American Peregrine Falcon. One American peregrine falcon, likely a transient, was detected within the Project Area during WBO surveys, perched on the ground north of the active agricultural field on August 14, 2007.

Northern Harrier. Harriers were detected twice in the one-mile buffer north of the Project Area: on May 30, 2007, during DT surveys, and on August 22, 2007, during

WBO surveys. This species also was detected within the Project Area during 2006 reconnaissance surveys (EREMICO, 2006).

Short-eared Owl. One short-eared owl was observed within the Project Area during reconnaissance surveys in 2006; however, because this species tends to be active both day and night and no subsequent observations were recorded, it is likely that this individual was a transient and did not breed within the Project Area.

Cooper's Hawk. A Cooper's hawk was observed flying over the BRSA during DT surveys in 2008. It would not be expected to nest within the BRSA due to lack of suitable habitat. The species typically nests in relatively large trees, and in areas of dense patches of trees. Within the Project Area there is a relatively sparse occurrence of trees within and adjacent to the Project; therefore, there is a low probability that the Cooper's hawk would nest on-site.

Merlin. The merlin was documented within the fallow agricultural fields in the Project Area during both DT and WBO surveys in 2008.

Prairie Falcon. Prairie falcons were observed twice within the Project Area: a pair was observed soaring just west of the Project Area during DT surveys and a single individual was observed hunting in the active agricultural area on two (2) consecutive days (August 22 and 23, 2007) during WBO surveys. This species also was detected during reconnaissance surveys of the Project Area in 2006. Suitable prairie falcon nesting habitat occurs on the desert bluffs approximately eight (8) miles northeast of the Project Area but not within the Project Area.

Other Special Status Wildlife

During the general wildlife surveys conducted concurrently with protocol wildlife surveys and vegetation mapping during 2007, 2008, and 2009, other special status wildlife species were surveyed, documented, and mapped. It was determined that due to lack of suitable habitat, protocol-level surveys were not required for willow flycatcher or western snowy plover. Surveys for two (2) other special status species with potential to reside within the BRSA (loggerhead shrike [*Lanius ludovicianus*] and American badger [*Taxidea taxus*]; both of which are CDFG Species of Special Concern) were performed. Survey results for other special status wildlife species that were detected or have the potential to occur within the BRSA are summarized in Table Biological Resources-1.

Loggerhead Shrike. Suitable breeding and nonbreeding habitat for loggerhead shrike occurs throughout the BRSA. Loggerhead shrikes were observed during biological surveys of the BRSA. Loggerhead shrikes were observed in the Project Area during 2007 and 2009. This species also was detected during 2006 reconnaissance surveys (EREMICO, 2006; EDAW, 2006).

American Badger. The American badger was not detected during 2007/2008 surveys; however, one badger den was detected within the Project Area during reconnaissance surveys in 2006 (EREMICO, 2006). The den was partially filled in and no recent badger sign was evident, indicating that the den likely had not been used recently.

Kit Fox. Although the Mojave Desert population of kit fox (*Vulpes macrotis)* is not considered special status by USFWS or CDFG, the species is protected under CCR §460

and CDFG has expressed interest in analyzing impacts and developing avoidance measures for projects that occur in occupied or potentially occupied kit fox habitat. Two kit fox dens were documented within the Project Area during DT surveys conducted in 2009. The dens were not previously documented during prior surveys conducted for the Project. However, desert kit fox scat and digs were detected during the constraints level habitat assessments, near a WBO complex, and a juvenile female, which had been struck by a vehicle, was observed at the intersection of Lockhart Road and Harper Lake Road (EDAW, 2006).

3.2.B.2.3 Wildlife Movement Corridors

The Project Area has been previously disturbed through agricultural activities, and biological surveys of the Project Area, conducted annually from 2007 through 2009, indicate that there is only a relatively low level of use by wildlife species. Additionally, the Project would not result in the severing, blocking, or constriction of any natural vegetation that connects areas of native desert.

Since the Project Area has been intensively disturbed by historic and ongoing agricultural activities, there are no topographical or habitat features on the Project Area that would facilitate wildlife movement. Additionally, an existing, somewhat degraded series of wire fences currently parallels portions of Harper Lake Road, providing a barrier to wildlife movement through the Project Area.

The current relatively small size of the artificial wetland area (approximately 0.5 acre) located 850 feet northwest of the Harper Lake Watchable Wildlife Area is not expected to provide a significant stop-point for migratory birds. As such, Harper Dry Lake and the surrounding area, including the Project site, is not part of a major avian migratory flyway. Nor would this small area, characterized by halophytic vegetation and periodic inundation, provide an important site for terrestrial wildlife to congregate. There is ample open space south and west of the Project Area for movement and genetic flow to occur. In summary, the Project would not result in any new severing, blocking, or constriction of any natural vegetation that connects areas of native desert open space.

3.2.B.2.4 Construction Impacts to Wildlife

Project development will result in the loss of approximately 1,765 acres of primarily former agricultural land and previously disturbed areas. Wildlife will be directly and indirectly impacted by the physical clearing of the site. Wildlife occurring in the site will be impacted or displaced. Those occurring adjacent to the site may be temporarily impacted by the construction activity levels, noise, increased vehicle traffic, dust, night-time lighting, and habitat fragmentation. Without appropriate mitigation and conservation measures, the increased construction activity may also attract or provide subsidized resources for an increased number of native and non-native predators.

Direct permanent impacts could potentially occur to DT and MGS as a result of impacts to 430.6 acres of mainly fallow agricultural and disturbed areas that have a prevalence of saltbush scrub regrowth within the Project Area. These areas represent poor quality habitat that would not be expected to support maintenance or recovery of the species, and would arguably not support an individual DT. The Project would not impact any desert tortoise critical habitat.

Direct permanent impacts could occur to WBO through the disturbance of 1,644 acres within the Project Area that support habitat variables that are conducive to use by WBO as foraging habitat. However, repeated surveys of the Project Area and adjacent lands indicate that WBO do not consistently use the Project Area as foraging habitat.

The project includes design features that are intended to minimize and avoid impacts to listed species, special status species, and common species. The Applicant will also implement a comprehensive list of conservation measures to avoid, minimize and mitigate indirect and direct impacts during construction.

These measures include preconstruction DT clearing and relocation, typical environmental awareness and biological monitoring as well as funding to protect DT, such as payment into the planned USFWS regional raven monitoring and control program. All of the various avoidance, minimization, and conservation measures proposed by the Applicant are described in detail in the Project's AFC, Biological Assessment (including the Desert Tortoise Relocation and Translocation Plan) (AECOM, 2010), and the Application for California Endangered Species Act Section 2081(b) Incidental Take Permit (AECOM, 2009). Desert tortoises will be removed from the site and relocated to appropriate habitat nearby. Tortoise relocation will include post relocation monitoring through an agency-approved plan. Efforts will be made to properly relocate and/or exclude other encountered wildlife such as burrowing owls and badgers. Some tortoise recovery actions have the potential to also benefit other wildlife species that will be affect by the proposed Project.

3.2.B.2.5 Operations Impacts to Wildlife

Potential impacts associated with Project operations were evaluated to determine whether biological resources would be significantly affected. Potential direct and indirect impacts associated with Project operations and the measures designed to avoid, minimize and mitigate those potential impacts include the various actions and measures described in the AFC, Biological Assessment, CESA ITP Application, and those measures outlined in the Conditions of Certification (as revised in the Applicant's testimony).

Operation of substations and transmission infrastructure has the potential to impact avian wildlife through electrocution hazards. Therefore, transmission lines and poles will be designed and constructed with appropriate spacing between conductors and/or bonding wires to avoid electrocution of large birds, as described in APLIC 1996 "raptor-friendly" guidelines (APLIC 1996).

Generally, continuous low noise levels from operations does not adversely impact wildlife, as wildlife usually becomes accustomed to routine background noise. Bright night lighting could disturb wildlife (e.g., nesting birds, foraging mammals, and flying insects). Night lighting also may distract and/or attract migratory birds to areas and, if the lights are on tall structures, collisions could occur. The area is not within migratory pathways, and lighting would be low on the structures, pointed downwards, and hooded to minimize impacts.

Operations could attract increased numbers of native and non-native predators. The Applicant will exclude wildlife from water collecting basins, contain food-related trash, and implement an agency-approved raven control plan.

3.2.B.2.6 Potential Cumulative Impacts to Wildlife

Due to high levels of human activity in the area, habitat loss, degradation, and fragmentation are considered significant issues in the western Mojave Desert (BLM, 2005). However, given the current disturbed and degraded nature of the MSP site, development of this area would result in the loss of former agricultural lands that currently support approximately 430.6 acres of sparse, disturbed saltbush scrub regrowth vegetation, which could be used sporadically by transient DT or MGS. The loss of habitat for special status species will be mitigated by the requirement for the Project to acquire and permanently protect suitable habitat for these species off-site.

Providing compensation in the form of permanently protected off-site mitigation acreage, combined with other mitigation measures described below to minimize the effects of Project activities on biological resources, will reduce the Project's potential cumulative biological impacts to a level that is less than significant.

Based on a review of data obtained from the County Planning Department, no other large development projects are currently underway or planned in the immediate vicinity of the MSP. Additionally, the County has not documented any medium-sized current or future projects on undeveloped or undisturbed lands within the extent of coverage for this cumulative analysis. One small-sized project has been identified by the County within the area covered by this cumulative analysis, the approximately 80-acre Nursery Products, LLC, Sludge Plant bio-solids composting facility (Sludge Plant), proposed to be located within the Fremont-Kramer DWMA, south of Highway 58, west of Helendale Road. Since the Sludge Plant was proposed for construction and operation on private property, the Environmental Impact Report (EIR) prepared in 2006 incorporated mitigation measures outlined in the West Mojave Plan to mitigate impacts to the DT and MGS to below a level of significance, including preparing a federal Habitat Conservation Plan and a state ITP application for effects on the desert tortoise and Mohave ground squirrel (URS 2006). Although the San Bernardino County Superior Court issued a judgment on June 23, 2008, requiring the County to prepare a revised EIR to address concerns over air quality and water resources, it is anticipated that the biological resources analysis will remain unchanged, and will continue to follow the mitigation requirements outlined in the 2006 Sludge Plant EIR.

One past project, the Harper Lake SEGS to the northwest of the MSP, has been built and has been in operation since 1990. The Harper Lake SEGS is similar to the MSP, in that they are both solar-thermal electrical generating facilities. Due to the relative proximity of the Harper Lake SEGS to the MSP, the biological resource types affected by each project are somewhat similar, although the degree to which the MSP affects biological resources is expected to be much less, due to the highly disturbed nature of the proposed MSP site, as well as the existing conditions at the Harper Lake SEGS (e.g., evaporation ponds and roosting structures).

The Project's impacts to relatively low-quality habitat, would contribute a negligible amount to the cumulative effects to wildlife, relative to the foreseeable projects within the region.

3.2.B.2.7 Permitting Overview

Applicable Federal, State, and local LORS are described in the AFC and summarized in Table Biological Resources-2. These LORS were reviewed and appropriate agencies were consulted to ensure compliance with all applicable requirements. Through on site field surveys, agency consultations and guidance, Project design modifications, and proposed protection measures, the Project will conform to all applicable LORS for protection of biological resources. These LORS are outlined in the Project's AFC. Combined with measures included in the CEC Conditions of Certification, and the Biological Assessment, the Project will avoid and minimize impacts to all special status wildlife species.

3.2.B.2.8 Mitigation for Wildlife

Project design features and avoidance measures, especially site fencing, a preconstruction DT clearance, an agency-approved DT relocation/translocation plan, and the conservation of 118.3 acres of high quality DT habitat as compensation lands will minimize potential direct impacts to DT as a result of Project construction and operations. Implementation of the avoidance, minimization and mitigation measures will reduce and fully mitigate the MSP's direct impacts to DT. There also will be no direct impact to DT designated critical habitat because the proposed Project is not located within and will not affect designated critical habitat for DT.

Indirect impacts to DT in the area in the vicinity of the MSP as a result of raven depredation, sediment deposition, connectivity and movement (AECOM 2010) also were evaluated. The addition of evaporation ponds as part of the Project represents only an expansion of existing, identical facilities at the nearby SEGS facility, and therefore is not likely to result in a biologically significant increase in the local raven population. More importantly, however, the MSP is likely to result in a substantial benefit to DT by removing common raven subsidies (e.g., freshwater, rodents, rodents and rabbits killed during harvesting) that currently exist due to agricultural activities on the Project site.. In addition, the Applicant will avoid and minimize potential impacts to DT from ravens through implementation of a raven control and monitoring plan (which may include participation in a regional USFWS raven program). n monitoring and management programs.

MSP will have little to no effect on hydrology associated with DT habitat adjacent to the site.. Desert tortoise habitat generally only occurs upstream (i.e. south and southwest) of the MSP site, and therefore will not be affected by MSP. Downstream, there is a small amount of remnant saltbush scrub in Section 28 that may be occupied by DT, although there was no evidence of DT use during all surveys. Further, the natural hydrology that supports this area has been cut off by agriculture for many decades. The MSP design will return flows to this area. Erosion from the site that could affect sediment deposition into this area would be minimized by grading, compaction, and other surface amendments. There is no designated DT critical habitat downstream of the Project..

The Project Area will not create an impediment to normal movements or gene flow. The small area in the eastern edge of the Alpha site along Harper Dry Lake is characterized by halophytic vegetation and periodic inundation; therefore, it likely does not include DT habitat. There is ample uninterrupted, higher quality, occupied habitat south and west of the Project Area for movement and genetic flow to occur within the DWMAs and designated DT critical habitat.

Translocation of DT that may be found during clearance surveys, which are anticipated to be none or very few on the Plant Site, will occur into habitat immediately outside of the DT-proof fencing. This measure would facilitate tortoises being minimally disturbed because, in all probability, they will simply be moved into another part of their home range.

In summary, there will be no direct or indirect effects to DT, the population, or species recovery that are not fully mitigated by project design features and Project conservation measures.

In addition to incorporating impact avoidance and minimization measures into the Project, the Applicant has also engaged in discussions with CDFG and USFWS, regarding potential mitigation scenarios to compensate for Project impacts to the desert tortoise. Based on the relatively disturbed nature of the Project Area, it is anticipated that the Applicant will provide for the conservation of 118.2 acres of high quality suitable habitat for the DT. The Applicant has tentatively identified an Applicant-owned parcel to the west-northwest of the Project Area, within designated DT critical habitat (Superior-Cronese Critical Habitat Unit), as the compensation lands. A habitat assessment was conducted for the prospective compensation area, which supports intact, natural stands of creosote bush scrub and saltbush scrub, and a desert dry wash. The compensation site currently is occupied by DT and contains habitat features that are suitable for MGS and WBO.

Because the compensation area is located entirely within designated DT critical habitat, it will foster the long-term protection of an area essential to the recovery of the species. The three vegetation communities on the compensation lands - Mojave creosote bush scrub, desert saltbush scrub and Mojave desert wash scrub – are intact and represent good quality DT habitat. Importantly, the habitat is fully connected to good quality DT habitat. DT sign were observed during reconnaissance and earlier surveys for DT in and adjacent to the compensation area (AECOM 2010).

The proposed conservation of 118.2 acres of high quality habitat suitable for DT also would concurrently fully mitigate potential impacts to MGS, in conjunction with implementing the Project's impact avoidance and minimization measures. It is also anticipated that the 118.2 acres of land proposed for conservation would provide compensation for impacts to WBO. If, upon final analysis, the entire compensation requirements for MGS and WBO cannot be satisfied with the proposed compensation area, the compensation requirements will be satisfied either with additional lands, or with the payment of a fee to be agreed upon by all applicable parties.

Considering that the ongoing surveys for golden eagle and SWHA have not documented either species as nesting or foraging within the Project Area or within the survey buffers beyond the Project Area boundary, it is not anticipated that mitigation would be required for potential impacts to the golden eagle or SWHA. However, if upon completion of the surveys it is determined that the Project would result in significant impacts to these species, additional impact avoidance, minimization, and/or mitigation measures would be implemented as conditions of project approval.

As described in the CEC Staff Assessment and the Project's AFC, impacts would occur through the loss of low-quality foraging and breeding/nesting habitat of the various other

special status species documented within and adjacent to the Project Area. These impacts are considered negligible, considering that the Project was redesigned several times to avoid higher quality habitats. Therefore, impacts to these special status species are considered less than significant, and do not require mitigation.

3.2.B.2.9 Areas of Controversy

The timing of information submittals required by the Applicant is well-documented in the Conditions of Certification. However, the timing of the reviews and responses by the CPM and regulatory agencies is not always clearly outlined. The Applicant maintains that without clear timing requirements for all pertinent parties, there is the potential to reduce flexibility in the Project schedule. A compression of the construction schedule, due to undefined CPM and agency review periods may have the adverse effect of making it infeasible for Project construction to occur within the timeframe allowed by the various biological seasonal restrictions. The Applicant has suggested various timing schedules for CPM and regulatory agency input that would allow optimal flexibility between submitting the required documents and/or information for review, and obtaining approval, balanced against the needs of the Project construction schedule.

Condition of Certification BIO-3 in the Supplemental Staff Assessment requires that the Designated Biologist be approved at least 60 days prior to the approval of the Biological Monitor(s). The Applicant has proposed a change to BIO-3, where the qualifications for the candidate Designated Biologist and Biological Monitor(s) are submitted concurrently for approval.

Conditions of Certification BIO-6 and BIO-17 include CPM review periods that the Applicant feels are either too lengthy, or the review period is ambiguously defined. Therefore, the Applicant has proposed a 15 day review and response period for the CPM for BIO-6 and BIO-17.

Conditions of Certification BIO-18 and BIO-19 in the Supplemental Staff Assessment contain confusing and ambiguous language, regarding the timing and approval of documents. The Verification process outlines a redundant process where the CPM approves final documents previously approved by the CPM and pertinent regulatory agencies. The Applicant has revised BIO-18 and BIO-19 to clarify the review and approval process.

3.2.B.2.10 Wildlife References

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California Department of Fish and Game (CDFG), 1995. Staff Report on Burrowing Owl Mitigation. October 17, 1995.

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EREMICO Biological Services (EREMICO), 2006. Mohave Ground Squirrel Survey at the Proposed Harper Lake Dairy Park, Lockhart, San Bernardino County, California. Prepared by EREMICO Biological Services for ENSR Corporation. August 2006.

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URS Corporation (URS), 2006. *Draft Environmental Impact Report: Nursery Products Hawes Composting Facility.* State Clearinghouse No. 2006051021. Prepared for County of San Bernardino.Zarn, M., 1974. Burrowing Owl. U.S. Department of Interior, Bureau of Land Management. Technical Note T-N 250. Denver, Colorado. 25pp.

3.2.B.3 Botanical Resources

3.2.B.3.1 General Botanical Resources

Survey and Assessment Methods

Information on botanical resources was collected from: a pre-field review of available literature and existing natural resource data, and field surveys. A reconnaissance-level survey for the proposed Project Area was conducted in 2006 for the Project Area, and adjacent areas up to approximately 10 miles outside of the current Project Area boundary. General botanical surveys were conducted in 2007 and 2008, in order to refine existing vegetation mapping, and to compile a comprehensive list of plant species observed within and adjacent to the Project. These general botanical surveys were conducted concurrently with the focused, special status plant surveys that are described in detail below.

Results

The majority of the Project Area has low vegetative cover, with large expanses of barren ruderal areas and some patches of desert scrub dominated by *Atriplex* species (saltbush) that exhibit an aerial cover ranging from approximately five to 50 percent. Saltbush shrub

growth within the Project Area is mostly the result of recolonization into areas left barren and disturbed following decades of agricultural practices.

A total of 14 vegetation communities and other land cover types were mapped within the Project Area and one-mile buffer, with 12 of those occurring within just the Project Area (BTR contains representative photos of vegetation communities mapped within the Survey Area [i.e., primarily the lands outside of the Project Area boundary]). Table Biological Resources 3 summarizes the vegetation communities and other land cover types.

Table Biological Resrouces-3.
Vegetation Communities and Other Cover Types for the Project Area and One-Mile Buffer

Vegetation Communities and Other Cover Types (Holland Code)	Project Area (Acres)	One-mile Buffer (Acres)	Survey Area[1] (Acres)
Mojave Creosote Bush Scrub (34100)	6.0	3,176.5	3,182.5
Desert Saltbush Scrub (36110)	0.6	5,973.0	5,973.6
Disturbed – Desert Saltbush Scrub	1.1	164.9	166.1
Mojave Desert Wash Scrub (34250)	1.9	675.0	676.9
Alkali Marsh (52310)	0.0	42.6	42.6
Desert Sink Scrub (36120)	39.6	354.0	393.7
Unvegetated Dry Lake Bed	9.3	2,359.0	2,368.3
Tamarisk Scrub (63810)	13.2	126.2	139.5
Disturbed	256.1	399.3	655.4
Disturbed - Saltbush Scrub Regrowth	226.0	775.0	1,001.0
Fallow Agricultural - Saltbush Scrub Regrowth	202.9	34.8	237.7
Fallow Agricultural - Ruderal	832.7	1.9	834.6
Active Agricultural	122.6	0.0	122.7
Developed	66.6	1,109.2	1,175.8
Evaporation Pond (Developed)	0.0	23.1	23.1
Total Acreage[2]	1,778.7[3]	15,214.6	16,993.4

[1]The BRSA includes the Project Area and the one-mile survey buffer (as described in the CEC Draft Survey Guidelines [CEC,2007]) exterior to the Project Area boundary.
[2]Acreage totals for Project Area and one-mile buffer were rounded to the nearest tenth.
[3] The total acreage for all vegetation communities and other cover types within the Project Area (approximately 1,779 acres) is slightly different than the area calculated during the MSP land survey performed by engineers (approximately 1,765 acres). The variation in acreage is attributed to a difference in equipment used for determining acreage of said area (i.e., land survey versus GIS processing).

During 2008 botanical surveys, 149 plant species were detected in the Project Area and one-mile buffer and consisted of 134 native species (91 percent) and 14 nonnative species (nine [9] percent) (AFC Appendix F.1, Attachment 4). Year 2008 was a good rainfall year and plant growth was average or better. For comparison, 53 plant species were detected during 2007 botanical surveys consisting of 44 native species (83 percent) and nine (9) nonnative species (17 percent) (AFC Appendix F.1, Attachment 3). During 2008, native annuals totaled 61, whereas in 2007, native annuals totaled four (4). The abundance of both native annual and herbaceous perennial species (i.e., those that sprout from corms, tubers, etc.) in 2008 supports the fact that botanical surveys were adequate with respect to detectability of special status plants.

Surrounding the Project Area are three dominant vegetation communities that include, in order of abundance, desert saltbush scrub, Mojave creosote bush scrub, and Mojave Desert wash scrub. Desert saltbush scrub is most abundant within the Survey Area and is dominated by allscale (*Atriplex polycarpa*) and spinescale (*Atriplex spinifera*). Other shrub species found associated with desert saltbush scrub in the Project Area include winter fat (*Krascheninnikovia lanata*), horsebush (*Tetradymia canescens*), and spiny senna (*Senna armata*). Mojave creosote bush scrub in the Survey Area is dominated by creosote bush (*Larrea tridentata*) spaced on average 15 to 25 feet apart, with subdominant species mainly represented by white bursage (*Ambrosia dumosa*). Mojave Desert wash scrub is present surrounding the proposed MSP within dry washes that lead from all directions to Harper Dry Lake. The dominant species in Mojave Desert wash scrub include cheesebush (*Ambrosia* [*Hymenoclea*] *salsola*), Anderson's boxthorn (*Lycium andersonii*), and peachthorn (*Lycium cooperi*). Other shrub species found associated with Mojave Desert wash scrub in the Survey Area include Johnson's indigo bush (*Psorothamnus arborescens* var. *minutifolius*), and white bursage. In addition to the three (3) dominant vegetation communities within the Survey Area, desert sink scrub and tamarisk scrub exist along the margin of the Harper Dry Lake. Desert sink scrub in the Survey Area consists mainly of annual bursage (*Ambrosia acanthicarpa*), five-hook bassia (*Bassia hyssopifolia*), and bush seepweed (*Suaeda moquinii*), and tamarisk scrub consists of tamarisk (*Tamarix ramosissima*) trees.

3.2.B.3.2 Special Status Plants

Special Status Plant Survey Methods

All botanical surveys (general/focused) followed the rare plant and vegetation survey guidelines provided by the CNPS (CNPS, 2001) and CDFG (CDFG, 2000). Vegetation mapping was conducted on the proposed Project Area out to one (1) mile to comply with CEC recommended guidelines. CEC released *Draft Recommended Biological Resources Field Survey Guidelines for Large Solar Projects* (hereafter referred to as the CEC Draft Survey Guidelines) on May 31, 2007 (CEC, 2007). The entire proposed Project Area out to one (1) mile was completely surveyed for special status plant species.

During 2007 and 2008 general botanical surveys, vegetation mapping occurred for the proposed Project Area out to one (1) mile. The 2008 surveys verified that vegetation communities had not changed, and performing new mapping of any areas not included in 2007 mapping. Vegetation communities were classified based on Holland's *Preliminary Descriptions of the Terrestrial Natural Communities of California* (1986).

Comprehensive biological resource surveys designed to meet all applicable CEC, CDFG, and USFWS requirements. CDFG and USFWS representatives were consulted, regarding the scope and type of surveys conducted during each of the survey years. Focused botanical surveys for special status plants were conducted in 2007, 2008, and 2009 by qualified biologists throughout the proposed Project Area out to one (1) mile (EDAW, 2007, EDAW 2009a; EDAW, 2009b). Field crews ranged from two to six surveyors. The survey time window and subsequent field visit dates were selected to maximize the potential for accurate identification of special status plant species when distinctive features such as flowers for vascular plants are present.

The following special status plant species were identified as having the potential to occur within or near the Project Area.

CNPS List 1B or 2

- chaparral sand-verbena (*Abronia villosa* var. *aurita*) – CNPS List 1B.1
- desert cymopterus (*Cymopterus deserticola*) – CNPS List 1B.2
- recurved larkspur (*Delphinium recurvatum*) – CNPS List 1B.2
- Barstow woolly sunflower (*Eriophyllum mohavense*) – CNPS List 1B.2
- sagebrush loeflingia (*Loeflingia squarrosa* var. *artemisiarum*) – CNPS List 2.2
- Mojave monkeyflower (*Mimulus mohavensis*) – CNPS List 1B.2
- Utah glasswort (*Salicornia* [*Sarcocornia*] *utahensis*) – CNPS List 2.2

Several invasive weeds occur in the Project Area and one-mile buffer, largely as a result of anthropogenic development. The following invasive plant species (in order of abundance) are present in the Project Area and one-mile buffer and are listed as having "severe" to "moderate" Invasiveness by the California Invasive Plant Council (Cal-IPC): Russian thistle (*Salsola tragus*), herb Sophia (*Descurania sophia*), Saharan mustard (*Brassica tournefortii*), London rocket (*Sisymbrium irio*), tamarisk, slender wild-oat (*Avena barbata*), red brome (*Bromus madritensis* ssp. *rubens*), cheat grass (*Bromus tectorum*), and hare barley (*Hordeum murinum*) (Cal-IPC, 2006). Russian thistle and tamarisk were the most abundant invasive weeds in the Survey Area and mainly occur in disturbed areas at the margin of Harper Dry Lake.

Special Status Plant Survey Results

No CDFG rare, state listed, or federally listed plant species were detected within the Project Area and one-mile buffer during 2007, 2008, or 2009; however, three special status plant species were detected in one-mile buffer area: desert cymopterus, Mojave fish-hook cactus, and Mojave spineflower but not within the Project Area.

In 2008, a single occurrence of desert cymopterus was observed growing in an open area of a small sandy wash approximately 1,350 feet southeast of the intersection of Santa Fe Avenue and Harper Lake Road and outside the Project Area. Dominant plant species found growing in the wash where desert cymopterus was detected include shrubs, cheesebush, and white bursage, as well as annual species including Mojave pincushion, woolly easterbonnets, redroot cryptantha (*Cryptantha micrantha*), bristly fiddleneck (*Amsinckia tessellata* var. *tessellata*), and desert dandelion.

3.2.B.3.3 Areas of Controversy

The Applicant has proposed avoidance and minimization strategies that will minimize and avoid potential impacts to special status plants in the Project Area. The CEC has proposed two Conditions of Certification, BIO-8 and BIO-9, which would require preconstruction surveys for desert cymopterus (*Cymopterus deserticola*), and that temporarily disturbed areas be restored and revegetated with native desert plant species. The Applicant's project design would result in only permanent impacts to the Project Area, and therefore no temporary impacts would occur that could potentially be restored and revegetated. The Applicant's 2007, 2008, and 2009 botanical surveys were conducted, where up to six (6) qualified biologists searched for special status plants species, did not result in any special status plant species detections in the Project Area. The Applicant has proposed the deletion of BIO-8 and BIO-9, as being unnecessary for implementation of the Project.

3.2.B.3.4 Botanical Resources References

California Department of Fish and Game (CDFG), 2000. Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened, and Endangered Plants and Natural Communities.

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3.2.B.4 Jurisdictional Waters of the U.S. and State

Based on field studies, and regulatory input and guidance provided by the U.S. Army Corps of Engineers (USACE) and U.S. Environmental Protection Agency (USEPA), it was officially determined that no federally jurisdictional wetlands or waters occur within the Project Area. The CDFG has reviewed a Streambed Alteration Agreement application submitted to the CEC and CDFG, and has determined that although there are waters of the State, in the form of isolated patches of tamarisk scrub, no significant impacts would occur to these areas.

Survey and Assessment Methods

Presurvey Investigations

Prior to conducting field investigation, AECOM reviewed historical land use and climactic data. AECOM also identified areas with topographical configurations in the Project Area and previously mapped riparian areas, wetlands, waters, and/or hydric soils that may suggest the potential or presence of jurisdictional waters of the U.S. and State at the time of the field survey.

Field Survey for Waters of the U.S.

Jurisdictional waters of the U.S. include those waters listed in 33 CFR 328.3. All waters of the U.S. were delineated to their jurisdictional limits as defined by 33 CFR 328.4. On April 14, 2009, a formal jurisdictional delineation and assessment of potentially regulated waters (including wetlands) was conducted within the Project Area by an AECOM ecologist. Jurisdictional waters of the U.S. were delineated pursuant to the criteria outlined in and in accordance with:

- The *Corps of Engineers Wetlands Delineation* (Manual) (Environmental Laboratory 1987).
- The *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Version 2.0) (Regional Supplement) (Environmental Laboratory 2008).
- *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States: A Delineation Manual* (USACE 2008).

- *Distribution of Ordinary High Water Mark (OHWM) indicators and their reliability in identifying the limits of "Waters of the United States" in arid southwestern channels* (Lichvar et al. 2006)

- Other relevant Federal guidance and procedural documents (e.g., USACE Regulatory Guidance Letters).

Although the entire Project Area was surveyed and assessed for jurisdictional waters of the U.S. and State (including wetlands), it was determined through field reconnaissance and assessment that only the portion of the Project Area that contains Harper Dry Lake has the potential to include federally regulated waters. The two types of Federal waters potentially present in Harper Dry Lake warranted field assessments composed of formal wetland delineations based on the three-parameter method outlined in the USACE Manual and the Regional Supplement (the simultaneous presence of wetland hydrology, hydric soil, and hydrophytic vegetation) to define the presence and jurisdictional extent of regulated waters in the form of wetlands defined by these procedural manuals; and formal surveys for field indicators of drainage features and unvegetated waters to define the jurisdictional lateral extent by utilizing indicators of OHWM (33 CFR 238.3[e]).

All potential nonwetland waters of the U.S. (e.g., the lakeshore and/or drainage features) were delineated within the Project Area utilizing the definition of OHWM and relevant guidance and procedural documents (e.g., Regulatory Guidance Letter [RGL] 88-06, RGL 05-05 and *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States: A Delineation Manual* [USACE 2008]). A positive determination for nonwetland jurisdictional waters of the U.S. would be made only for areas that did not meet all three wetland parameters outlined within the Manual and 2008 Supplement guidance but were within the lateral extent of established OHWM.

The jurisdictional delineations were conducted in accordance with Part IV (Methods), Section D (Routine Determinations), Subsection 2 (Onsite Inspection Necessary) of the Manual's "Routine Determinations for Areas Greater Than Five Acres in Size." The Manual recommends that a baseline be established that parallels the major watercourse(s) through the area and that the maximum distance between transects (intervals) for linear delineations does not exceed 0.5 mile. For this delineation, transect intervals for major and significant watercourses occurring within the Project Area did not exceed 0.25 mile. Obvious upland areas were not mapped as part of this analysis as they did not represent wetland and/or riparian communities that warranted a formal jurisdictional delineation.

Where feasible, the baseline for establishing the transect (and field data point) locations was situated in nonjurisdictional (i.e., upland and/or nonriparian) habitat so that the initial observation points of each transect were likely outside wetland boundaries or on either side of the potential jurisdictional waters (OHWM and/or wetland), and extended across the jurisdictional features to nonjurisdictional habitat on the opposite side. This baseline placement ensured that the outer observation point for each transect was also located in

nonwetland habitat, allowing for accurate demarcation of the limits of potentially jurisdictional areas. Two transects, providing a cumulative total of four data points, were completed throughout the Project Area for the field delineation and this report. In most instances, additional soil pits were dug between observation points to accurately determine the wetland boundary.

To determine the presence of hydric soils, subsurface soil taken from soil pits (field data points) was analyzed visually for redoximorphic features using *Field Indicators of Hydric Soils in the United States: A Guide for Identifying and Delineating Hydric Soils* (USDA 2006). A field diagnostic test for determining the presence or absence of iron reduction and identifying aquic conditions using α, α' Dipyridyl was also applied in select areas. The soil test pits were also evaluated for the presence of subsurface wetland hydrology indicators such as soil saturation, oxidized root channels, and hydric soil indicators.

An area was determined to support hydrophytic vegetation if more than 50 percent of the dominant species were listed as Obligate Wetland (OBL), Facultative Wetland (FACW), or Facultative (FAC) species on the U.S. Fish and Wildlife Service *National List of Plant Species That Occur in Wetlands: California (Region 0)* (Reed 1988). Vegetation was assessed using the "50/20 Rule" to determine dominant species. By definition, dominant species are the most abundant plant species (when ranked in descending order of abundance and cumulatively totaled) that immediately exceed 50 percent of the total dominance measure (e.g., basal area or areal coverage) for the stratum, plus any additional species that individually comprise 20 percent or more of the total dominance measure for the stratum (Tiner 1999). All observation points were also surveyed for the presence of surface wetland hydrological field indicators, such as inundation, saturation, water marks, drift lines, drainage patterns, and sediment deposits occurring within a hydrophytic vegetation community.

All field data points and upland/jurisdictional waters boundaries were surveyed for the presence (including extents, types, and boundaries) of potential jurisdictional waters using Trimble XH sub-foot accuracy Global Positioning System (GPS) handheld units. All field data were post-field processed using Trimble GPS Analyst (Version 2.1) geographic information system (GIS) software. Post-field analysis to code, define, designate, and edit all acquired GPS field data representing jurisdictional waters occurring within the Project Area was conducted in tandem with an EDAW GIS specialist and the ecologist who performed the fieldwork. The Wetland Determination Data Forms — Arid West Region (Version 2.0) completed for the Project are included as Attachment B to this report.

Field Survey for Waters of the State

Jurisdictional waters of the State were delineated either to the head of the playa bank and/or to the edge of the scattered and limited riparian canopy composed of tamarisk (*Tamarix ramosissima*), abutting or in immediate proximity to Harper Dry Lake occurring within the Project Area. Riparian habitats do not always have identifiable hydric soils or clear evidence of wetland hydrology as defined by USACE. Therefore, CDFG wetland boundaries often

extend beyond USACE wetland boundaries, which may include only portions of the riparian habitat adjacent to a river, stream, or lake. Jurisdictional boundaries for State waters may encompass an area that is greater than that under the jurisdiction of USACE. The findings for each potential jurisdictional water and wetland parameter(s) were recorded for each of the field datapoints taken within the Project Area (Table 1).

Survey Results

Table 1
Survey Results for Potential Jurisdictional Waters[a]
Occurring within the Project Area

Sample Point	Vegetation Community	Wetland Hydrology	Hydric Soils	Hydrophytic Vegetation	Potential Federal Waters	Potential State Waters	Comments
T1.1	Desert Sink Scrub		+		no	no	Upland
T1.2	Playa lakebed	+	+		yes	yes	Alkali playa. Federal status to be confirmed via jurisdictional determination process
T2.1	Playa lakebed	+	+		yes	yes	Alkali playa. Federal status to be confirmed via jurisdictional determination process
T2.2	Tamarisk scrub	+	+	+	yes	yes	Federal status to be confirmed via jurisdictional determination process

[a] As defined by 33 FR 328.3, 33 CFR 328.3; 40 CFF 230.3; the Manual; and the 2008 Supplement.

Vegetation and Other Cover Types

This formal jurisdictional delineation uses the Holland Code Classification System for vegetation communities (Holland 1986). Within the portion of the Project Area that contains Harper Dry Lake and supports potential jurisdictional waters, two vegetation communities occur as described below. The dry lake land cover type is also described below.

1. Disturbed Desert Sink Scrub (Holland Code 36120)

Desert sink scrub is similar to desert saltbush scrub and characterized as being dominated by chenopod type plants that grow on poorly drained soils with high alkalinity and sometimes with a layer of salt crust at the soil surface (Holland 1986). Within the Project Area, this vegetation community has been altered by previous human activity including grading, repeated clearing, and vehicular damage, which over time has degraded "naturally" occurring desert sink scrub resulting in a lower shrub density and an increased abundance of nonnative plant species. Within the Project Area, disturbed desert sink scrub includes five-horn smother-weed (*Bassia hyssopifolia*) intermixed with desert saltbush scrub mainly dominated by allscale (*Atriplex polycarpa*) and spinescale (*Atriplex* spinifera), with an established understory of nonnative herbaceous plants.

2. Tamarisk Scrub (Holland Code 63810)

Tamarisk scrub is characterized by a weedy, virtual monoculture of any of several *Tamarix* species, usually supplanting native vegetation following major disturbance (Holland 1986). Within the Project Area, this vegetation community is dominated by scattered stands, a planted windbreak, and a large stand intermixed with relictual alkali marsh.

3. Dry Lake (Alkali Playa) (Holland Code 46000)

Alkali playa is a low-growing vegetation community that typically occurs on poorly drained soils with high salinity. Alkali playa has a very low plant cover with wide spacing between shrubs. Alkali playas within the Project Area were mostly barren, with shadscale (*Atriplex confertifolia*) occurring along its margins.

Soils

Only those soils within the Project Area that are listed as hydric, have diagnostic hydric properties and/or features, have hydric inclusions, meet the criteria and/or definition for a hydric soil, or have the potential for being hydric by definition are addressed herein. Only those soils occurring within the Project Area that are listed on the National List of Hydric Soils (NRCS 2009a) are described below:

1. Dune Land

The Dune land soil unit consists of unstable hills and ridges of loose, wind-deposited sand. It is excessively drained and is barren. Typically, Dune land is a sand that is blown and shifted by the wind. Dunes vary in size and shape. Generally, Dune lands are less than 15 feet high, but some can be up to 25 feet high, with 5 to 15 percent slopes. Included in this unit are small areas of Cajon sand and Halloran between dunes (USDA 1986).

2. Playas

The Playas soil unit consists of very poorly drained areas on flats in closed basins. It is essentially barren of vegetation. Playas consist of stratified sediment that has accumulated as a result of surface runoff from the higher surrounding areas. The sediment is dominantly clay, but ranges from silty clay to loamy sand. Areas of Playas are strongly saline-alkali. Salt commonly accumulates on the surface (USDA 1986).

3. Cajon Loamy Sand, Loamy Substratum, 0 to 2 percent slopes and Cajon Sand, Loamy 0 to 2 percent slopes

The Cajon soil series consists of very deep, somewhat excessively drained soils that formed in sandy alluvium from dominantly granitic bedrock. Cajon soils are common on

alluvial fans, fan aprons, fan skirts, inset fans, and river terraces with slopes of 0 to 15 percent. The Cajon soil series is found in climates that average an annual precipitation of about 6 inches, and the mean annual temperature is about 65°F. This soil series is a mixed, thermic Typic Torripsamment-mesic. These soils are often found on stabilized dunes. Cajon soil is alkaline and the texture is single grained and loose, and presents little horizon development. Thin A horizons are the most apparent change from the parent material (stabilized dune sand) (USDA 1986; NRCS 2009b).

4. Norob-Halloran Complex, 0 to 5 percent slopes

The Norob soil series consists of very deep, moderately well-drained soils that formed from mixed alluvium, with many areas having eolian deposits on the soil surface. Norob soils are on alluvial plains and alluvial flats in the Mojave Desert with slopes of 0 to 5 percent. The Norob soil series is found in climates that average an annual precipitation of about 5 inches and the mean annual air temperature is about 65°F. This soil series is a fine-loamy, mixed, superactive, thermic Typic Natrargids-mesic. Narob soil is moderately alkaline and the texture is single grained and loose (USDA 1986; NRCS 2009b).

The Halloran soil series is deep, moderately well-drained soil that forms from mixed alluvium from granite bedrock. Halloran soils occur on old alluvial terraces and depressions with slopes of 0 to 2 percent. The Norob soil series is found in climates that average an annual precipitation of about 5 inches and the mean annual air temperature is about 65°F. This soil series is a mixed, thermic Typic Natrargids. The soils are usually associated with Cajon and Rosamond soils. Halloran soils have slow runoff and moderately low permeability, and pond after flooding. They support creosote bush scrub and four-wing saltbush vegetation. The Halloran soil series is moderately alkaline and the texture is coarse-loamy (USDA 1986; NRCS 2009b).

Hydrology

The Project Area is located within the southwest portion of the 1,829-square-mile Coyote-Cuddeback Lakes Watershed (HUC 18090207), which is part of the Mojave Desert region of California. The Mojave Desert is the driest desert in the continental U.S., with precipitation ranging from 2.23 to 2.5 inches a year, with much of the rain falling between October and March, and temperatures ranging from 40 to 110°F (SANBAG 2006). Perennial and intermittent rivers and streams are rare, and most water flow occurs in washes and flood-flow paths during major winter rain events that occur rarely (USGS 2004).

Hydrological inputs to Harper Dry Lake are from rainwater and approximately 35 acre-feet input of groundwater delivery administered by the U.S. Bureau of Land Management (BLM) to a designated area located approximately 2,000 feet southeast (and outside) of the Project Area. The nearest Relatively Permanent Water is the Mojave River, which during heavy rains, flows northeast into Soda Lake. The Mojave River is located more than 10 miles south of Harper Dry Lake. The 100-year and 500-year floodplains adjacent to the Mojave River within the City of Barstow are generally confined to the floodplain

adjacent to the river channel and do not exceed 0.25 and 0.5 mile lateral extent during 100- and 500-year events, respectively. Harper Dry Lake is a low point in the region; there are no drainages that flow out of Harper Lake. A dry wash flows northwest from the Mojave River through Hinkely Valley toward Harper Dry Lake, but only flows during extreme events and does not present itself as a relatively permanent connection between the Mojave River and Harper Lake.

Prior agricultural operations, which provided runoff that supported wetland development in the southwest portions of Harper Dry Lake during the mid- to late-20th century, began to decline after peaking in the late 1970s and early 1980s (BLM 2007a; Mundstock 1996). In 1997, agricultural operations stopped entirely, cutting off a supplemental water supply (beyond occasional rain) to Harper Dry Lake (BLM 2007a). Between the years of 1998–2001, the remaining wetland area within the southwest portion of Harper Dry Lake became completely dry (BLM 2007a). This condition would likely be permanent, except for temporary and transitory wetland/marsh periods related to exceptional precipitation events (Kubly and Cole 1979).

Although BLM initiated deliberate groundwater transfers into the southern marsh area in Harper Dry Lake (south and outside of the Project Area) in 2001 and 2002 to reestablish the wetland habitat (after the water delivery system was built by BLM [BLM 2007b]), the first formal record of dedicated water input for the marsh (occurring south and outside of the Project Area) was in 2003 (by BLM administrative request). Agricultural runoff, the former primary source of water for the wetland area, which significantly expanded and maintained suitable marsh habitat for avian species for approximately 30 years, had essentially ceased to exist by 1997, and the marsh threatened to dry up and disappear by reverting to a dry playa lake bed with a disturbed aquifer limiting or restricting natural groundwater surface seepage.

The cessation of agricultural runoff and the lowering of the water table from decades of large-scale irrigation had compounding adverse effects on the large portions of wetlands occurring within Harper Dry Lake, now in a relictual form within the Project Area. These effects prevent groundwater from collecting at the surface ("daylighting") through capillary action, and impact or destroy artesian wells/springs within the wetland area. Additionally, cessation of agricultural runoff removed effective wetland hydrology from the Project Area. However, the wetland hydrology indicator of "salt crust" remains and persists.

3.2.B.4.1 Jurisdictional Waters of the U.S.

The extent and distribution of the collective area of potential jurisdictional waters of the U.S. occurring within the Project Area is 11.03 acres. Potential jurisdictional waters of the U.S. are listed for each wetland habitat in Table 2. Wetlands (or in this case desert aquatic-related habitats) have been classified according to *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979). This classification system incorporates a hierarchical structure of systems, subsystems, and classes to

identify wetland and habitat types. The vegetation occurring within the Project Area is vegetation typically associated with disturbed areas occurring within this vicinity of California.

Table 2
Potential Jurisdictional Waters of the U.S. [a]
Occurring within the Project Area

Type of Jurisdictional Water of the U.S.	Type of Habitat (Holland 1986)	Type of Habitat (Cowardin et al. 1979)	Regulatory Authority[a]	Area of Aquatic Resource (Acres)[b]
Wetland	Tamarisk Scrub (63810)	Palustrine; Scrub/Shrub, Needle-Leaved, Evergreen, Seasonally Flooded/Saturated, Mixosaline, Alkaline	CDFG, RWQCB, USACE	1.59
Other Waters	Playa Lakebed (46000)	Lacustrine, Littoral, Unconsolidated Bottom, Sand, Intermittently Flooded/Temporary, Hypersaline, Alkaline	CDFG, RWQCB, USACE	9.44
Total potential USACE Waters =				**11.03**

[a] Jurisdictional waters of the U.S. are also jurisdictional waters of the State, as discussed below.
[b] Jurisdictional waters acreage within the Project Area was determined by utilizing ArcGIS. All acreages are rounded to the nearest hundredth.

3.2.B.4.2 Jurisdictional Waters of the State

Areas under potential State jurisdiction and CDFG regulatory administration include 1.59 acres of tamarisk scrub wetland and 9.44 acres of playa lakebed, as outlined in Table 2, and an additional 1.47 acres of riparian habitat (which does not meet the definition of a federal water [in the form of wetland] but meets the definition of a state water [in the form of riparian extent]), for a total area of approximately 12.50 acres of potential jurisdictional waters of the State. A summary of the additional potential jurisdictional waters of the State occurring within the Project Area is provided in Table 3.

Table 3
Potential Jurisdictional Waters of the State
Occurring within the Project Area

Type of Jurisdictional Water of the U.S.	Type of Habitat (Holland 1986)	Type of Habitat (Cowardin et al. 1979)	Regulatory Authority[a]	Area of Aquatic Resource (Acres)[b]
Lacustrine Riparian Extent	Tamarisk Scrub (63810)	Palustrine; Scrub/Shrub, Needle-Leaved, Evergreen, Seasonally Flooded/Saturated, Mixosaline, Alkaline	CDFG, RWQCB	1.47
Total potential CDFG Waters =				**12.50[b]**

[a] Jurisdictional waters acreage within the survey area was determined by utilizing ArcGIS. All acreages are rounded to the nearest hundredth.
[b] This total includes the 11.03 acres of potential jurisdictional waters of the U.S. which are also potential jurisdictional waters of the State, as listed in Table 2 and discussed above.

3.2.B.4.3 Federal and State Agency Discussions

Federal Waters

- On August 26, 2009, AECOM submitted a formal Jurisdictional Delineation Report (JDR) to the USACE (Los Angeles District) for the purpose of obtaining a jurisdictional determination of federal status. Based upon the latest federal guidance, AECOM contended in the accompanying Approved JD Form to the JDR that all delineated aquatic features occurring within the Project footprint and buffers were 'isolated' and thus not under the regulatory administration of the USACE and USEPA (e.g., the aquatic features were considered 'nonjurisdictional' waters of the U.S.)

- On January 14, 2010, AECOM conducted a field meeting with USACE (Mark Durham, USACE Section Chief and Stephen Estes, USACE Project Manager) for the purpose of conducting a jurisdictional determination.

- On February 26, 2010, the USACE issued an Approved Jurisdictional Determination Regarding the Absence of Geographic Jurisdiction, concluding that there are no waters of the United States on the project site (File No. SPL-2009-000928-SME).

- On February 26, 2010, the USACE issued a Determination Requirement for Department of the Army Permit, concluding that the proposed project is not subject to USACE jurisdiction under Section 404 of the Clean Water Act, and that a Section 404 permit would not be required from the USACE for the project as proposed (File No. SPL-2009-000928-SME).

State Waters

- On December 17, 2009, AECOM conducted a field meeting with the CDFG (Tonya Moore, CDFG Environmental Scientist) and the CEC (biologist Heather Blair) for verification of field findings of the jurisdictional delineation. During this field meeting informal discussions with CDFG and CEC were undertaken concerning potential mitigation measures for potential impacts to jurisdictional waters of the state as a result of the project. CDFG stated that they would not consider impacts to tamarisk scrub as substantial nor would CDFG require compensatory mitigation for such impacts.

- January 26, 2010 AECOM submitted a completed Notification of Lake or Streambed Alteration (SAA) as a component of the AFC. The SAA stated that:

a. No compensatory mitigation is proposed for permanent impacts to approximately 0.28 acre of tamarisk scrub and temporary impacts to approximately 1.46 acres of tamarisk scrub.

b. The storm channels will be designed and constructed following the flow design requirements of the San Bernardino County Flood Control District Design Criteria and will adhere to the San Bernardino County Hydrology manual to include flow bulking, erosion protection, and free-board. The downstream aquatic feature of Harper Dry Lake will not be indirectly or directly impacted because of minimal grading to construct and the attenuation design of the drainage channel outlet to restore off site flows to historical patterns, including historical volume, velocity and occurrence.

c. The ultimate design of the storm channels and spreading ground is contingent upon the final site and grading plans for the project and will be designed in conjunction with the approved, engineer's plans for the site. The outlet of the proposed drainage channel, in addition to the installation of gabion energy dissipater placed at the mouth, will be developed with minimal grading to ensure historical drainage volume, velocity and flow patterns of stormwater are maintained prior to entering Harper Dry Lake (the approximate dimensions of the proposed drainage outlet will be approximately 1400 feet wide and at a slope of less than 1%).

d. Operationally, the proposed Project would not alter the amount of impervious surface area. Accordingly, the amount of surface runoff would not increase substantially as a result of the Project and impacts related to on- or off-site flooding would be less than significant

e. The Project does not propose to discharge pollutants into any surface or ground waters. Construction activities do have the potential to temporarily impact water quality and wetlands. However, the DSECP will be incorporated during the construction process to avoid such potential impacts. Temporary impacts to tamarisk scrub also have the potential to occur from excavation activities or access to the site by construction equipment.

f. Operations and maintenance protocols approved by San Bernardino County would include installation of BMPs, a DSECP, and various other protocols to avoid or minimize impacts following operation and maintenance activities. Permanent erosion control will occur through the use of landscaping per the project plans. The DSECP defines temporary and postconstruction BMPs and will not be terminated until planned construction is ended.

3.2.B.4.4 Jurisdictional Waters of the U.S. and State References

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2007a *Harper Dry Lake Area of Critical Environmental Concern Wetlands Restoration Project: Environmental Assessment*. Barstow Field Office.

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3.3 Proposed CEC Licensing Conditions

The Supplemental Staff Assessment, Part B, for the Project filed by the CEC recommends that 21 Conditions of Certification (COCs) be adopted to avoid, minimize, or mitigate potential or anticipated impacts to biological resources. These measures include COCs BIO-1 through BIO-21. The Applicant proposes modification of the

following COCs: BIO-3, BIO-5, BIO-6, and BIO-17 through BIO-19. Subject to the general comments below, and the Applicant's Prehearing Conference Statement, the other COCs are acceptable. The Applicant proposes to revise the following conditions:

Proposed Revisions to BIO-3

The Applicant proposes to revise BIO-3 by allowing the submittal of qualifications for CPM approval of the Designated Biologist and Biological Monitor(s), concurrently. This revision will provide for flexibility in the timing of Project activities, since BIO-3 is currently written with the requirement that the Designated Biologist and Biological Monitor(s) would be submitted and approved as separate steps, thus lengthening the period of time before obtaining approval of the biologists working on the Project.

BIOLOGICAL MONITOR SELECTION, QUALIFICATIONS, AND DUTIES

BIO-3 The project owner shall submit the resume, at least three references and contact information, of the proposed Biological Monitors to the CPM, CDFG, and USFWS for approval, concurrently with the submittal of the information required for the candidate Designated Biologist (as described in BIO-1). The resume shall demonstrate to the satisfaction of the CPM, the appropriate education and experience to accomplish the assigned biological resource tasks, including:

- Biological Monitor(s) involved in any aspect of desert tortoise surveys or handling must meet the criteria to be considered a USFWS Authorized Biologist (USFWS 2008) and demonstrate familiarity with the most recent protocols and guidelines for the desert tortoise.
- Biological Monitor(s) involved in any aspect of Mohave ground squirrel surveys or handling must possess a California ESA Memorandum of Understanding pursuant to Section 2081(a) for Mohave ground squirrel or have adequate experience and qualifications to obtain this authorizations.

Biological Monitor(s) training by the Designated Biologist shall include familiarity with the conditions of certification and the Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP), Worker Environmental Awareness Program (WEAP), and all permits.

The Biological Monitors shall assist the Designated Biologist in conducting surveys and in monitoring of site mobilization activities, construction-related ground disturbance, grading, boring or trenching. The Designated Biologist shall remain the contact for the Project owner, BLM's Authorized Officer and the CPM.

Verification: The project owner shall submit the specified information to the CPM, CDFG, and USFWS for approval at least 60 days prior to the start of any pre-construction site mobilization, and concurrent with the submittal of information required for the Designated Biologist approval process outlined in BIO-1. The CPM, CDFG, and USFWS have 30 days to approve or deny proposed Biological Monitor(s).

The Designated Biologist shall submit a written statement to the CPM confirming that the individual Biological Monitor(s) have been trained including the date when training was completed.

If additional biological monitors are needed during construction, the specified information shall be submitted to the CPM for approval 10 days prior to their first day of monitoring activities.

Proposed Revisions to BIO-5

The Applicant proposes a 15-day review and response period for the CPM. The proposed revision is intended to help maintain the Project's schedule.

WORKER ENVIRONMENTAL AWARENESS PROGRAM

BIO-5 The project owner shall develop and implement a CPM-approved Worker Environmental Awareness Program (WEAP) in which each of its employees, as well as employees of contractors and subcontractors who work on the project site or any related facilities during site mobilization, ground disturbance, grading, construction, operation, and closure are informed about sensitive biological resources associated with the project.

The WEAP must:

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 is made available to all participants;

2. Discuss the locations and types of sensitive biological resources on the project site and adjacent areas, if present;

3. Present the reasons for protecting these resources;

4. Present the meaning of various temporary and permanent habitat protection measures as necessary;

5. Discuss penalties for violation of applicable LORS (e.g., federal and state endangered species acts);

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 45 days prior to the start of any pre-construction site mobilization, the project owner shall provide to the CPM the proposed 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 CPM shall review and provide written comments within 15 days of receipt of the WEAP.

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 submit two copies of the CPM-approved materials.

Training acknowledgement forms signed during construction shall be kept on file by the project owner for a period of at least six months after the start of commercial operation.

During project operation, signed statements for operational personnel shall be kept on file for six months following the termination of an individual's employment.

Proposed Revisions to BIO-6

The Applicant proposes a 15-day review and response period for the CPM. The proposed revision is intended to help maintain the Project's schedule.

BIOLOGICAL RESOURCES MITIGATION IMPLEMENTATION AND MONITORING PLAN (BRMIMP) DEVELOPMENT AND COMPLIANCE

BIO-6 The project owner shall develop a BRMIMP and submit two copies of the proposed BRMIMP to the CPM (for review and approval) and to CDFG and USFWS (for review and comment) if applicable and shall implement the measures identified in the approved BRMIMP. A copy of the BRMIMP shall be kept onsite and made readily available to biologists, regulatory agencies, the project owner, contractors, and subcontractors as needed.

The BRMIMP shall be prepared in consultation with the Designated Biologist and shall identify:

1. All biological resource mitigation, monitoring, and compliance measures proposed and agreed to by the project owner;

2. All applicant-proposed mitigation measures presented in the Application for Certification, data request responses, and workshop responses;

3. All biological resource conditions of certification identified as necessary to avoid or mitigate impacts;

4. All biological resource mitigation, monitoring, and compliance measures required in federal agency terms and conditions, such as those provided in the Biological Opinion;

5. All biological resource mitigation, monitoring, and compliance measures required in local agency permits, such as site grading and landscaping requirements;

6. All sensitive biological resources to be impacted, avoided, or mitigated by project construction, operation, and closure;

7. All required mitigation measures for each sensitive biological resource;

8. A detailed description of measures that shall be taken to avoid or mitigate temporary disturbances from construction activities;

9. 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;

10. Aerial photographs, at an approved scale, of all areas to be disturbed during project construction activities — one set prior to any site (and related facilities) mobilization disturbance and one set subsequent to completion of project construction. Include planned timing of aerial photography and a description of why times were chosen;

11. Duration for each type of monitoring and a description of monitoring methodologies and frequency;

12. Performance standards to be used to help decide if/when proposed mitigation is or is not successful;

13. All performance standards and remedial measures to be implemented if performance standards are not met;

14. A preliminary discussion of biological resources-related facility closure measures; and

15. A process for proposing plan modifications to the CPM and appropriate agencies for review and approval.

Verification: The project owner shall provide the specified document at least 45 days prior to start of any pre-construction site mobilization.

The CPM, in consultation with other appropriate agencies, will determine the BRMIMP's acceptability within 15 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 the CPM within 5 days of their receipt, and the BRMIMP shall be revised or supplemented to reflect the permit condition within 10 days of their receipt by the project owner. Ten days prior to pre-construction site mobilization the revised BRMIMP shall be resubmitted to the CPM. Site mobilization will not occur without an approved BRMIMP.

The project owner shall notify the CPM no less than five working days before implementing any modifications to the approved BRMIMP to obtain CPM approval.

Any changes to the approved BRMIMP must also be approved by the CPM in consultation with other appropriate agencies to ensure no conflicts exist.

Implementation of BRMIMP measures will be reported in the Monthly Compliance Reports by the Designated Biologist (i.e., survey results, construction activities that were monitored, species observed). Within 30 days after completion of project construction, the project owner shall provide to the CPM, for review and approval, a written construction closure 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.

Proposed Revisions to BIO-17

The Applicant proposes a 15-day review and response period for the CPM. The proposed revision is intended to help maintain the Project's schedule.

MONITORING IMPACTS OF SOLAR COLLECTION TECHNOLOGY ON BIRDS

BIO-17 The project owner shall prepare and implement a Bird Monitoring Study to monitor the death and injury of birds from collisions with facility features such as reflective mirror-like surfaces and from heat, and bright light from concentrating sunlight. The study design shall be approved by the CPM in consultation with CDFG and USFWS, and shall be incorporated into the project's BRMIMP and implemented. The Bird Monitoring Study shall include detailed specifications on data and carcass collection protocol and a rationale justifying the proposed schedule of carcass searches. The study shall also include seasonal trials to assess bias from carcass removal by scavengers as well as searcher bias.

Verification: At least 60 days prior to any construction-related ground disturbance, the project owner shall submit to the CPM, USFWS, and CDFG a draft Bird Monitoring Study. The CPM shall review and provide written comments within 15 days of receipt of the draft Bird Monitoring Study. At least 30 days prior to start of any construction-related ground disturbance activities, the project owner shall provide the CPM with the final version of the Bird Monitoring Plan that has been reviewed and approved by the CPM, in consultation with CDFG and USFWS. All modifications to the Bird Monitoring Study shall be made only after approval from the CPM.

For at least two years following the beginning of operation the Designated Biologist shall submit quarterly reports to the CPM, CDFG, and USFWS describing the dates, durations and results of monitoring. The quarterly reports shall provide a detailed description of any Project-related bird or wildlife deaths or injuries detected during the monitoring study or at any other time.

Following the completion of the fourth quarter of monitoring the Designated Biologist shall prepare an Annual Report that summarizes the year's data, analyzes any Project-related bird fatalities or injuries detected, and provides recommendations for future monitoring and any adaptive management actions needed. The Annual Report shall be provided to the CPM, CDFG, and USFWS.

Quarterly reporting shall continue until the CPM, in consultation with CDFG and USFWS, determine whether more years of monitoring are needed, and whether mitigation (e.g., development and/or implementation of bird deterrent technology) and/or adaptive management measures are necessary. After the Bird Monitoring Study is determined by the CPM to be complete, the project owner or contractor shall prepare a paper that describes the study design and monitoring results to be submitted to a peer-reviewed scientific journal. Proof of submittal shall be provided to the CPM within one year of concluding the monitoring study.

Proposed Revisions to BIO-18

The proposed change to BIO-18 eliminates the redundancy of the approval process by the CPM. Currently, the Verification includes a requirement for the Applicant to provide a final "Raven Plan to USFWS and CDFG that has been reviewed and approved by USFWS and CDFG" and then the CPM is required to determine the acceptability of the Raven Plan within 15 days. The proposed revision would eliminate the 15 day review requirement, since the Raven Plan would already have been reviewed and approved by both USFWS and CDFG.

BIO-18 The project owner shall implement the following measures to manage their construction site and related facilities in a manner to control raven populations to mitigate cumulative and indirect impacts to desert tortoise associated with regional increases in raven numbers:

1. Common Raven Monitoring, Management, and Control Plan. The project owner shall design and implement a Common Raven Monitoring, Management, and Control Plan that is consistent with the most current USFWS-approved raven management guidelines and that meets the approval of USFWS, CDFG, and Energy Commission staff. The Raven Plan shall:

   A. Identify conditions associated with the project that might provide raven subsidies or attractants;

B. Describe management practices to avoid or minimize conditions that might increase raven numbers and predatory activities;

C. Describe control practices for ravens;

D. Address monitoring and nest removal during construction and for the life of the project;

E. And discuss reporting requirements.

2. USFWS Regional Raven Management. The project owner shall submit payment to the project sub-account of the REAT Account held by the National Fish and Wildlife Foundation (NFWF) to support the regional raven management plan. The amount shall be a one-time payment of $105 per acre of land permanently disturbed by the project.

Verification: At least 45 days prior to start of any construction-related ground disturbance activities, the project owner shall provide the CPM, USFWS, and CDFG with the final version of the Raven Plan that has been reviewed and approved by USFWS and CDFG. All modifications to the approved Raven Plan must be made only after consultation with the Energy Commission staff, USFWS, and CDFG. The project owner shall notify the CPM no less than five working days before implementing any CPM-approved modifications to the Raven Plan.

Prior to start of any construction-related ground disturbance activities, the project owner shall submit to the CPM verification of payment to the REAT Account to support the regional raven monitoring plan. Payment shall be included in the AMS project's land management enhancement fund, pursuant to Condition of Certification **BIO-15 (5(D))**.

Within 30 days after completion of project construction, the project owner shall provide to the CPM for review and approval a report identifying which items of the Raven 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.

Proposed Revisions to BIO-19

The proposed change to BIO-19 eliminates the redundancy of the approval process by the CPM. Currently, the Verification includes a requirement for the Applicant to provide a final Evaporation Pond Monitoring and Adaptive Management Plan ("Final Plan") to the CPM, USFWS, RWQCB, and CDFG "that has been reviewed and approved by the CPM in consultation with USFWS, RWQCB, and CDFG." However, the CPM is then required to determine the Plan's acceptability within 60 days of receipt of the Final Plan. The proposed revision would eliminate the 60 day review requirement, since the Final Plan would already have been reviewed and approved by the CPM, USFWS, RWQCB, and CDFG.

Evaporation Pond Monitoring and Adaptive Management Plan

BIO-19 The project owner shall design and implement an Evaporation Pond Monitoring and Adaptive Management Plan that meets the requirements of the USFWS, CDFG, RWQCB and the CPM. The objective of the Plan is to define the monitoring and reporting procedures as well as triggers for adaptive management strategies that shall be implemented to prevent wildlife mortality at the evaporation ponds. The plan shall include:

- A description of evaporation pond design features such as side slope specifications, freeboard and depth requirements, which will prevent use by wildlife;

- A detailed description of the wildlife monitoring procedures and schedule. For the initial implementation of a new technology, daily monitoring shall be conducted both at the project evaporation ponds and the wetlands within the Harper Lake ACEC. Monitoring may be reduced to weekly and potentially bi-weekly or monthly depending on the results of initial monitoring period.

- A detailed description of the water quality and water level monitoring procedures and schedule. Water quality and water level monitoring shall coincide with wildlife monitoring to provide a basis for comparative analysis.

- A description of wildlife exclusion/deterrent technologies and adaptive management strategies. Technologies shall include, but are not limited to netting, and shall not disturb or harass non-target wildlife adjacent to the project area.

- Triggers for adaptive management (i.e., modifications to existing technology or replacement with new technology). Adaptive management shall be necessary if: 1) more than one dead bird per quarter is discovered at the evaporation ponds; or 2) one special-status animal is discovered at the evaporation ponds; or 3) noise levels attributable to the technology exceed 60dB at the Harper Lake ACEC wetlands. After three failed attempts at new technology or modification of existing technology, the ponds shall be netted;

- Reporting requirements, to include monthly reporting for the first year if a technology other than netting is used. Reporting may be reduced to monthly or quarterly thereafter if no bird or wildlife deaths are reported during the first year. If wildlife mortality occurs at the ponds or if birds are disturbed at the marsh as described above, the CPM shall be notified within 10 days of the incident and the accompanying adaptive management action to be implemented.

Evaporation pond monitoring and reporting shall continue for the life of the project. The draft Plan submitted by the Applicant (AS 2009d) shall provide the

basis for the final plan, subject to review and revisions from the CPM in coordination with USFWS, CDFG, and RWQCB.

Verification: At least 120 days prior to operation of the evaporation ponds, the project owner shall provide the CPM, USFWS, RWQCB, and CDFG with the final version of the Plan that has been reviewed and approved by the CPM in consultation with USFWS, RWQCB, and CDFG. All modifications to the approved Plan may be made by the CPM after consultation with USFWS, RWQCB, and CDFG. The project owner shall notify the CPM no less than five working days before implementing any CPM-approved modifications to the Evaporation Pond Plan.

3.4 Correlation to SA, SSA, and Hearing Topics

- Staff Assessment, Section 5.2
- Supplemental Staff Assessment, Part B, Section 5.2
- Biological Resources

4.0 CULTURAL RESOURCES

4.1 Introduction

A. Name: Maria K. "Trina" Meiser, M.A. and Theodore G. Cooley, M.A., R.P.A.

B. Qualifications: Ms. Meiser's and Mr. Cooley's qualifications are listed in Appendix A.

C. Prior Filings:

- Application for Certification, Volume 1, Section 5.4 [Exhibit 1]
- Application for Certification, Volume 2, Appendix D (submitted under confidential cover) [Exhibit 1]
- Applicant's Written Response to CEC Data Request, Set 1B (1-86), dated November 25, 2009, Responses to Requests 1-4, 8, 9, 13 and 14 [Exhibit 4]
- Applicant's Supplemental Written Response to CEC Data Request, Set 1B (1-86), dated January 5, 2010, Response to Requests 5, 10 and 15, (submitted under confidential cover) [Exhibit 8]
- Applicant's Second Supplemental Written Response to CEC Data Request, Set 1B (1-86), dated February 17, 2010, containing the Final Testing Report, "Evaluation of Cultural Resources for Mojave Solar Project" in Response to Requests 6, 7, 10, 11, 12, 14, 15, 16 and 17, including confidential appendices (submitted under separate confidential cover) [Exhibit 16]
- Applicant's Comments to CEC Staff Assessment and Proposed Conditions of Certification. [Exhibit 26]

D. Filings by Others Considered:

SWCA, Application for Confidential Designation and "Geoarcheological Testing Report for the Mojave Solar Project, Lockhart, California," dated December 23, 2009 [Exhibit 40]

To the best of my knowledge, all of the facts contained in this Section of the Applicant's testimony (including all referenced documents) are true and correct. To the extent this testimony contains opinions, such opinions are my own based upon my professional judgment. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

4.2 Summary of Testimony

A. Affected Environment

The proposed Abengoa Mojave Solar (AMS) Project is located on private land approximately 15 miles northwest of Barstow near Harper Dry Lake, in an unincorporated area of San Bernardino County, California. The primary solar energy facilities and associated construction and operations footprint are located within a 1,765-

acre plant site. A required 200-foot buffer around the perimeter of the plant site was also included in the study area. EDAW AECOM (EDAW) was retained to conduct cultural resources studies, including a 100 percent archaeological and historic architectural survey in support of preparation of an Application for Certification, required by the California Energy Commission (CEC) for power generating plants that produce an excess of 50 MW of energy. A portion of the study area within the required 200-foot wide buffer was conducted on lands managed by the Bureau of Land Management (BLM) under EDAW's Cultural Use Permit (CA-06-21) and Fieldwork Authorization dated June 18, 2009.

Consultation with local Native American groups and interested parties included a letter sent to the Native American Heritage Commission (NAHC) requesting information on sacred lands and traditional cultural properties, and a list of Native American individuals and organizations that might have knowledge of or concerns with cultural resources within the Project area. The records search by the NAHC of the Sacred Lands File did not reveal any specific site information or specific sites in the Project area and 1-mile buffer. Thirteen Native American representatives were identified by the NAHC and attempts were made to contact these representatives both in writing and by phone. The contact program did not yield any information that located any Native American cultural resources or sites within the study area.

Prior to field work, archival research was conducted, including a records search, performed at the San Bernardino Archaeological Information Center (SBAIC) in 2006, of an area encompassing the Project area and a 1-mile radius. The search reviewed previously conducted cultural resources studies, site records, historical information, and maps. In 2009, EDAW requested an updated records search for the Project area and a 1-mile radius for the current survey area. In a letter dated April 27, 2009, the SBAIC responded that no new records or reports for the records search area had been received by the SBAIC since the 2006 records search. Historical societies and potentially interested parties were contacted requesting any pertinent information regarding historic or other cultural resources within the records search boundary (Project area and 1-mile radius). Those contacted included the San Bernardino County Museum, the Mojave River Valley Museum, Mojave Desert Heritage and Cultural Association, the City of San Bernardino Historical and Pioneer Society, and the Upper Mojave Historical Society.

The records search identified 15 previous studies that investigated cultural resources, and 30 previously recorded cultural resources within the Project area and/or within a 1-mile radius. The cultural resources included one prehistoric site, 13 historic refuse deposits, and 16 historic sites associated with farming or residential structures or complexes. With the exception of the prehistoric site, the historic resources date to the early to mid-20th century. The refuse deposits primarily contained domestic items, including canisters, bottles, and ceramics. Of the previously recorded sites, three sites (P-36-006556, P-36-006557, and P-36-006558) were located within the Project area boundary, three sites (P-36-007429, P-36-007430, and P-36-006553) were located within the 200-foot archaeological survey buffer area, and an additional nine sites with built resources (P-36-001025, P-2084-99, P-36-006348, P-36-006552, P-36-006555, P-36-006877, P-36-006880, P-36-006881, P-36-006882) were identified within the 0.5-mile historic architectural survey buffer area. The 15 previously recorded cultural resources identified in the Project area and/or buffers included two historic refuse deposits, and 13 historic

sites associated with farming or residential structures or complexes that date to the early to mid-20th century. Many of the historic sites had standing structures at the time that they were recorded.

The intensive pedestrian archaeological field survey identified a total of 27 sites and 39 isolates. Five of these sites and 25 of the isolated finds were located within the Project area, and an additional 22 sites and 14 isolated finds were located in the 200-foot buffer area (outside the Project area). The five sites in the Project area that could be impacted by the Project included one prehistoric archaeological site (P-36-021006) and four historic archaeological sites (P-36-007429, P-36-020994, P-36-021005, and P-36-021007). The 22 sites identified in the buffer included two previously recorded historical sites that were relocated (P-36-007430 and P-36-006553), one multi-component site (P-36-021002), and 20 newly identified historic sites. The newly identified historical archaeological sites consisted primarily of refuse scatters or dumps that contain combinations of cans, glass, metal, and ceramics.

The historic architecture field survey identified a total of 19 resources including six resources within the Project area, eight resources within the 0.5-mile buffer area, and five previously recorded resources that no longer exist. The six resources in the Project area that could be impacted by the Project include three previously recorded historic sites (P-36-006556, P-36-006557, and P-36-006558) and three newly identified resources (P-36-021009, P-36-021010, and P-36-021011). The eight sites identified in the buffer included three previously recorded historic sites (P-36-001025/P-2084-99H, P-36-006555, and P-36-006882) and five newly identified resources (P-36-021008, P-36-021012, P-36-021013, P-36-021014, and MS-B-1008). Five previously recorded historic architectural resources located within the buffer area (P-36-006348, P-36-006552, P-36-006877, P-36-006880, and P-36-006881) could not be relocated.

Archaeological resources located within the 200-foot buffer were not considered to be subject to potential impacts from the Project. Architectural resources located within the 0.5-mile buffer were not considered subject to potential indirect impacts from the Project due to the previously disturbed resource setting.

The surveys identified four potentially significant resources in the Project area. Two potentially significant archaeological sites were identified within the Project area and would be subject to potential impacts: P-36-021005 and P-36-021006. One significant and one potentially significant historic architectural resource were identified within the Project area and would have potential impacts: P-36-006556 and P-36-006558.

In response to CEC Staff Requests, these resources and an additional resource, MS-H-026, were further evaluated through additional archival research and archaeological testing. Based on the assessment and evaluation of the cultural resources located within the Project area, only one resource, P-36-006558 (specifically the Lockhart General Merchandise Store), was recommended as eligible for the California Register of Historic Resources (CRHR) as defined under the criteria of the California Environmental Quality Act (CEQA). Isolates are not considered to be CRHR-eligible resources.

CEC Staff conducted further evaluation and determined that the one cultural resource identified in the survey as significant, P-36-006558 (Lockhart General Merchandise Store), was not eligible for the CRHR.

B. Construction Impacts

Based on the CEC Supplemental Staff Assessment, no known CRHR-eligible prehistoric or historical archaeological or architectural resources are anticipated to be affected by project construction. A geoarcheological subsurface testing study conducted by SWCA Environmental Consultants ("Geoarchaeological Testing Report for the Mojave Solar Project, Lockhart, California," prepared for the California Energy Commission by Matthew J. Steinkamp, M.S./SWCA Environmental Consultants on behalf of Abengoa Solar, Inc., December 2009) concluded that potential for buried archaeological deposits within the Project area was moderate to high. These results indicate that the potential for possibly CRHR-eligible, subsurface (buried) prehistoric archaeological deposits within the Project area is moderate to high. Taking this into account, there is a possibility of construction impacts to buried archaeological resources.

C. Operational Impacts

There should be no operational impacts to CRHR-eligible resources.

D. Cumulative Impacts

There are no known CRHR-eligible resources in the Project area; therefore, there will be no cumulative impacts on known cultural resources. With the adoption and implementation of CEC Staff proposed Conditions of Certification CUL-1 through CUL-7, the potential cumulative impact of the Project on buried prehistoric archaeological deposits would be rendered less than significant. These measures are intended to facilitate the identification and assessment of inadvertent discoveries of archaeological resources during construction and to mitigate any significant impacts from the project on these resources should they be determined significant.

E. Mitigation

Although no cultural resources were determined significant through the studies requested by CEC or in the Supplemental Staff Assessment, the Project area has the potential for buried archaeological and paleontological resources. The applicant, Abengoa Mojave Solar, intends to implement measures recommended in the AFC to mitigate potential impacts to cultural resources:

Evaluation and Documentation. In the event that a resource cannot be avoided during construction, the applicant would retain a qualified Cultural Resources Specialist to prepare and implement an evaluation program to assess the significance of the resource and prepare a treatment plan for significant resources. The Cultural Resources Specialist would meet the qualifications for a Principal Investigator per the Secretary of the Interior's Guidelines.

Mitigation for Resource. Should a resource be discovered that is determined, in consultation with the CEC, to be significant, a mitigation plan would be developed and carried out in accordance with State and Federal Guidelines. The appropriate DPR forms would be completed and a technical report prepared.

Crew Education. Training would be given to construction personnel by the monitoring archaeologists on procedures for the handling of discovered archaeological resources,

including the need to stop work until a qualified archaeologist has assessed the significance of the find and implemented appropriate mitigation measures.

Collection and Curation: Cultural materials, field notes and other pertinent materials collected as part of an assessment or data recovery mitigation would be curated at a qualified curation facility.

Human Remains: Should human remains be encountered during excavation, work shall be stopped, the Cultural Resources Specialist would notify the Principal Investigator and the Energy Commission would be contacted. All applicable State and Federal laws, including NAGPRA, would be followed and the remains treated with respect.

4.3 Proposed Licensing Conditions

CEC Staff expanded upon the applicant's suggestions to ensure that all impacts to buried CRHR-eligible prehistoric resources are mitigated to below the level of significance. CEC Staff recommends that seven Conditions of Certification, CUL-1 through CUL-7, be adopted.

- **CUL-1** requires a Cultural Resources Specialist (CRS) to be retained and available during the AMS's construction-related excavations to evaluate any discovered buried resources and, if necessary, to conduct data recovery as mitigation for the project's unavoidable impacts on them.

- **CUL-2** would require the applicant to provide the CRS with all relevant cultural resources information and maps.

- **CUL-3** would require the CRS to write and submit to the Energy Commission Compliance Project Manager (CPM) a Cultural Resources Monitoring and Mitigation Plan (CRMMP).

- **CUL-4** would require the CRS to write and submit to the CPM a final report on all AMS cultural resources monitoring and mitigation activities.

- **CUL-5** would require the project owner to train workers to recognize cultural resources and instruct them to halt construction if cultural resources are discovered.

- **CUL-6** proposes archaeological monitoring, by an archaeologist and, possibly, by a Native American, intended to identify buried prehistoric archaeological deposits.

- **CUL-7** would require the applicant to halt ground-disturbing activities in the area of an archaeological discovery and to fund data recovery, if the discovery is evaluated as CRHR-eligible.

These proposed conditions provide for identifying, evaluating, and possibly mitigating impacts to previously unknown archaeological resources discovered during construction and ensure that impacts to significant archaeological discoveries would be mitigated to a less than significant level. These mitigation measures are appropriate and acceptable to the Applicant.

4.4 Correlation to SA, SSA, and Hearing Topics:

- Staff Assessment, Section 5.3
- Supplemental Staff Assessment, Part B, Section 5.3
- Cultural Resources

5.0 Hazardous Materials

5.1 Introduction

A. Name: Brad Merrell

B. Qualifications: Mr. Merrell's qualifications are as noted in his resume contained in Appendix ..

C. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

- Application for Certification, Volume 1, Section 5.6 [Exhibit 1]
- Surface Soil Sampling, dated January 26, 2010 [Exhibit 13]
- Site Material Sampling Report, dated April 5, 2010 [Exhibit 20]
- Mojave Solar Project Site Sampling Analysis, dated April 16, 2010 [Exhibit 25]
- Applicant's Comments on Staff Assessment [Exhibit 26]

To the best of my knowledge, all of the facts contained in this Section of the Applicant's testimony (including all referenced documents) are true and correct. To the extent this testimony includes opinions, such opinions are my own based upon professional judgment. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

5.2 Summary of Testimony

A. Affected Environment

The proposed AMS project site will be located approximately nine miles northwest of the Town of Hinkley in unincorporated San Bernardino County, approximately halfway between the City of Barstow and Kramer Junction (Highway 395 / Highway 58 junction). Project access is provided by Harper Lake Road, which is located approximately twenty miles west of Barstow along the Highway 58 corridor. The project site is approximately six miles north of where Harper Lake Road intersects with Highway 58.

There are no sensitive receptors (such as schools, day-care facilities, convalescent centers, or hospitals) in the vicinity of the project site. The nearest sensitive receptor is the Hinkley Elementary School, approximately 10.5 miles from the site via Santa Fe Road, and 15.1 miles via State Route 58. The nearest medical facility is Barstow Community Hospital which is approximately 23.2 miles from the site via State Route 58.

B. Construction Impacts

Hazardous materials that are anticipated for use during Project construction include gasoline, diesel fuel, lubricants, welding gases (e.g., acetylene) and small quantities of solvents and paints. There are no feasible alternatives to utilizing these materials for running construction vehicles and equipment and conducting other construction activities

such as welding. No acutely hazardous substances will be used or stored on the plant site during construction.

Small volumes of hazardous materials will be temporarily stored onsite inside fuel and lubrication service trucks. Paints and solvents will be stored in flammable material storage cabinets. Welding gases will be stored in steel cylinders. Maintenance and service personnel will be trained in handling these materials.

Small fuel spills may occur. Soil contaminated by a spill or leak will be disposed of in accordance with applicable State and Federal requirements. Minimal risk for fire and/or explosions exists with the use of these types of materials in the limited quantities expected. There is minimal potential for environmental impacts from incidents involving other hazardous materials during construction.

C. Operational Impacts

Some large quantity chemicals (chemicals stored in excess of 55 gallons for liquids, 500 pounds for solids, and 200 cubic feet for compressed gases) may be stored and used at the site. Additionally, small quantities of janitorial supplies, office supplies, laboratory supplies, paints, degreasers, herbicides, pesticides, air conditioning fluids, gasoline, hydraulic fluid, propane, and welding rods may also be stored and used at the facility.

Chemicals will be stored or processed in vessels or tanks specifically designed for their individual characteristics. All hazardous materials storage or process vessels will be designed in conformance with applicable ASME codes. Small quantity chemicals will be stored in their original delivery containers in order to minimize risk of upset.

Personnel working with chemicals will be trained in proper handling technique and in emergency response procedures for chemical spills or accidental releases. Personal protection equipment (PPE) will be provided. If a spill involves hazardous materials equal to or greater than the specific reportable quantity, all federal, state, and local reporting requirements will be followed.

D. Cumulative Impacts

There are no projects in the vicinity of the proposed project that use, store or transport hazardous materials. The Staff Assessment (SA) concluded that there are no cumulative impacts because the use of hazardous materials in neither frequent nor concentrated in this area.

E. Mitigation

As outlined in the AFC, potential impacts during construction and operational phases will be mitigated through extensive implementation of engineered controls, training, best management practices, and the development of plans and procedures. With the implementation of the proposed project mitigation measures and the Conditions of Certification, the project will comply with all applicable federal, state, and local laws, ordinances, regulations, and standards (LORS).

Onsite mitigation procedures during construction will include an onsite construction safety officer designated to implement health and safety guidelines. Construction

contractors will be required to develop standard operating procedures for servicing and fueling construction equipment. Spills occurring during vehicle fueling and maintenance will be cleaned up immediately, and contaminated soil will be containerized and sent for subsequent evaluation and offsite disposal. Containers used to store hazardous materials will be properly labeled and maintained in good condition. Emergency telephone numbers will be available onsite for emergency personnel and for environmental regulatory agencies.

The Project is not expected to cause significant adverse environmental impacts from hazardous materials storage or handling during operations. The potential for incidents involving hazardous materials during operations will be further minimized by hazardous materials being stored and managed to mitigate potential releases.

The project owner will develop and implement spill response procedures. Personnel working with hazardous materials will be trained in proper handling and emergency response to chemical spills or accidental releases. Additionally, the owner will develop and implement several programs to address hazardous materials storage, emergency response procedures, employee training requirements, hazard recognition fire safety, first-aid/emergency medical procedures, hazardous materials release containment/control procedures, hazard communication training, personnel protective equipment training, and release reporting requirements.

5.3 Proposed Licensing Conditions

The Supplemental Staff Assessment (SSA), Part A for the project filed by the CEC recommends that seven Conditions of Certification be adopted to address hazardous materials management issues: HAZ-1 through HAZ-7. The Applicant agrees with and finds acceptable proposed Conditions of Certification with the exception of HAZ-6. The Applicant's proposed edits to HAZ-6 are discussed below.

Proposed Revisions to HAZ-6

The discussion in the SSA regarding site security (see page 5.4-13) concludes that the proposed AMS facility would not be subject to U.S Department of Homeland Security's Interim Final Rule published in the Federal Register (6 CFR Part 27) – requiring facilities that use or store certain hazardous materials to conduct vulnerability assessments, and implement certain specified security measures – or the rule's Appendix A, containing the list of chemicals, published on November 2, 2007. The Applicant proposes the deletion of this Condition of Certification because the project is not subject to these requirements. Nonetheless, the Applicant notes that its 24 hour personnel meet the spirit of these requirements.

~~**HAZ-6** The project owner shall also prepare a site-specific security plan for the commissioning and operational phases that will be available to the CPM for review and approval. The project owner shall implement site security measures that address 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 and topped with barbed wire or the equivalent;

2. Main entrance security gate, either hand operated or motorized;

3. Evacuation procedures;

4. Protocol for contacting law enforcement 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;

   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 determine the accuracy of employee identity and employment history and shall be conducted in accordance with state and federal laws 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 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 the CPM after consultation with the project owner) certifying that background investigations have been conducted on contractors who visit the project site;

6. Site access controls for employees, contractors, vendors, and visitors;

7. A statement(s) (refer to sample, **ATTACHMENT C**), signed by the owners or authorized representative of hazardous materials transport vendors, certifying that they have prepared and implemented security plans in compliance with 49 CFR 172.802, and that they have conducted employee background investigations in accordance with 49 CFR Part 1572, subparts A and B;

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) with cameras able to pan, tilt, and zoom, have low light

capability, and are able to view the outside entrance to the control room and the front gate; and

9. Additional measures to ensure adequate perimeter security consisting of either:

A. Security guard(s) present 24 hours per day, 7 days per week; **or**

B. Power plant personnel on site 24 hours per day, 7 days per week,

and
the CCTV able to view 100% of the entire solar array fenceline perimeter

or breach detectors **or** on-site motion detectors along the entire solar array fenceline.

The project owner shall fully implement the security plans and obtain CPM approval of any substantive modifications to those security plans. The CPM
may authorize modifications to these measures, or may require additional measures such as protective barriers for critical power plant components—
transformers, gas lines, and compressors—depending upon 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 both appropriate law enforcement agencies and the applicant.

Verification: At least thirty (30) days prior to the initial receipt of hazardous materials
on site, the project owner shall notify 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 that updated certification statements have been 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.

5.4 Correlation to SA, SSA and Hearing Topics:

- Staff Assessment, Section 5.4
- Supplemental Staff Assessment, Part A, Section 5.4
- Hazardous Materials

6.0 LAND USE

6.1 Introduction

A. Name: William Graham

B. Qualifications: Mr. Graham's qualifications are as noted in his resume contained in Appendix A.

C. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

- Application for Certification, Volume 1, Section 5.7 [Exhibit 1]
- Application for Certification, Volume 4, Data Adequacy Supplement, page 4 [Exhibit 2]
- Applicant's Written Responses to CEC Data Request, Set 1 (1-93), dated November 25, 2009, Responses to Data Requests 81 and 82 [Exhibit 4]
- Applicant's Supplemental Written Response to CEC Data Request, Set 1A (1-93), dated December 23, 2009, Supplemental Responses to Data Requests 78, 79, and 80 [Exhibit 5]
- Applicant's Comments on Staff Assessment, dated April 22, 2010. [Exhibit 26]
- CA Department of Conservation's Letter Re Agriculture Mitigation, dated April 7, 2010. [Exhibit 42]
- Department of Conservation's Revised Abengoa LESA model, dated May 4, 2010. [Exhibit 43]

6.2 Summary of Testimony

To the best of my knowledge, all of the facts contained in this Section of the Applicant's testimony (including all referenced documents) are true and correct. To the extent this testimony is based on opinions, such opinions are my own based upon my professional judgment. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

A. Affected Environment

The Abengoa Mojave Solar Project (AMSP) site is located within an unincorporated portion of San Bernardino County. The proposed Project site is located on private land under the Applicant's ownership. The study area is comprised of the land uses within a 1-mile radius of the Project site. Some of the study area, outside of the project site, is federal land managed by the Department of the Interior, Bureau of Land Management (BLM). The area beyond the study area (defined as "surrounding" area or lands) is mostly managed by BLM under the West Mojave (WEMO) Plan (2002, as amended), which is an amendment to the California Desert Conservation Area (CDCA) Plan of 1980. For the purposes of environmental review and permitting, the CEC is the lead state agency for compliance with the California Environmental Quality Act (CEQA).

The AMSP site is located within areas in the California Desert Conservation Area Plan (CDCA) that are designated Multiple-Use Class L (Limited Use). The Energy Production and Utility Corridors Element of the CDCA Plan also states that the BLM focuses on the same factors affecting public lands and their resources as those used by the CEC. These factors include: (1) consistency with the CDCA Plan, including the designation of proposed planning corridors; (2) protection of air quality; (3) impact on adjacent wilderness and sensitive resources; (4) visual quality; (5) fuel sources and delivery systems; (6) cooling-water source(s); (7) waste disposal; (8) seismic hazards; and (9) regional equity. The Proposed Northern and Eastern Mojave (NEMO) Desert Management Plan (July 2002) amends the BLM CDCA Plan as discussed below.

County of San Bernardino

The AMSP and linear components (transmission, natural gas, and sewer lines) are all located in an area designated in the CDCA Plan as Multiple-Use Class L (Limited Use) and in the San Bernardino County General Plan and Development Code as RL (Rural Living).

General Description of Study Area

Land uses in the vicinity of the project area are largely BLM-managed open space. Approximately 10 rural residences and small farms are located in the study area. Most of the homes are located approximately 50 to 1,000 feet from the proposed Project. No community facilities, such as schools, stores, or recreational facilities currently exist in the study area. A crop semicircle of 128 acres in the northeast quarter of section 32 on the proposed Project site is designated as Prime Farmland and Farmland of Statewide Significance by the California Department of Conservation. Harper Dry Lake is located approximately 1,000 feet east of the project site and is and has a wildlife viewing area that is accessible by Lockhart Ranch Road, an unimproved dirt road.

B. Environmental Analysis

The AMSP was evaluated against CEQA Guidelines Appendix G, CEQA Checklist to evaluate the potential land use impacts associated with implementation of the project. For each of the appropriate checklist criteria, it was determined that implementation of the AMSP would not result in any unmitigable land use impacts.

Specifically it was determined that the AMSP does not:

1. Physically divide an established community because the area surrounding the Project site is rural residential and farmland, habitat conservation areas, and solar power plant. An established community does not exist in this area.

2. Conflict with applicable land use plans, policies, or regulations adopted for the purpose of avoiding or mitigating an environmental effect. The Project

would be consistent with the San Bernardino County General Plan and the RL zoning designation with approval of a conditional use permit (CUP). However, because the Project is proposed to generate more than 50 MW of thermal electricity, facility permitting will be addressed under the Warren-Alquist Act power plant licensing process.

3. The proposed Project site is not subject to any Habitat Conservation Plan or Natural Community Conservation Plan or within the boundaries of any wildlife preserve or critical habitat area. Thus, the proposed Project would not conflict with a habitat conservation plan or natural community conservation plan. The proposed Project does not go beyond private land into public lands and, therefore, would not have an effect on publicly-owned lands with habitat conservation plans.

4. The Project will not conflict with agricultural zoning because the Project site is not zoned for agricultural use. Because no lands on the Project site are currently under a Williamson Act contract, construction of the proposed MSP would not result in any related impacts to Williamson Act contracts.

It was determined that the AMSP does:

5. The Project will involve other changes in the existing environment, which, given their location and nature, could result in conversion of farmland to non-agricultural use. A small portion of the AMSP falls within the category of lands designated for Prime Farmland or Farmland of Statewide Importance. As acknowledged in the AFC, the impact to the California Farmland Mapping and Monitoring Program (FMMP) Important Farmland designations is considered a significant land use impact. Specifically, 71 acres of Farmland of Statewide Importance and 57 acres of Prime Farmland (Farmland) will be affected. No other Prime or Statewide Farmland is located in the Project study area. Applicant proposes mitigation measure LAND 1 that will mitigate this impact to a level of less than significant.

C. Cumulative Impacts

The AMSP is consistent with the applicable plans and policies and, therefore, would not result in significant land use, recreation, or agricultural impacts. While farmland is present in the study area, existing agricultural uses are minimal, so the project would directly but not cumulatively affect farmland. The project site does not lie within critical habitat, and therefore, would not result in a cumulative conflict with any habitat conservation plan. Further, it is expected that the reasonably foreseeable projects considered in the cumulative analysis would also not contribute to a significant impacts on land use, recreation, or agricultural impacts because each of these projects will receive development approvals that could not be issued without a determination that these projects are consistent with applicable plans and policies, including development, farmland, and habitat conservation policies.

D. Mitigation

The Applicant proposed mitigation for impacts to on-site Farmland of State Wide Importance and Prime Farmland.

It is important to note that the Important Farmland's designation is a byproduct of irrigation occurring in one remaining crop circle. This Farmland (128 acres) is not protected by the County by agricultural zoning, Williamson Act, or any other conservation mechanism. The Farmland is an isolated parcel that is a remnant of the alfalfa farming in the Harper Dry Lake Area. Farming has almost completely ceased on the Project site, the study area, and the surrounding lands due to the unsustainability of continued groundwater withdrawal for agricultural irrigation.

The viability of the future agricultural use of this parcel is not supported in light of recent San Bernardino County General Plan actions (the update occurred in 2007) that resulted in rezoning of the Project site to RL, and not Agricultural (AG). The County acknowledged in the General Plan with a statement of overriding considerations that implementation of the General Plan would result in a loss of productive agricultural resources that would be a significant and unavoidable cumulative impact in the county.

The impact to FMMP Important Farmland designations is considered significant and unavoidable land use impact, but it is expected that implementation of mitigation measure LAND 1 will mitigate this impact to a level of less than significant.

Proposed Mitigation Measure

The Applicant proposed LAND 1 (Previously titled LAND-3 from the AFC): Prior to any earthmoving activities, the project applicant shall place Important Farmlands (i.e., farmland that meets CDC criteria of Prime, Statewide, or Unique farmland) of equal or higher quality into a permanent agriculture conservation easement at a ratio of 1 acre of agricultural conservation easement for every 1 acre of important agricultural land developed (based on similar agricultural value). The applicant shall conserve a minimum of 128 acres of Important Farmland or shall contribute mitigation fees to allow for protection of such.

Significance after Mitigation

Implementation of the mitigation measure would substantially lessen significant impacts associated with the conversion of farmland because establishment of agricultural conservation easements would provide assistance to public and private sectors in protecting other farmland from the pressures of development. The Project applicant would be required to provide conservation easements on farmland of equal or higher quality than farmland lost on the Project site. This mitigation measure requiring conservation easements is expected to offset the conversion of State-designated Important

Farmland to a level of less than significant because of the uncertainty of the long-term viability of the project agricultural land.

6.3 Proposed Licensing Conditions

The Staff Assessment for the project filed by the CEC recommended that three Conditions of Certification be adopted to address land use issues: LAND-1 through LAND-3. The Applicant did not dispute LAND-2 and LAND-3. However, the Applicant did propose changes to Condition of Certification LAND-1, as proposed by the CEC in the SA.

The CEC's initial Condition of Certification LAND-1 (from the SA) states: "The proposed project would result in the permanent conversion of 1,588.5 acres of agricultural land to a non-agricultural use (i.e., a solar farm), which represents a significant impact. Therefore, staff recommends Condition of Certification LAND-1, which requires the project owner to mitigate for the conversion of 1,588.5 acres of agricultural land to a non-agricultural use at a level not to exceed a one-to-one ratio."

In a letter to the CEC, dated April 7th, 2010, the California Department of Conservation (DOC) supported the SA's Condition of Certification LAND-1. In a subsequent letter to the CEC dated May 3, 2010, however, the DOC readdressed their statements from the April 7th, 2010 letter. During a review of the LESA model (found in the Staff Assessment online) the DOC found discrepancies that they attempted to correct, and based on the corrected the Land Evaluation and Site Assessment model (LESA) analysis the DOC concurred with the applicants' suggested mitigation amounts of 128 acres of Important Farmland. (This mitigation measure was originally titled LAND-3 in the AFC.)

The CEC's Supplemental Staff Assessment (Part B), dated May 25, 2010 agreed with the DOC and reversed their initial SA Condition of Certification. The CEC acknowledged the limitations of the LESA model and took into consideration the effects of groundwater pumping in the basin and the limitations of growing crops that require high volumes of water (e.g. – alfalfa). The CEC acknowledged that the site has high potential for agricultural production due to high soil quality as shown by the LESA Model results, but that the poor water quality at the site would be both physically and economically restrictive to most productive farming activities, and the adjudicated water rights are a physical restriction to agricultural production. In light of the totality of the facts and circumstances of this case, staff concluded that impacts to all but 128 acres of agricultural resources would be less than significant. Therefore, staff proposed mitigation for the conversion of the 128 acres of FMMP-designated Important Farmlands. The Applicant accepts this condition.

6.4 Correlation to SA, SSA and Hearing Topics

- Staff Assessment, Section 5.5
- Supplemental Staff Assessment, Part B, Section 5.5
- Land Use

7.0 NOISE AND VIBRATION

7.1 Introduction

A. Name: Bob Mantey

B. Qualifications: Mr. Mantey has more than 30 years of technical, managerial, and supervisorial experience in the field of applied engineering acoustics and noise control. Mr. Mantey's expertise includes environmental/ community noise modeling, predictive noise analyses, noise monitoring/measurement, preparation of CEQA/NEPA noise assessment documentation, and machinery noise analysis, mitigation, and control. Mr. Mantey has completed noise evaluations and studies for a broad range of power generation, industrial, commercial, residential, entertainment, mixed-use, and transportation projects. Mr. Mantey has conducted technical noise studies over the last 20 years on over two hundred power plant facilities, both domestic and overseas, including fossil-fueled, wind, geothermal, and solar facilities. Besides being the Principal Investigator on this Mojave Solar Project for noise, Mr. Mantey has also reviewed, contributed to, analyzed, and/or written noise sections for the following permit applications to the California Energy Commission (CEC):

- Hydrogen Energy CA (HECA)
- Orange Grove Power
- Avenal Power Center
- South Bay Replacement Project
- Morro Bay
- Moss Landing
- Mountain View Power
- Rio Linda Power
- High Desert Power
- Colusa Power

Mr. Mantey has been a Principal Consultant for the last ten years with Alliance Acoustical Consulting (AAC) and, prior to AAC, has practiced acoustical consulting/engineering with PCR Services Corp., Fluor Daniel, McDonnell-Douglas Aircraft, Wyle Laboratories, and Bolt Beranek and Newman (BBN). A full résumé is included in Appendix A.

C. Prior Filings:

In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

- Application for Certification, Volume 1, Section 5.8 [Exhibit 1]
- Application for Certification, Volume 3, Appendix G [Exhibit 1]
- Applicant's Comments on Staff Assessment [Exhibit 26]

To the best of my knowledge, all of the facts contained in this testimony (including all referenced documents) are true and correct. To the extent this testimony contains opinions, such opinions are my own. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

7.2 Summary of Testimony

A. Opening Statement

The MSP site is located in an unincorporated area in San Bernardino County, California, approximately nine miles northwest of the city of Hinkley. The Project would use well-established parabolic trough solar thermal technology to produce electrical power. The Project would have a combined nominal electrical output of 250 megawatts (MW) from twin 125-MW power blocks. The power islands would be joined at the transmission line interconnection substation to form one full-output transmission interconnection. The solar-thermal technology would provide 100 percent of the power generated by the plant; no supplementary fossil-based energy source is proposed to be used for electric energy production.

Although this is a solar power generation facility, there would still be several industrial-scaled pieces of equipment that could produce noise emissions beyond the two power block areas. Specifically, the plant will employ several large, rotating-equipment items, including the steam turbine generators (STGs), multi-cell, wet cooling towers, and large pumps for circulating water, thermal oil, and other fluids.

Generally, the design basis for noise control is the most stringent noise level required by any of the applicable laws, ordinances, regulations, or standards (LORS). This design philosophy will ensure that the noise from this project will comply with local ordinances as well as the CEC's guideline for the late-night noise increase increment. These local requirements and CEC guidelines will be met with a combination of inherent operational principles, project design features that provide noise reduction from the expected major noise sources, and the intrinsic benefit of large propagation distances. These noise reduction features involve both architectural and equipment considerations. Architectural considerations involve the sound isolation performance of the architectural components, including the walls, roof, doors, windows, and louvers, of buildings housing equipment. Equipment considerations involve reduced noise emissions from the equipment sources themselves, as well as potential sound treatment systems including enclosures, silencers, and/or localized barriers. During the Project’s detailed engineering phase, each equipment component will be evaluated to determine and update the noise control strategies necessary to support the overall project acoustical design.

B. Summary

The MSP will be a state-of-the-art facility that will be designed to operate at low noise levels. This inherent characteristic of a modern power plant design, coupled with relatively long distances from the power blocks to the nearest noise-sensitive, residential receptors (see AFC Table 5.8-5 for more details), will yield a facility that will produce no noise burden on the areas surrounding the Project Site.

From a noise impact assessment standpoint and as discussed in Section 5.8 of the AFC, the Project is shown to: (a) comply with the Commission's noise criterion limits [as was shown in AFC Table 5.8-10] and (b) comply with the County of San Bernardino Development Code limits [as was shown in AFC in Table 5.8-11]. Thus, the Project will not generate significant adverse noise or vibration impacts on people within the affected area; directly, indirectly, or cumulatively. This conclusion is valid for both the construction and on-going operations phases. Since no significant impacts have been identified, no noise mitigation measures are required for the MSP.

As part of responsible plant design regarding noise emissions, several 'standard' noise reduction features are envisioned for the Project's design. These planned noise-related design features include:

- Housing the main power generation trains inside an industrial building;
- Housing the water treatment systems inside an equipment enclosure;
- Housing the closed loop cooling system inside an equipment enclosure;
- Low-noise sound level specifications for standard-service vent silencers;
- Appropriate sound level specifications for the cooling tower system (and secondary/support equipment items);
- Appropriate sound level specifications for the major pumps (possibly using enclosures and/or casing blanket packages, as needed);
- Noise mitigation strategies for the heating, ventilation, and air conditioning (HVAC) systems; and
- Appropriate sound level specifications for the main and aux transformers

To assure and confirm that noise impacts remain less than significant, the noise production characteristics of the Project equipment will be re-evaluated during the detailed design phase and appropriate noise level specifications will be issued for plant equipment.

7.3 Proposed Licensing Conditions

The Staff Assessment (SA) and Supplemental Staff Assessment (SSA), Part A filed by the CEC recommends seven Conditions of Certification (COCs) be adopted to address noise and vibration issues for the project. COCs NOISE-1, NOISE-3, NOISE-5, and NOISE-6 are acceptable to the Applicant.

Minor changes to NOISE-2 and NOISE-7 are proposed by the Applicant and are set forth below.

Revisions of a more significant nature are proposed for NOISE-4. Given the remote nature of the project site and lack of sensitive receptors, the following modifications to NOISE-4 are proposed to provide the Applicant flexibility, while still complying with the relevant noise requirements. The proposed noise levels for the Project meet the pertinent LORS for the County's noise ordinance and the CEC's established L_{90}+5 dB guideline. It is the Applicant's opinion that the Applicant's noise modeling results, reported for informational purposes in the AFC, should not be used as a basis for a permitting condition and thus override applicable LORS and established guidelines. The nighttime County requirement at Location LT-2 is 45 dBA, while the CEC guideline would yield 30-31 dBA for the plant contributions (i.e. the existing L_{90} ambient of 27 dBA plus the plant's calculated, allowable contribution of 30 dBA would yield a total future environment of 32 dBA, which is +5 dB for the nighttime L_{90} metric). Thus, the most restrictive compliance criterion for plant contributions would be 30 dBA, not the 7 dBA that was modeled and reported for informational purposes in the AFC.

Proposed changes are noted in the text below for ease of identification.

NOISE COMPLAINT PROCESS

NOISE-2 Throughout the construction and operation of the project, the project owner shall document, investigate, evaluate, and attempt to resolve all legitimate, 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 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 in the complaint; If the noise is legitimate ~~project related~~, take all feasible measures to reduce the source of the noise; and
- Submit a report documenting the complaint and actions taken. The report shall include: a complaint summary, including the final results of noise reduction efforts and, if obtainable, a signed statement by the complainant stating that the noise problem has been resolved to the complainant's satisfaction.

Verification: Within five days of receiving a noise complaint, the project owner shall file a Noise Complaint Resolution Form, shown below, with both the local jurisdiction and the CPM, that documents the resolution of the complaint. If mitigation is required to resolve the complaint, and the complaint is not resolved within a three-day period, the project owner shall submit an updated Noise Complaint Resolution Form when the mitigation is performed and complete.

NOISE RESTRICTIONS

NOISE-4 The project design and implementation shall include appropriate noise mitigation measures adequate to ensure that the operation of the project will not cause the noise levels due to plant operation alone, during the daylight hours (when the project is capable of producing electricity), to exceed an average of 55 ~~53~~ dBA measured at or near monitoring location LT-1 (15563 Edie Road), an average of 43 ~~40~~ dBA measured at or near monitoring location LT-2 (41234 Harper Lake Road), an average of 55 ~~52~~ dBA measured at or near monitoring location ST-1 (15635 Lockhart Road), and an average of 49 ~~46~~ dBA measured at or near monitoring location ST-2 (15654 Roy Road).

[Applicant's Note: The above revised sound levels are based on either meeting the County LORS requirements or being 3 dB above the AFC-predicted plant contribution levels, whichever is more restrictive.]

Also, the project design and implementation shall include appropriate noise mitigation measures adequate to ensure that the operation of the project will not cause the noise levels due to plant operation alone, during the four quietest consecutive hours of the nighttime, to exceed an average of 24 ~~22~~ dBA measured at or near monitoring location LT-1 (15563 Edie Road), an average of 30 ~~7~~ dBA measured at or near monitoring location LT-2 (41234 Harper Lake Road), an average of 24 ~~21~~ dBA measured at or near monitoring location ST-1 (15635 Lockhart Road), and an average of 24 ~~15~~ dBA measured at or near monitoring location ST-2 (15654 Roy Road).

All noise limitations contained in this condition of certification are independent of ambient levels. The limitations are placed on noise created by the project plant operation alone.

No new pure-tone components shall 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.

[Applicant's Note: The above revised sound levels are based on meeting the CEC's L90+5 dB guideline as this is the most restrictive limit in the noise LORS that are pertinent to the AMS project.]

A. When the project first achieves a sustained output of 90% or greater of rated capacity, the project owner shall conduct a 25-hour community noise survey at monitoring location LT-1, or at a closer location acceptable to the CPM. This survey shall be conducted during a windy day to be representative of the normal daytime environment in the project area. This survey during the power plant's full-load operation shall also include measurement of one-third octave band sound pressure levels to ensure that no new pure-tone noise components have been caused by the project.

[Applicant's Note: The provision for conducting the survey during a windy day, although deemed by Staff to be a representative condition for the AMS area, may lead to falsely-elevated sound level readings due to wind-induced artifacts that have little or nothing to do with the AMS plant noise emissions. Care, engineering judgment, and a prudent application of applicable ANSI and ISO outdoor measurement standards need to be exercised during the compliance verification survey to enable accurate assessment of the AMS facility, rather than the recording of extraneous wind-noise effects.]

During the period of this survey, the project owner shall conduct a short-term survey of noise at each of the monitoring locations LT-2, ST-1, and ST-2, or at closer locations acceptable to the CPM. The short-term noise measurements at these locations shall be conducted during the daylight hours and again during the nighttime hours of 10:00 p.m. to 7:00 a.m.

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 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 residence. The character of the plant noise shall be evaluated at the affected receptor locations to determine the presence of pure tones or other dominant sources of plant noise.

B. If the results from the noise survey indicate that the power plant noise at the affected receptor sites exceeds the above values during the above specified period(s) of time, mitigation measures shall be implemented to reduce noise to a level of compliance with these limits.

C. If the results from the noise survey indicate that pure tones are present, mitigation measures shall be implemented to eliminate the pure tones.

Verification: The survey shall take place within 90 ~~30~~ days of the project first achieving a sustained output of 90% or greater of rated capacity. Within 30 ~~15~~ days after completing the survey, the project owner shall submit a summary report of the survey to 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 CPM approval, for implementing these measures. When these measures are in place, the project owner shall repeat the noise survey.

Within 30 ~~15~~ days of completion of the new survey, the project owner shall submit to the CPM a summary report of the new noise survey, performed as described above and showing compliance with this condition.

[Applicant's Note: The above revised milestones are more realistic for addressing the field measurement process and reporting effort. Also,

they are consistent with the milestones in SA/SSA NOISE-5 for reporting the results of the Occupational Noise Survey.]

STEAM BLOW RESTRICTIONS

NOISE-7 If a traditional, high-pressure steam blow process is used, the project owner shall monitor steam blow noise at the closest receptors, LT-1, ST-2, and ST-1, to ensure the noise of steam blows does not exceed 60 dBA at these locations. If this noise level is unattainable, the project owner shall either relocate the residents for the duration of steam blows to a location further away from these activities, or equip steam blow piping with a temporary silencer that quiets the noise of steam blows to no greater than 60 dBA, measured at LT-1, ~~and~~ ST-2~~.~~, and ST-1. The steam blows shall be conducted between 7:00 a.m. and 7:00 p.m. unless arranged with the CPM such that offsite impacts would not cause annoyance to noise receptors. If a low-pressure, continuous steam blow process is used, the project owner shall submit to the CPM a description of the process, with expected noise levels and planned hours of steam blow operation.

Verification: At least 15 days prior to the first steam blow, the project owner shall notify all residents and business owners within two miles of the project site. The notification may be in the form of letters, phone calls, fliers, or other effective means as approved by the CPM. The notification shall include a description of the purpose and nature of the steam blow(s), the planned schedule, expected sound levels, and explanation that it is a one-time activity and not part of normal plant operation. During steam blow activities, noise levels will be monitored at receptor locations LT-1, ST-1, and ST-2 and the results reported to the CPM.

[Applicant's Note: Based on the Staff's responses to agency and public comments, as contained in the SSA starting on page 5.6-14, it is believed that three receptor locations, namely LT-1, ST-1 and ST-2, are intended to be subject to noise monitoring during steam blows, as well as to potential relocation efforts, should far-field steam blow noise levels be unable to be reduced to the levels of NOISE-7. The text of the SSA NOISE-7 mentions only LT-1 plus ST-1, then later only LT-1 and ST-2 which was confusing. The above suggested wording changes are aimed at clarifying the three pertinent locations.

The Applicant agrees with Staff that if a controlled steam blow event produces 89 dBA at 100 feet in the construction area then, with nominal distance attenuation, far-field noise levels of approximately 60 dBA or less should result at receptor locations LT-1, ST-1 and ST-2. However, the Applicant is relying on the Staff's statements in the Supplemental Assessment (page 5.6-15) regarding similar noise emissions values for

"numerous power plants" and the inferred ability of the AMS Applicant to replicate those results for this project.]

7.4 Correlation to SA, SSA and Hearing Topics

- Staff Assessment, Section 5.6
- Supplemental Staff Assessment, Part A, Section 5.6
- Noise and Vibration

8.0 PUBLIC HEALTH

8.1 Introduction

A. Name: Richard B. Booth

B. Qualifications: I am a Supervising Project Manager with over thirty-four years of consulting experience conducting air quality permitting assessments for new and modified industrial and energy related sources. I have twenty-two years experience conducting public health related studies (including health risk assessments) for new and modified industrial and energy related sources. I have a B.A. degree in Natural Sciences. My qualifications are summarized more completely in the attached resume (Appendix A).

C. Purpose: This testimony addresses public health issues associated with the Abengoa Mojave Solar Project.

D. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

- Application for Certification, Volume 1, Section 5.10 [Exhibit 1]
- Application for Certification, Volume 2, Appendix C (Section C.4) [Exhibit 1]
- Application for Certification, Volume 4, Data Adequacy Supplement, p. 6-7 [Exhibit 2]
- Applicant's Written Response to CEC Data Request, Set 1 (1-93), dated November 23, 2009, Responses to Requests 83, 85-88 [Exhibit 3]
- Applicant's Supplemental Written Response to CEC Data Request, Set 1A (1-93), dated January 11, 2010, Initial and Revised Responses to Requests 83, 84, 86-88 [Exhibit 11]
- Applicant's Second Supplemental Written Response to CEC Data Request, Set 1A (1-93), dated February 2, 2010, Revised Responses to Requests 83, 85, 86 [Exhibit 13]
- Applicant's Revised Second Supplemental Written Response to CEC Data Request, Set 1A (1-93), dated February 25, 2010, Revised Response to Request 83 [Exhibit 19]
- Authority to Construct Permit Application, July 2009 [Exhibit 39]

To the best of my knowledge, all of the facts contained in this testimony (including all referenced documents) are true and correct. To the extent this testimony contains opinion, such opinion is my own. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

8.2 Summary Of Testimony

A. Affected Environment

The proposed Project site is located in western San Bernardino County, east of the Kern County line, approximately 18 miles west-northwest of Barstow, California. The site is a mix of open desert and agricultural land, located in the western desert region of the county. The Four Corners area (intersection of Hwy 58 and Hwy 395) lies approximately 11 miles south-southwest of the project site. The site is flat, gently rising in elevation from the northeast to the west and southwest, with an elevation of approximately 2,070 feet above mean sea level**.** There were no known or identified sensitive receptors within a six-mile radius of the plant site.

B. Construction Impacts

Construction will occur at the proposed project. Construction impacts to public health as a result of air quality impacts will be in the form of fugitive dust and vehicle exhaust emissions. Fugitive dust emissions will result from construction equipment disturbing (excavating, grading, and dumping) soils on the proposed project site and from the movement of vehicles on unpaved soils. Vehicle exhaust emissions are associated with burning ultra low sulfur diesel and gasoline in the construction equipment, construction vehicles, and construction worker's automobiles traveling to and from the construction site. These construction impacts will be temporary and finite in duration with construction activities expected to be completed within 26 months.

A screening health risk assessment (SHRA) was performed for the construction activities, primarily exhaust emissions associated with the use of onsite diesel construction equipment. The SHRA for construction was conducted consistent with the *Health Risk Assessment Guidance for Analyzing Cancer Risks from Mobile Source Diesel Emissions, South Coast AQMD, December2002.* The results of the screening level HRA indicated the following:

- Cancer risk ≤ 1.33 E-6
- Chronic HI ≤ 0.029
- Acute HI = n/a (no Acute REL has been established for diesel PM)

These values are well below the significance thresholds established by the Mojave Desert Air Quality Management District (MDAQMD). It should be noted that the MDAQMD does not require health risk assessments for construction activities, and the district significance thresholds are not applied to construction related activities. No significant public health effects are expected during construction.

C. Operations Impacts

Potential public health impacts from onsite stationary source, area source, fugitive source, and mobile source operations were determined by performing air dispersion modeling coupled with the latest version of the California Air Resources Board Hot Spots Analysis

Reporting Program (CARB HARP) model. The air modeling input and output were used in the HARP On-Ramp pre-processor and made ready for use in HARP. HARP was supplemented via the use of device and process specific emissions files. Emissions of combustion by-products from stationary and mobile sources, as well as direct and indirect (degradation) products from the use of HTF were evaluated in the facility HRA.

Emissions values and operational scenarios for the facility were evaluated using HARP. The revised HRA values for the facility are as follows:

Boilers, Stationary Engines, Cooling Towers, HTF System, Mobile Ops Vehicles		
Risk Category	**MIR Project Values**	**Applicable Significance Threshold**
Cancer Risk	6.85 E-6	See Table 5.10-4 in Section 5.1 (Air Quality)
Chronic Hazard Index	0.00992	
Acute Hazard Index	0.0087	
Cancer Burden	0.0001[1]	
MIR Receptor #: 302 , and location 473151mE, 3873400mN. Acute MIR, Receptor #130, HI=0.026, 469945mE, 3874500mN.		

* No acute REL has been established for diesel PM.

[1] The 10^{-6} MIR radius is located ~1815 ft. from the site center. The estimated population within this radius is less than 100 individuals, therefore the cancer burden is 0.0001

D. Cumulative Impacts

The project's public health cumulative impacts are estimated through air dispersion modeling and use of the CARB HARP model. The project applicant, in consultation with the MDAQMD confirmed that there were no projects within six miles from the AMS project site that are under construction or have received permits to be built or operate in the foreseeable future. Therefore, no cumulative public health impact assessment was necessary and no cumulative impacts are expected.

E. Mitigation

Fugitive dust and tailpipe emissions from construction activities will be controlled through the applicant proposed and CEC recommended mitigation measures which include fugitive dust control, use of Tier 2 and 3 off-road engines, and the implementation of an on-site construction mitigation manager. The use of these mitigation measures is expected to reduce construction health related impacts to levels below or less than significance.

Federal, state, and local air district rules and regulations do not require the project to mitigate the operational air quality impacts as the emissions of these pollutants will be less than significant. Mitigation will be utilized that will reduce the non-stationary source

emissions through the use of new on-road and off-road vehicles that meet California emission standards in addition to the development of a site Operations Dust Control Plan which will minimize fugitive dust emissions during operation and maintenance activities. In addition, the various stationary devices and processes, i.e., boilers, HTF ullage systems, and power block cooling systems are proposed with best available control technology.

8.3 Proposed Licensing Conditions

The applicant agrees with and will abide by all of the proposed public health conditions of certification.

8.4 Correlation to SA, SSA, and Hearing Topics

- Staff Assessment, Section 5.7
- Supplemental Staff Assessment, Part A, Section 5.7
- Public Health

9.0 SOCIOECONOMIC RESOURCES

9.1 Introduction

A. Name: William Graham

B. Qualifications: Mr. Graham's qualifications are as noted in his resume contained in Appendix A.

C. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

- Application for Certification, Volume 1, Section 5.11 [Exhibit 1]

9.2 Summary of Testimony

To the best of my knowledge, all of the facts contained in this Section of the Applicant's testimony (including all referenced documents) are true and correct. To the extent this testimony is based on opinions, such opinions are my own based upon my professional judgment. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

A. Affected Environment

The Abengoa Mojave Solar Project (AMSP) will be located in southern California's Mojave Desert, approximately 10 miles west of the City of Barstow southwest of Harper Dry Lake. The project will be located in San Bernardino County, California.

B. Construction Impacts

Overall construction period will be 26 months. Total construction personnel requirements will average approximately 830 employees per day for the AMSP. The workforce will peak at 1,162 workers in month 17.

Available skilled labor in San Bernardino, Kern, and Los Angeles counties in California was evaluated by surveying local labor unions and contacting the California Employment Development Department. All sources show that the workforce in the area will be adequate to fulfill AMSP's labor requirements for construction. It is expected that most of the construction workforce will be drawn from the local area and/or will commute daily from within the three counties to reach the job site. As a result, the construction of the AMSP will not create any significant adverse impacts to the local school system since there will likely be very few new students, if any, entering the local school districts. The construction of the proposed project will not cause significant demands on public services or facilities.

AMSP's initial capital cost is estimated to be about $1 billion. The estimated value of materials and supplies that will be purchased locally during construction is $121 million. The total local sales tax expected to be generated annually during construction is $4.87

million (assuming it all stayed in San Bernardino County). AMSP will provide about $272 million in total construction payroll.

In addition to the direct impacts of the project, construction activity will result in secondary beneficial economic impacts (indirect and induced impacts) within San Bernardino, Kern, and Los Angeles counties. The estimated indirect and induced impacts resulting from the $55.8 million in annual local construction expenditures as well as the $125.6 million in annual payroll is $141 million.

C. Operational Impacts

AMSP is expected to employ up to 68 full-time employees. The entire permanent workforce is expected to commute from San Bernardino, Kern, or Los Angeles counties. The AMSP's operation will generate a small benefit by employing 68 full-time employees with an annual payroll of about $8.2 million. In addition to the payroll, there will be an annual operations and maintenance budget of $12.7 million.

The operation of the proposed project would result in secondary beneficial economic impacts (indirect and induced impacts) that would occur within San Bernardino, Kern, or Los Angeles counties. These indirect and induced impacts represent permanent increases in the county's economic variables. The estimated indirect and induced impacts would result from annual $8.2 million in operations payroll as well as the $12.7 million in annual operations and maintenance (O&M) is approximately $6 million annually.

There will be no significant impacts due to plant operations, since the entire permanent workforce is expected to commute from within San Bernardino, Kern, or Los Angeles counties. AMSP is expected to pay approximately $300,000 per year in property taxes and about $1.1 million in annual sales tax revenues to San Bernardino County.

AMSP will be in compliance with Guidances and the Executive Order 12898, Federal Actions to Address Environmental Justice in Minority and Low Income Populations (1994), because local minority and low-income populations will not be exposed to disproportionately high and adverse impacts from the project.

D. Cumulative Impacts

Because the majority of both construction and operations personnel will reside primarily in the three county area and live within commuting distance, no adverse effect to local schools or housing is anticipated. No adverse cumulative socioeconomic impacts are anticipated from either the construction or operation of AMSP. Instead, the local community will enjoy a beneficial (but not significant) impact from short-term construction and longer-term operations employment.

E. Mitigation

The project has no significant socioeconomic or environmental justice impacts, so no mitigation measures are proposed.

9.3 Proposed Licensing Conditions

The Staff Assessment (SA) for the project filed by the CEC does not recommend Conditions of Certification to address socioeconomic resource issues. We concur with this assessment.

9.4 Correlation to SA, SSA and Hearing Topics

- Staff Assessment, Section 5.8
- Socioeconomic Resources

10.0 SOIL AND WATER RESOURCES

A. SOIL RESOURCES, SURFACE WATER, AND STORMWATER RUNOFF

10A.1 Introduction

A. Name: Brad Merrell

B. Purpose: This section of Soil and Water Resources pertains to soil resources and to surface water and storm water runoff.

C. Qualifications: Mr. Merrell's qualifications are as noted in his resume contained in Appendix A.

D. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

- Application for Certification, Volume 1, Section 5.17 [Exhibit 1]
- Application for Certification, Volume 3, Appendices J, K.1, and K.2 [Exhibit 1]
- Application for Certification , Volume 4 – Data Adequacy Supplement, pages 8-9, 15-16, and Attachments A, B, and C [Exhibit 2]
- Applicant's Written Response to CEC Data Request Set 1B (1-86), Dated November 25, 2009, Response to Data Request 80 [Exhibit 4]
- Storm Channel Surface Profile [Exhibit 41]
- Applicant's Comments on Staff Assessment [Exhibit 26]

To the best of my knowledge, all of the facts contained in this Section of the Applicant's testimony (including all referenced documents) are true and correct. To the extent this testimony includes opinions, such opinions are my own based upon professional judgment. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

10A.2 Summary of Testimony

A. Affected Environment

Site History: The proposed project would be developed on the western edge of Harper Dry Lake in the Harper Valley approximately halfway between the City of Barstow and Kramer Junction (Highway 58 / Highway 395 Intersection) in an unincorporated area of San Bernardino County. Stormwater runoff from the tributary areas west of the Project site historically crosses the project site in the form of sheet runoff flow toward the dry lake bed.

Drainage and Flood Control: The project site slopes from the southwest towards the northeast at grades of approximately one percent. The 100-year flood plain has not been mapped for the Harper Dry Lake area. Storm runoff flow, in the form of sheet flow, across the Project site will be intercepted as it enters the site, conveyed around the

Project, and returned to its historical flow location and parameters as it flows into Harper Dry Lake.

Off-site storm runoff flow around the project will be isolated from on-site flows within the Project. Sheet flow within the solar field will be managed through the construction of internal drainage facilities designed to capture storm water and allow it to percolate and evaporate within the fields.

On-site storm runoff flows within the power island areas will be intercepted, treated to remove possible pollutants, and recycled as plant cooling water. Local area containments will be provided around locations such as oil-filled transformers and chemical storage areas. Storm water from the power islands and from other plant drains will be sent to on-site oil-water separators and then added to plant cooling water.

Wastewater from plant processes will be discharged to on-site surface impoundments (evaporation ponds). Sanitary waste water will be disposed of in septic systems and leach fields at each power island. On-site soil contaminated with HTF will be processed within land treatment units adjacent to the surface impoundments. Report of Waste Discharge materials consisting of leak detection and monitoring plans, corrective action plans, and closure plans for the surface impoundments and land treatment units were prepared and submitted to the regional water quality control board.

A hydrology study was conducted to provide design data for surface water drainage storm water management structures, and to design drainage structures to convey off-site storm runoff around the plant site. Drainage channels were analyzed to ensure hydraulic capacity for the 100-year storm event and for compliance with county flood control standards. A water surface profile was prepared to analyze the 100-year storm water surface through the drainage channels and to ensure that the 100-year storm could be conveyed within the designed channels.

B. Project Impacts

Drainage channels can be subject to scour and erosion and could have the potential to cause impacts related to off-site flooding. Improper handling of plant wastewater could cause dispersion of contaminates to soil and groundwater. However, with proper design and operation of the Project, including stormwater and flood management, retention of on-site storm water, on-site wastewater management, and contaminated soil remediation, there will be no significant adverse impacts to soil or groundwater resulting from surface stormwater and plant wastewater.

C. Mitigation

The MSP will institute mitigation measures to protect the Project site and the environment from storm water runoff. Prior to beginning any clearing, grading, or excavation activities associated with construction of the Project, the Applicant will prepare and approved construction phase SWPPP and a DESCP to meet CEC requirements. The applicant will obtain final Waste Discharge Requirements issued by Lahontan RWQCB. Permits for construction of septic systems will be obtained.

Prior to commercial operation, the Applicant will develop and implement an operations phase SWPPP. Throughout the operational life of the Project, the Applicant will

maintain the control BMP's throughout the project site to protect the project and the environment.

10A.3 Proposed Licensing Conditions

The CEC has proposed the Conditions of Certification (COC) that relate to stormwater, wastewater, and drainage: SOIL&WATER-1, SOIL&WATER-2, and SOIL&WATER-3 requiring development of a site specific Drainage, Erosion, and Sedimentation Control Plan (DESCP), compliance with the Waste Discharge Requirements (WDR) in accordance with applicable California Regional Water Quality Control Board requirements, and development and implementation of a Channel Maintenance Program for routine maintenance of the AMS Project storm water channels. COC SOIL&WATER-8 requires the Applicant to recycle and reuse all process wastewater streams to the extent practicable and properly classify and dispose of any wastewater prior transported offsite for disposal. COC SOIL&WATER-9 requires the applicant to submit plans for the sanitary waste septic systems to the county for review and comment and to the commission for approval. The Applicant agrees with these Conditions.

10A.4 Correlation to SA, SSA and Hearing Topics

- Staff Assessment, Section 5.9
- Supplemental Staff Assessment, Part B, Section 5.9
- Soil and Water Resources

10.0 SOIL AND WATER RESOURCES
B. GROUNDWATER MODELING

10B.1 Introduction

A. Name: Jack Wittman, Vic Kelson

B. Purpose: This testimony addresses the groundwater modeling and impact analysis performed for the project's proposed water use.

C. Qualifications: Mr. Wittman, Mr. Kelson, and Mr. Parker's qualifications are as noted in their resumes contained in Appendix A.

D. Prior Filings:

- Application for Certification, Volume 1 & Volume 2, Appendix A, Basin Conceptual Model [Exhibit 1]
- Application for Certification, Volume 4 - Data Adequacy Supplement, pages 21-22 [Exhibit 2]
- Applicant's Written Response to CEC Data Request Set 1B (1-86), dated November 25, 2009, Responses to Data Requests 26, 27, 28, 29, 32, 33, 36, 39, 46, 47, 48, and 49 [Exhibit 4]
- Applicant's Supplemental Response to CEC Data Request 1B (1-86), dated December 23, 2009, Background and Responses to Data Requests 21, 22, 23, 30, 31, 34, 35, 38, 40, 41, 42, 43, 44, and 45 [Exhibit 6]
- Modeling files in submittal entitled "Applicant's Response to California Energy Commission Data Request for Soil and Water Resources, Set 1B," dated December 23, 2009 [Exhibit 7]
- Supplementary input data for modeling files submitted with "Cover Letter for Supplementary MODFLOW Files," dated December 30, 2009 [Exhibit 9]
- Groundwater Modeling Analysis Presentation, dated January 15, 2010 [Exhibit 12]
- Applicant's Second Supplemental Response to CEC Data Request Set 1B for Water Resources, dated February 16, 2010, supplemental Responses to Data Requests 21, 23, 31, 41, 44, and 45, and modeling files [Exhibit 14]
- Applicant's Revised Figures for Second Supplemental Response to CEC Data Request Set 1B for Water Resources, dated February 17, 2010 [Exhibit 15]

10B.2 Summary of Testimony

A. Opening Statement

In our original filing, Layne Christensen described work that our scientists performed at the site of an existing well in the Harper Valley Groundwater Basin (HVGB), including an aquifer test and some limited water level measurements. That field test was used to determine local aquifer properties and to develop a regional and local groundwater flow model of the system. Since the 1930s, groundwater in the HVGB has been used for agricultural purposes. Wells were drilled into the deeper sediments to provide irrigation water for alfalfa and other crops. Agricultural water use in the basin has declined significantly since the mid-1980s, and water levels have recovered as a result. The petitioner has purchased water rights, formerly used for agriculture, that exceed the needs of the planned solar power facility.

In response to CEC data requests about the original Layne Christensen model, we adapted an existing USGS model (Stamos, et al, 2001) to construct a more complete analysis of the regional groundwater budget. The Stamos model was used by USGS to evaluate water management alternatives, in cooperation with the Mojave water agency. We adapted the original USGS model for our study.

The model covers the entire Mojave River Basin, and was calibrated to water level measurements in the basin from 1931 to 1992. In addition to the 1931-1992 calibration, Stamos validated the model against water-level data from 1992-1998. During the process of updating the model for our study, CEC's consultants and Layne identified and corrected some inconsistencies between the input files provided by USGS and the USGS report.

With an operational version of the USGS model, we extended the time frame of the model to 2050 and ran the following predictive scenarios:

- no additional withdrawals;
- addition of Abengoa project; and
- addition of Abengoa project, plus an increase of 10% in withdrawals from all other wells in the HVGB.

When the analysis of future conditions was complete, it was clear that using the revised regional model resolved concerns about the impacts of the Abengoa project on regional groundwater flow patterns and water budgets.

In addition to addressing the question of how much the planned withdrawal would alter groundwater flow in the vicinity of the new facility, we addressed other questions that were raised by the CEC. In particular, the CEC desired an assessment of the potential effects of new pumping on groundwater quality in neighboring wells. The water-quality concern is based on the fact that groundwater with a high total dissolved solids (TDS) concentration in the basin is categorized as non-potable. The CEC staff's concern was that potentially the proposed project could draw salty water to neighboring wells, changing their water from a potable to a non-potable condition. Alternately, the project's wells might receive more fresh water and would no longer achieve the objective of using

non-potable water for the operation. To address these concerns, we evaluated trends in groundwater quality in nearby wells during the past 30 years.

B. Summary of Results

It was necessary to establish a standard for determining whether a well would suffer adverse impacts due to the proposed project. An adverse impact was noted if the water level in a particular well would fall below a benchmark water level because of withdrawals at the proposed project site. We used the 1995 modeled water levels for the calibrated model at each HVGB well as the benchmark for determining if significant impacts had occurred.

Water levels near Harper Lake declined from the time development began until the mid-1980s, when agricultural water use was curtailed. Starting in the late 1980s, water levels near Harper Lake recovered, with the most rapid rate of recovery in the late 1980s and early 1990s. The year 1995 was chosen as a benchmark because by that time regional water levels had recovered substantially from their historic (mid-1980s) low levels, and because additional water-level recovery has occurred since 1995. Furthermore, since many wells in the area were pumped successfully during the mid-1980s, we are confident that all the wells that are presently in use will be capable of pumping should water levels approach the 1995 levels. For each predictive scenario, a well was considered to have experienced a significant impact in 2042 (the end of the operational period for the proposed project) if its simulated water level was below the simulated 1995 water level for that well

Based on the 1995 benchmark for impacted wells, we reached the following conclusions:

1. Our local analysis is consistent with the regional hydrology as described by the published USGS model (Stamos et al., 2001).

The local model of Harper Lake that was presented in our original filing had an important limitation in that it was not calibrated to the long-term data set that extended back to 1930. Because that effort requires updated fluxes at the model boundary each year in the model, we chose to use the existing transient USGS Mojave River model of Stamos et al. (2001). This model was calibrated over a 69-year time period, and the groundwater stress data (e.g., withdrawals and recharge sources) have undergone extensive review. At present, the Stamos model is the best available predictive tool for groundwater flow in aquifers associated with the Mojave River.

By adapting the Stamos model, we ensured that simulated changes in groundwater flow patterns and budgets in the HVGB are governed by the regional groundwater flow system, upgradient water sources, and other water withdrawals inside and outside of the HVGB.

2. Long-term rebound of water levels will be attenuated by the Abengoa withdrawals.

Currently, groundwater levels in the vicinity of Harper Lake are rising in response to recent reductions in withdrawals in the basin. Our modeling analysis predicts that this "rebound" will be attenuated by the proposed project, with the degree of attenuation largest in the vicinity of the Abengoa wells. This conclusion was determined by

comparing simulated 2042 water levels in model simulations that excluded and included the proposed project.

3. Total water withdrawals after project inception will be smaller than historical withdrawals.

Although our current filing does not explicitly report historical water withdrawal rates in the HVGB, it is possible to make a relative comparison between historical withdrawals and future withdrawals including the proposed project. Since the simulated water-levels do not reach the historic lows seen in the 1980s, even with the proposed project withdrawals, we infer that the project will not result in total withdrawals in the basin that exceed historical maximum withdrawals.

4. No wells in the vicinity of Harper Lake will suffer adverse impacts resulting from the proposed project.

The model simulations indicate that water levels near Harper Lake were at their lowest in the mid-1980s and have recovered since. The most rapid rate of recovery in water levels occurred in the 1985-1995 period. Since it is known that water users in the region were able to satisfy their demands during this time period, we chose the simulated 1995 water levels as a benchmark for assessing impacts. Our model predicts that the proposed development will not result in water levels that are below the simulated 1995 water levels in any of 31 wells identified near the project site.

5. There is no conclusive evidence that water quality has been changing in response to changes in withdrawals near Harper Lake. It is not possible to project water-quality impacts of the proposed development on the basis of historical data.

We collected and evaluated the available water-quality data sets; however, only limited data are available for wells in the HVGB. There is no indication that the observed changes in TDS is related to long-term water withdrawal rates in the basin. Therefore, it is not possible to predict the impact of the proposed project on TDS concentrations in other wells in the HVGB.

Furthermore, our modeling analysis examined the groundwater travel time between Harper Lake and the proposed wells. The resulting travel times were longer than 100 years, consistent with the travel times reported in the USGS report. Given the long travel times for regional groundwater in the basin, any water-quality impacts are likely to be buffered by the slow response of the aquifer to changes in pumping withdrawals.

10B.3 Proposed Conditions of Certification

The CEC has proposed three Conditions of Certification that relate to the topics of this testimony: SOIL&WATER-4, SOIL&WATER-6 and SOIL&WATER-7. SOIL&WATER-4 govern the installation of groundwater wells and requires documentation that wells were properly completed. It also governs groundwater well abandonment for wells on the Applicant's property with screen intervals that intercept the poor quality perched water and deeper aquifer water. SOIL&WATER-6 requires the Applicant to submit a Groundwater Level Monitoring and Reporting Plan and SOIL&WATER-7 requires the Applicant to submit a Groundwater Quality Monitoring

and Reporting Plan to the CPM. The Applicant agrees with these conditions with the exception of the proposed revisions to SOIL&WATER-6, noted below.

Proposed revisions to SOIL&WATER-6

The Applicant proposes clarification edits to section D.10. of the mitigation measures set forth in SOIL&WATER-6. In addition, the Applicant does not agree that well yield should be considered significantly impacted if it is incapable of meeting 150% of the well owner's maximum daily demand, dry-season demand, and annual demand. The threshold for considering well yield significantly impacted should be set at 100% because, as defined, the threshold already takes into account variability through maximum daily demand, dry-season demand, and annual demand.

SOIL&WATER-6 The project owner shall submit a Groundwater Monitoring and Reporting Plan to the CPM for review and approval. This plan shall consist of two parts as defined by Conditions of Certification **SOIL&WATER-6** and **-7**. **SOIL&WATER-6** describes the requirements for establishing a groundwater well monitoring network and monitoring groundwater levels in that network. **SOIL&WATER-7** describes the requirements for monitoring groundwater quality in the network. Mitigation for impacts related to project induced groundwater level declines or degradation in groundwater quality are provide in each condition of certification. All work and reporting under these conditions of certification shall be conducted under the supervision of a licensed California professional geologist or engineer. 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 conditions. The primary objective for the monitoring is to establish a baseline of pre-construction groundwater level trends that can be quantitatively compared against observed and simulated trends near the project pumping wells and near potentially impacted existing wells during project construction and over the life of project operation. The project owner shall:

A. Prior to Project Construction

1. Well Reconnaissance. Conduct a well reconnaissance to investigate and document condition of existing water supply wells within the monitoring area provided access is granted by the well owner). The monitoring area shall be defined by the 20-foot contour of simulated groundwater drawdown induced by AMS project pumping at the end of the project life (as presented in Appendix B Figure Soil and Water 3). Notices shall be sent by registered mail to each well owner identified within monitoring area that provide the following information:

a. A summary of the proposed project with an explanation of how the groundwater levels are expected to be lowered due to the AMS project groundwater pumping;

b. An option for the well owner to be provided a copy of the Groundwater Monitoring and Report Plan as approved by the CPM and all reports prepared in compliance with the CPM-approved plan;

c. The project owner's contact name, address, and telephone where the well owner can obtain more information; and

d. The address and telephone number of the Energy Commission.

2. Monitoring Plan. Submit a Groundwater Level Monitoring and Reporting Plan to the CPM for review and approval at least sixty (60) days prior to construction. This plan shall include at a minimum:
a. The monitoring plan and network of monitoring wells shall make use of two of the four project production wells (once installed), all monitoring wells installed to comply with Waste Discharge Requirements for the evaporation ponds and land treatment unit associated with the project, and the BLM marsh water supply well. In addition, and at least three additional existing wells in the Harper Lake area shall be incorporated into the program. The final well selection shall be based on access being granted by the
owners and by BLM and that the wells are deemed by the CPM to be of suitable location and construction to satisfy the requirements for the monitoring program. Some Harper Lake area wells are already monitored, and these wells can be included as part of the network if they meet the objectives of the monitoring program.
b. A scaled map showing the project site, boundary, location of all wells within the monitoring area, and location of wells selected for the monitoring network. The map shall also include relevant natural (e.g., faults, playa lake, etc.) and man-made features that are existing and proposed as part of the AMS project.
c. Available well construction information, drilling and well installation methods, and borehole lithology for all wells in the monitoring area.
d. For monitoring network wells, report the results of a wellhead elevation survey that record: the location and elevation of the well; the location and elevation of the top of the well casing reference point for all water level measurements (the measurement point); and the coordinate system and datum for the survey measurements.
e. A description of how groundwater measurements will be collected and reported. All groundwater level measurements shall be made to the nearest 1/100 of a foot.
f. A description of the groundwater level measurements and reporting protocols and quality assurance/quality control plan.
g. Information about the AMS project wells shall be added to a revised plan submitted to the CPM for review and approval within sixty (60) days after the project wells are installed.
h. A description of the reporting requirements presented below, including a statistical analyses conducted on the data collected, the thresholds employed to determine impact significance, and a description of the mitigation required for significant water level
impacts should they occur.
i. A schedule for measuring water levels in all wells in the monitoring network.
j. The plan shall be signed and stamped by a licensed California professional geologist or engineer.
3. Monitoring. Before the start of project construction, collect groundwater levels from all existing wells within the monitoring network, in accordance with the

requirements in the Groundwater Level Monitoring and Reporting Plan, to establish pre-construction
conditions.
4. Reporting. A report documenting the pre-construction monitoring results shall be submitted to the CPM no less than sixty (60) days after measuring groundwater levels in network wells. At a minimum, the report shall contain: a tabular summary of the network wells; the water level measurements; and dates of the water level measurements; diagrams showing water levels in the wells over time (hydrographs); a map of groundwater elevation contours and calculated gradients; and conclusions regarding groundwater level trends and recommendations for future monitoring and the likelihood
of potential interferences to existing wells made by a licensed California professional geologist or engineer.

B. During Construction

5. Collect groundwater levels within the monitoring network on a quarterly basis throughout the construction period. Perform statistical trend analysis for groundwater levels data. Assess the significance of apparent trends using appropriate statistical analysis and compare to observed background trends in other monitored wells in the subbasin.
6. Within sixty (60) days of measuring groundwater levels in network wells, submit to the CPM a report of pre-project groundwater levels, present a summary of available climatic information (monthly average temperature and rainfall records from the nearest weather station), and provide a comparison and assessment of water level data relative to the spatial trends simulated by the USGS Mojave River Basin Model (USGS2001). This report shall also contain a tabular summary of the wells, current and historical water level measurements, and dates of water level measurements; a map of the groundwater
elevation contours and calculated gradients; and conclusion and recommendations of a licensed California professional geologist or engineer.

C. During Operation

7. On a quarterly basis for the first year of operation and semi-annually thereafter for the following four years, collect groundwater level measurements from all wells identified in the groundwater monitoring network. Quarterly operational parameters (i.e., pumping rate and days on which pumping occurred) of the groundwater supply wells shall be monitored.
8. On an annual basis, perform statistical trend analysis on water levels, compare water levels and trends to pre-project conditions, present a summary of available climatic information (monthly average temperature and rainfall records from the nearest weather station), and provide a comparison and assessment of water level data relative to the assumptions and spatial trends simulated by the USGS Mojave River Basin Model (USGS2001). The magnitude and significance of any trends shall be evaluated. Based on comparisons between preproject, project, and background water level trends, the project owner shall estimate the groundwater level change attributed to project pumping. These calculations shall

be supported using a tabular summary of the wells, current and historical water level measurements, a map of the groundwater elevation contours; calculated gradients; and conclusion and recommendations of a licensed California professional geologist or engineer.

D. Mitigation

9. If groundwater levels have been lowered more than 20 feet below preconstruction
levels in an offsite well and monitoring data indicates the water level decline is attributed to project pumping, then the project owner shall assess the impact to the water column above the pump and well screen and related impact to well yield.

10. Mitigation shall be provided to ~~significantly impacted~~ well owners that experience 20 feet or more of project-induced drawdown if well monitoring data confirms project pumping causes all or a portion of the drawdown and either the previously submerged well screen has been exposed or the well yield or performance has been reduced such that the well fails to meet demand. The type and extent of mitigation shall be determined by the amount of water level decline induced by the project, the type of impact, and site specific well construction and water use characteristics. If an impact is determined to be caused by drawdown from more than one source, the level of mitigation provided shall be proportional to the amount of drawdown induced by the project relative to other sources. In order to be eligible, a well owner must provide documentation of the well location and construction, including pump intake depth, and evidence that the well was constructed in use before project pumping was initiated. The mitigation of impacts shall be determined as follows:

a. Increased Electrical Usage. If project pumping has lowered a well's water levels and increased pumping lifts, increased energy costs shall be calculated. Payment or reimbursement for the increased costs shall be provided at the option of the affected well owner. In the absence of specific electrical use data supplied by the well owner, the following formula shall be used to calculate the additional electrical usage:

Increased Cost for Energy = (change in lift/total hydraulic head) x (total energy consumption times costs/unit of energy)

Where:

change in lift (ft) = calculated change in water level in the well

total hydraulic head (ft) = (elevation head) + (discharge pressure head)

elevation head (ft) = (wellhead discharge pressure gauge elevation) – (water level elevation in well during pumping)

discharge pressure head (ft) = (pressure in pounds per square inch at wellhead discharge gauge) x (2.31 to convert psi to feet of water)

The project owner shall submit to the CPM for review and approval the documentation showing which well owners must be compensated for increased

energy costs and that the proposed amount is sufficient compensation to comply with the provisions of
this condition.
i. Any reimbursements (either lump sum or annual) to impacted well owners shall be only to those well owners whose wells were in service within six months of the Commission decision and within the 20-foot contour interval established in Item A above.
ii. The project owner shall notify all owners of the impacted wells within one month of the CPM approval of the compensation analysis for increase energy costs.
iii. Compensation shall be provided on either a one-time lumpsum basis, or on an annual basis, as described below.

Annual Compensation. Compensation provided on an annual basis shall be calculated prospectively for each year by estimating energy costs that will be incurred to provide the additional lift required as a result of the project. With the permission of the impacted well owner, the project owner shall provide energy meters for each well or well field affected by the project. The impacted well owner to receive compensation must provide documentation of energy consumption in the form of meter readings or other verification of fuel consumption. For each year after the first year of operation, the project owner shall include an adjustment for any deviations between projected and actual energy costs for the previous calendar year.
One-Time Lump-Sum Compensation. Compensation provided on a one-time lump-sum basis shall be based on a well-interference analysis, assuming the maximum project-pumping rate of 2,160 AF/y. Compensation associated with increased pumping lift for the life of the project shall be estimated as a lump sum payment as follows:
i. The current cost of energy to the affected party considering time of use or tiers of energy cost applicable to the party's billing of electricity from the utility providing electric service, or a reasonable equivalent if the party independently generates their electricity;
ii. An annual inflation factor for energy cost of 3%; and
iii. A net present value determination assuming a term of 30 years and a discount rate of 9%;
b. Well Screen Exposure. If groundwater monitoring data indicate project pumping has lowered water levels below the top of the well screen, and the well yield is shown no longer meet pre-project demand, compensation shall be provided to diagnose and treat and well screen ~~encrustation~~ fouling.
Reimbursement shall be provided at an amount equal to the customary local cost of performing the necessary diagnosis and maintenance for well screen encrustation. Should well yield reductions reoccur ~~be reoccurring~~, the project owner shall provide payment or reimbursement for either periodic maintenance throughout the life of the project or replacement of the well.
c. Well Yield. If project pumping has lowered water levels to significantly impact well yield so that it can no longer meet its intended purpose, causes the well to

go dry, or cause casing collapse, payment or reimbursement of an amount equal to the cost of deepening or replacing the well shall be provided to accommodate these effects. Payment or reimbursement shall be at an amount equal to the customary local cost of deepening the existing well or constructing a new well of comparable design and
yield (only deeper). The demand for water, which determines the required well yield, shall be determined on a per well basis using well owner interviews and field verification of property conditions and water requirements compiled as part of the pre-project well
reconnaissance. Well yield shall be considered significantly impacted if it is incapable of meeting ~~150~~100% of the well owner's maximum daily demand, dry-season demand, and annual demand – assuming the pre-project well yield documented by the initial well
reconnaissance met or exceeded these yield levels. The contribution of project pumping to observed decreases in observed well yield shall be determined by interpretation of the groundwater monitoring data collected and shall take into consideration the effect of other nearby pumping wells, basin-wide trends, and the condition of the well prior to the commencement of project pumping.
d. The project owner shall notify any owners of the impacted wells within one month of the CPM approval of the compensation analysis.
e. Pump Lowering. In the event that groundwater is lowered as a result of project pumping to an extent where pumps are exposed but well screens remain submerged, the pumps shall be lowered to maintain production in the well. The project shall reimburse the impacted well owner for the costs associated with lowering pumps in proportion to the project's contribution to the lowering of the groundwater table that resulted in the impact.
f. Deepening of Wells. If the groundwater is lowered enough as a result of project pumping that well screens and/or pump intakes are exposed, and pump lowering is not an option, such affected wells shall be deepened or replacement wells constructed. The project shall reimburse the impacted well owner for all costs associated with deepening existing wells or constructing replacement wells in proportion to the project's contribution to the lowering of the water table that resulted in the impact.

E. Monitoring Program Evaluation:
11. After the first five-year operational and monitoring period, and every subsequent 5-year period, the CPM shall evaluate the data and determine if the monitoring program water level measurement frequencies should be revised or eliminated. Revision or elimination of any monitoring program elements shall be based on the consistency of the data collected.

Verification: The project owner shall do all of the following: 1. At least sixty (60) days prior to project construction, the project owner shall submit to the CPM, for review and approval, a comprehensive plan (Groundwater Level Monitoring and Reporting Plan) presenting all the data and information required in Item A above.

The project owner shall submit to the both the CPM all calculations and assumptions made in development of the plan.
2. During project construction, the project owner shall submit to the CPM quarterly reports presenting all the data and information required in Item B above. The project owner shall submit to the CPM all calculations and assumptions made in development of the report data and interpretations.
3. No later than sixty (60) days after commencing project operation, the project owner shall provide to the CPM, for review and approval, documentation showing that any mitigation to private well owners during project construction was satisfied, based on the requirements of the property owner as determined by the CPM.
4. During project operation, the project owner shall submit to CPM, applicable quarterly, semi-annual, and annual reports presenting all the data and information required in Item C above. The project owner shall submit to the CPM all calculations and assumptions made in development of report data and interpretations, calculations, and assumptions used in development of any reports.
5. The project owner shall provide mitigation as described in Item D above, if the CPM's inspection of the monitoring information confirms project-induced changes to water levels and water level trends relative to measured pre-project water levels, and well yield has been lowered by project pumping. The type and extent of mitigation shall be determined by the amount of water level decline and site-specific well construction and water use characteristics. The mitigation of impacts will be determined as set forth in Item D above.
6. No later than 30 days after CPM approval of the well drawdown analysis, the project owner shall submit to the CPM for review and approval all documentation and calculations describing necessary compensation for energy costs associated with additional lift requirements.
7. The project owner shall submit to the CPM all calculations, along with any letters signed by the well owners indicating agreement with the calculations, and the name and phone numbers of those well owners that do not agree with the calculations.
8. If mitigation includes monetary compensation, the project owner shall provide documentation to the CPM that compensation payments have been made by March 31 of each year of project operation or, if a lump-sum payment is made, payment shall be made by March 31 of the following year. Within 30 days after compensation is paid, the project owner shall submit to the CPM a compliance report describing compensation for increased energy costs necessary to comply with the provisions of this condition.
9. After the first 5-year operational and monitoring period, and every subsequent 5- year period, the project owner shall submit a 5-year monitoring report to the CPM for review and approval. This report shall contain all monitoring data collected and provide a summary of the findings and a recommendation about whether the frequency of water level measurements should be revised or eliminated.

10. During the life of the project, the project owner shall provide to the CPM all monitoring reports, complaints, studies, and other relevant data within 10 days of being received by the project owner.

10B.4 Correlation to SA, SSA, and Hearing Topics

- Staff Assessment, Section 5.9
- Supplemental Staff Assessment, Part B, Section 5.9
- Soil and Water Resources

10.0 SOIL AND WATER RESOURCES
C. PLANT WATER DEMAND CALCULATIONS

10C.1 Introduction

A. Name: Frederick Redell, PE

B. Purpose: This testimony describes and provides a comparative analysis of the quantity of water proposed to be used by the project.

C. Qualifications:

Mr. Redell's qualifications are as noted in his resume contained in Appendix A.

C. Prior Filings:

- Abengoa Mojave Solar Project Applicant's Comments on Staff Assessment dated April 21, 2010. "Summary of Comments", Section VII. Soil and Water Resources. [Exhibit 26]

To the best of my knowledge, all of the facts contained in this Section of the Applicant's testimony (including all referenced documents) are true and correct. To the extent this testimony contains opinions, such opinions are my own based upon my professional judgment. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

10C.2 Summary of Testimony

A. Water Usage.

The following summarizes projected water use by the Project. The Applicant disagrees with Staff's conclusion in the Supplemental Staff Assessment, Part B, that the overall use of the water would be inefficient for this technology or that it would necessarily require 3.6 acre-feet per gigawatt (GW) hour generated. (p.5.9-39). Instead, the water demand will likely be 2.62 acre-feet/GW hour. The amount of water proposed is higher than will actually be used in most years to account for plant design and in order to adopt conservative assumptions. The discussion below sets forth an analysis of the Project's water demand.

Demonstrated Water Use at the SEGS Plants

A summary of the annual water use at the 80 MWe SEGS VIII and SEGS IX projects, from 1999 through 2002, is shown in Table 1.

Table 1
Annual Water Use at SEGS VIII and IX

	Annual Energy Generation, GWhe					
Year	SEGS VIII [1]	SEGS IX [1]	Solar production	Solar + gas production [2]	Water use, acre-ft/yr [3]	Unit water use, acre-ft/GWhe
1999	135,233	107,513	242,746	323,661	1,054	3.26
2000	140,079	128,315	268,394	357,859	1,189	3.32
2001	137,754	132,051	269,805	359,740	1,190	3.31
2002	138,977	137,570	276,547	368,729	1,221	3.31

Notes:
1) http://www.ornl.gov/sci/engineering_science_technology/world/renewable/Trough%20Technology%20-%20Algeria2.pdf
2) 75 percent solar thermal contribution; 25 percent natural gas thermal contribution
3) "Verified Production" in Appendix L of Mojave Basin Area Watermaster Annual Reports

For the 8 plant-years of operations at the SEGS plants, the average unit water demand was 3.30 acre-feet/GWhe of gross electric generation. These calculations assume the maximum natural gas allowance was used to generate the maximum potential electricity. If the entire 25% natural gas generation was not employed, then the actual electricity generation is overestimated in the above table, and the water use per GWhe is in reality higher than the 3.30 acre-feet.

The Applicant's estimate of maximum annual water usage, submitted to the CEC, was 2,163 acre-feet for the production of a gross 650 GWhe of electricity, for a 3.34 acre-feet/GWhe annual water usage. This maximum proposed water usage per GWh electricity generation for the Mojave Solar Project is approximately the same as the documented actual water consumption at operating solar electric facilities, arguably using the same water and subjected to the same climactic conditions as would be the Mojave Solar Project.

Projected Water Use at the Mojave Solar Plant

A more detailed analysis of the anticipated water demand for the Project was recently conducted by the Applicant's technical staff, a discussion of which follows.

The principal water demands at the Mojave Solar Plant include cooling tower evaporation, cooling tower drift, concentrated brine flow to the evaporation ponds, mirror wash water, miscellaneous Rankine cycle water and steam losses, and potable water.

The wet heat rejection system is based on conventional, mechanical draft cooling towers. The principal design parameters included the following:

- 42 °C design dry bulb temperature, and coincident 13 percent relative humidity
- 5.6 °C cooling water approach to a 17.8 °C wet bulb temperature
- 9.8 °C circulating water temperature range

- 240 MWt heat rejection duty, including 10.0 MWt from the closed cooling water system.

The cooling tower consists of 6 cells, each with a 150 kWe fan. The circulating water flow rate is a nominal 5,670 kg/sec, and the cooling tower makeup water flow rate at the design point is 124.93 kg/sec. Of the makeup water flow, 123.70 kg/sec is to compensate for evaporation losses, 0.028 kg/sec is to compensate for drift losses, and a net of 1.20 kg/sec is to compensate for brine losses from the cooling tower basin to the evaporation ponds.

To estimate the annual water use in the plant, the following calculations were performed:

1) A weather file was compiled for Harper Lake, listing for each hour of the year, the dry bulb temperature, the relative humidity, and the direct normal solar radiation.

2) For each hour of the year, the thermal output from the collector field was calculated by the Excelergy computer program.

3) The dry bulb temperature, the relative humidity, and the thermal input from the collector field were exported to the GateCycle program. The program calculated the steam turbine expansion efficiency, exhaust loss, steam enthalpy at the inlet to the condenser, condenser duty, circulating water temperatures, cooling tower duty, evaporation loss, and drift loss. The makeup water flow to the cooling tower was then calculated, assuming a constant flow rate of 1.20 kg/sec for brine losses to the evaporation ponds. To the cooling tower makeup flow was added the following water demands: 0.5 percent of the live steam flow rate for miscellaneous water losses due to drips and drains; 3.78 kg/sec for mirror cleaning water; and 0.30 kg/sec for potable water. The calculations were repeated for each of the 3,006 hours each year in which thermal energy was available from the collector field.

4) The following water demands were assumed to occur during each of the 5,754 hours in a year in which the Rankine cycle was not in operation: 1.20 kg/sec for brine losses to the evaporation ponds; 3.78 kg/sec for mirror cleaning water; and 0.30 kg/sec for potable water.

5) An annual sum of the water demand during both turbine operating periods, and turbine non-operating periods, was then made. The results of the calculation are shown in Table 2.

Table 2
Annual Water Use, Each 140 MWe Plant, acre-feet

	Cooling Tower Evaporation	Cooling Tower Drift	Brine to Evaporation Ponds	Mirror Cleaning	Potable Water	Cycle Water and Steam Losses	Total
Turbine in operation (1)	708.6	0.4	10.5	33.2	2.6	4.9	760.2
Turbine not in operation (2)	0.0	0.0	20.1	63.5	5.0	0.0	88.7
Annual Total	708.6	0.4	30.6	96.7	7.6	4.9	848.9

Notes:
(1) 3,006 hours per year
(2) 5,754 hours per year

The sum of the projected gross electric outputs from the two plants is 647.5 GWhe, for a unit water demand of 2.62 acre-ft/GWhe.

The projected water demand is approximately 20 percent below the historical demand of 3.30 acre-ft/GWhe for the latest SEGS projects. Nonetheless, calculated values do not carry the same credibility as demonstrated values. Further, the water use on the Mojave project may be higher than projected. For example, if the total dissolved solids concentrations in the groundwater are higher than estimated from the test wells, the required brine flow to the evaporation ponds will also be higher than projected. To maintain maximum flexibility in plant operations, we are requesting the use of groundwater quantities up to the original estimated value.

10C.3 Proposed Conditions of Certification

The CEC has proposed one Condition of Certification that relates to the Project's proposed water demand. SOIL&WATER-5 requires that the proposed Project's use of groundwater for all construction and operations activities shall not exceed 2,160 acre-feet per year. The Applicant agrees with this condition. In addition, the CEC has proposed Condition of Certification SOIL&WATER-10 that requires the project owner to obtain a permit from the County of San Bernardino to operate a non-transient, non-community water system. The Applicant agrees with this condition with the following proposed revisions.

Proposed Revisions to SOIL&WATER-10

The Applicant finds it acceptable to submit information to the County typically required to obtain a permit to operate a non-transient, noncommunity water system in order to provide an opportunity for the County to review and comment. However, given the Commission's exclusive authority under Public Resources Code section 25500, the Applicant proposes final approval authority by the CPM to avoid any potential delay in the start of project operations or any potential delays in annual renewals thereafter.

SOIL&WATER-10 The Project is subject to the requirement of Title 22, Article 3, Sections 64400.80 through 64445 for a non-transient, non-community water system (serving 25 people or more for more than six months). In addition, the system will require periodic monitoring for various bacteriological, inorganic and organic constituents.

Verification: The project owner shall submit for review and comment a copy of the information required ~~obtain a permit~~ to operate a non-transient, noncommunity water system with the County of San Bernardino at least sixty (60) days prior to commencement of operations at the site. The Applicant shall submit the information along with any comments received to the CPM for review and approval prior to the commencement of plant operations. In addition, the project owner shall submit to the CPM a monitoring and reporting plan for production wells operated as part of the domestic water supply system prior to plant operations. The plan will include reporting requirements including monthly, quarterly, and annual submissions. The project owner shall designate a California Certified Water Treatment Plant Operator as well as the technical, managerial, and financial requirements as prescribed by State law. The project owner will supply updates on an annual basis of monitoring requirements, and provide copies of any submittals to County of San Bernardino. ~~as well and proof of~~ The project owner will provide a copy of the information required for annual renewal of the operating permit to the County for review and comment, and obtain approval for annual renewal of the permit from the CPM.

10C.4 Correlation to SA, SSA, and Hearing Topics

- **Staff Assessment, Section 5.9**
- **Supplemental Staff Assessment, Part B, Section 5.9**
- **Soil and Water Resources**

10.0 SOIL AND WATER RESOURCES
D. WATER RIGHTS

10D.1 Introduction

A. Name: Christopher Hansmeyer

B. Purpose: This testimony addresses the water rights owned by the Applicant and issues associated with the purposed exercise of those water rights for power plant cooling.

C. Qualifications: The witness's qualifications are as noted in the resume contained in Appendix A.

D. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

- Section 5.17 of the AFC (Exhibit 1)
- Data Adequacy Supplement and Attachments G1-G4 (Exhibit 2)
- Comments on Staff Assessment (Exhibit26)

To the best of my knowledge, all of the facts contained in this testimony (including all referenced documents) are true and correct. To the extent this testimony contains opinions, such opinions are my own. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

10D.2 Summary of Testimony

A. Water Rights and Mojave Basin Adjudication

Abengoa Solar, Inc. owns the rights to 10,478 acre-feet per year of groundwater in the Centro Subarea of the Mojave Basin Area. These water rights are granted by a final stipulated Judgment entered by the Riverside County Superior Court ("the Court") as a Judgment After Trial on January 10, 1996 (the "adjudication" or "Judgment").[2] These rights were transferred to the Applicant from several parties to the adjudication; upon purchasing these rights, the Applicant became a party to the Judgment through a Stipulation for Intervention entered and approved by the Court.[3] As such, the Applicant is entitled to the rights and privileges accorded under the Judgment and holds vested rights to groundwater in the Mojave Basin Area.

In California, groundwater use is governed by a court-developed doctrine of correlative use which provides that landowners have the right to a reasonable quantity of water necessary for use on overlying land, allowing an appropriator to take the surplus.[4] Article X, section 2 of the California Constitution provides that the right to water is limited "to

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[2] *City of Barstow, et al. v. City of Adelanto, et al.,* Superior Court of Riverside County, No. 208568, Judge Erik Michael Kaiser, "Judgment After Trial" (Jan. 10, 1996) (hereinafter "Judgment").
[3] Proof of groundwater rights and stipulation to judgment was provided by Applicant in the Data Adequacy Supplement, Attachments G1-G4.
[4] *See Katz v. Walkinshaw* (1902) 141 Cal. 116.

such water as shall be reasonably required for the beneficial use to be served, and such right does not and shall not extend to the waste or unreasonable use or unreasonable method of use or unreasonable method of diversion or water."[5] If natural supply is not sufficient for all overlying owners of a common groundwater basin, then the courts may adjudicate their rights and regulate the use to prevent unnecessary injury, restricting each to his reasonable share.[6]

In the Mojave Basin Area adjudication, the Court declared the existence of overdraft and the Court adjudicated the water rights of various users, having jurisdiction to enter Judgment declaring and adjudicating the rights to reasonable and beneficial use of water by the parties in the Mojave Basin Area pursuant to Article X, section 2 of the California Constitution.[7]. The Judgment entered by the Court is a final decision on the merits and a final and conclusive determination of the rights of the parties.[8]

The Court established the rights of each party to the adjudication as relative annual rights (the Base Annual Production Right) to the total amount of water that may be produced from a Subarea free of a replacement obligation (the Free Production Allowance).[9] The Judgment addressed all production within the Mojave Basin Area and declared the water rights of parties who collectively account for nearly all rights of water use within the basin.[10] The Judgment ordered parties to comply with the Physical Solution "which will equitably allocate the natural water supplies and which will provide for equitable sharing of costs for Supplemental Water."[11] The Court enjoined all production not in accordance with this framework, concluding that any production outside the framework will contribute to increased overdraft, potentially damage the Basin Area and the public interest, injure the rights of all parties and interfere with the Physical Solution.[12] The Court appointed the Mojave Water Agency ("MWA") as the Watermaster to administer and enforce the provisions of the Judgment and any subsequent orders of the Court.[13]

The Judgment directs the Watermaster to adjust Subarea rights to keep production within the "Production Safe Yield," or the highest average annual amount of groundwater that

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[5] Cal. Const. Art X § 2.
[6] *San Bernardino v. Riverside* (1921) 186 Cal. 7, 15.
[7] Judgment, at ¶¶ II.A.1.a, II.B.7, II.C.
[8] The Court entered a stipulated interlocutory order and judgment pending a trial requested by non-stipulating parties. Judgment, at ¶ I.D. The Court's decision upon trial regarding the non-stipulating parties was appealed to the California Supreme Court. *City of Barstow v. Mojave Water Agency* (2000) 23 Cal.4th 1224, 1256. After the Supreme Court entered its decision and otherwise affirmed the application of the stipulated Physical Solution to the stipulating parties, the Court entered the Judgment setting forth the Physical Solution implemented by the Watermaster today. The stipulated Judgment is final decision on the merits. *Greatorex v. Board of Adminsitration of the City Employees' Retirement System of the City of San Diego* (1979) 91 Cal.App.3d 54, 58 (holding "a stipulated judgment is a decision on the merits)' *See also Palo Alto-Menlo Park Yellow Cab Co. v. Santa Clara County Transit Dist.* (1976) 65 Cal.App.3d 121, 130 (explaining "a court that enters an equitable decree may appropriately reserve jurisdiction… to modify procedural provisions, not to materially change the adjudication of substantial issues."
[9] Judgment, at ¶¶ II.C.8, II.C.10, II.C.13, V.A.22.
[10] Judgment, at ¶¶ II.A.1.b, II.A.2, II.C.12;*See also City of Barstow v. Mojave Water Agency*, supra 23 Cal.4th at 1234 (discussion of procedural history of adjudication).
[11] Judgment, at ¶¶ I.A.3, V.A.20.
[12] Judgment, at ¶ II.C.12.
[13] Judgment, at ¶V.B.23.

can be produced from a Subarea without long-term net reduction of groundwater in storage.[14] The Watermaster also adjusts an individual's Free Production Allowance ("FPA") when required by a change in purpose of use that results in a higher rate of consumption than the rate applicable to the original use, using the consumptive use ratios set forth in Exhibit F of the Judgment.[15] The producer's production is adjusted upward for the purpose of determining the producer's replacement water assessment and the FPA portion of such production is adjusted upward for the purpose of determining the producer's makeup water assessment. The Watermaster must replace excess production by any producer or Subarea with replacement water or supplemental water, funded by fees charged to those producers.[16] The Watermaster also provides biological resources protection and mitigation funded by assessments charged for those purposes.[17]

The declaration of water rights and the framework established by the Court to be managed by the Watermaster are the "Physical Solution" the Court adopted. The Court declared:

> A Physical Solution for the Mojave Basin Area based upon a declaration of water rights and a formula for Intra- and Inter-Subarea allocation of rights and obligations is necessary to implement the mandate of Article X, section 2 of the California Constitution and California water policy.[18]

The Court also declared:

> the Physical Solution herein contained: 1) is a fair and equitable basis for satisfaction of all water rights in the Mojave Basin Area; 2) is in furtherance of the mandate of the State Constitution and the water policy of the State of California; and 3) takes into account applicable public trust interests…. The purpose of the Physical Solution is to establish a legal and practical means for making the maximum reasonable beneficial use or the waters of the Basin Area by providing for the long-term conjunctive utilization of all water available thereto to meet the reasonable beneficial use requirements of water users therein.[19]

Based on the above provisions of the Judgment, groundwater use in compliance with the terms of the Physical Solution adopted by the Court and managed by the Watermaster is also water use in compliance with the constitutional reasonable beneficial use requirement and state water policy.

Here, the Applicant is proposing to use a portion of its Base Annual Production Right of 10,478 acre-feet per year ("afy") to operate the project, proposing to produce

[14] Judgment at ¶ V.B.24.o.
[15] Judgment at ¶ V.B.24.q; Exhibit F.
[16] Judgment at ¶¶ V.B.24.c, V.B.24.f, V.B.24.g, V.C.
[17] Judgment at ¶¶ V.B.24.f, V.B.24.x; Exhibit H.
[18] Judgment, at ¶ II.A.3.
[19] Judgment, at ¶ V.A.20.

groundwater at a maximum of 2,160 afy (typically expected to be 1,700 afy) for cooling tower purposes and all potable water supply needs, as well as dust suppression and mirror washing. The change in purpose of use for this proposed groundwater production will be from agricultural to industrial and the Watermaster will adjust the production right to account for the higher consumptive use rate (expected to apply a 2:1 adjustment). The Applicant's production right will also be subject to annual adjustments of the Free Production Allowance of the Centro Subarea, if needed and recommended by the Watermaster to account for production in excess of the Production Safe Yield. The FPA for the Centro Subarea is currently 80%. The proposed use will comply with all requirements of the Judgment and the Watermaster's regulations; therefore, it must be concluded that the proposed use is in accordance with Article X, section 2 of the California Constitution and state water policy.

B. Discussion Concerning Compliance with LORS in Staff Supplement Assessment

The Staff Supplemental Assessment ("SSA"), Part B, issued May 25, 2010, states that staff believes that the project's proposed groundwater source could possibly be used as a municipal supply and that the project's proposed method of wastewater disposal is not consistent with the CEC's policy that encourages the use of zero liquid discharge systems.[20] The staff "conclude that a project proposed to use a fresh water source that is of higher quality than the most degraded source reasonably available to the project, can comply with the policy where the project also includes measures that would accomplish conservation of water."[21] The SSA states: "Similarly, in this case the applicant has proposed to conform with Energy Commission water policy by implementing a water conservation plan."[22]

The Applicant disagrees with staff's apparent conclusion that the project's proposed water use does not comply with applicable laws, ordinances, regulations and standards ("LORS") and with the comparison drawn to projects proposing to use a fresh water source. The project's proposed water use is in compliance with all applicable LORS and does not propose to use a fresh water source, discussed further below. Nonetheless, despite full compliance with applicable LORS, the Applicant proposed a water conservation measure to address staff's concerns. This plan would annually sequester a volume of groundwater in the Harper Lake area equal to the annual volume of groundwater used by the project.

The project's proposed water supply is not "fresh" water, but brackish water, as defined by State Water Resources Control Board ("SWRCB") Resolution 75-58.[23] This Resolution provides that the source of powerplant cooling water should come from a list of sources in order of priority, with brackish water preferred over inland wastewaters of low total dissolved solids ("TDS") and other inland waters. In addition, although not

[20] SSA, part B, at p. 5.9-40.
[21] SSA, part B, at p. 5.9-41.
[22] SSA, part B, at p. 5.9-41.
[23] SWRCB Resolution 75-58 (June 19, 1975) defines brackish waters as "all waters with a salinity range of 1,000 to 30,000 mg/l and a chloride concentration range of 250 to 12,000 mg/l."

proposing to use fresh water, the Applicant provided an evaluation of the feasibility of alternative water supply sources, alternative cooling technologies, and wastewater discharge alternatives in the AFC, Alternatives section (this analysis is also summarized in the testimony submitted on alternatives). Thus, the proposed water supply is in compliance with the Warren Alquist Act (section 25008 of the Public Resources Code), the 2003 Integrated Energy Policy Report, and State Water Resources Control Board (SWRCB) Resolution 75-58. In fact, the SSA notes that "[u]se of lower quality… water or reclaimed water appears infeasible."[24]

Staff's conclusion that the quality of water proposed to be used is below the threshold identified in SWRCB Resolution 88-63 (May 19, 1988) does not change the conclusion that the project's proposed water use is in compliance with state water policy and all applicable LORS.[25] SWRCB Resolution 88-63 directs Regional Water Quality Control Boards to designate surface and ground waters as suitable, or potentially suitable for municipal or domestic water supply where the TDS level is under 3,000 mg/l. As explained in a letter from the SWRCB to the CEC, while Resolution 75-58 defines "fresh inland waters" as "those inland waters which are suitable for use as a source of domestic, municipal, or agricultural water supply and which provide habitat for fish and wildlife" and Resolution 88-63 indicates that water up to 3,000 mg/l TDS is a source of domestic or municipal supply, brackish groundwater with a TDS between 1,000 mg/l and 3,000 mg/l are NOT "fresh inland waters" for purposes of determining acceptable cooling water supply sources.[26]

While the adjudication is described in Soil & Water Table 1 as LORS, the SSA ignores its application in the discussion of the project's compliance with LORS.[27] In fact, the adjudication has resolved the issue of the project's compliance with the California Constitution and state water policy. Article X, section 2 of the California Constitution prohibits waste and limits rights to water to the amount reasonably necessary to achieve a beneficial use. As discussed above, the Court declared the water rights in the Mojave Basin Area and established a framework for management by the Watermaster in furtherance of this constitutional reasonable beneficial use requirement and state water policy. Thus, production in accordance with the adjudication and the Watermaster's administration of the Judgment is reasonable beneficial use and is in accordance with state water policy.

C. Conservation Proposal

The Staff Assessment issued March 15, 2010, proposed a Condition of Certification SOIL&WATER-9 to require the project owner to reduce the proposed water use though a project design change(s) and/or through a water conservation program. This Condition was proposed to address the inconsistency with state water policy staff identified in the Staff Assessment. As discussed above, while the Applicant disagreed with the

[24] SSA, part B, at p. 5.9-40.
[25] *See* SSA, part B, at p. 5.9-40.
[26] Letter to Melissa Jones from Dorothy Rice, dated January 20, 2010. The reason that brackish ground waters are not fresh inland waters as defined in Resolution 75-58 is that groundwater does not provide habitat for fish and wildlife as required by that definition.
[27] SA, at p. 5.9-6 (Soil&Water Table 1); SA, at p. 5.9-36 – 5.9-40 (discussion of project compliance with LORS).

conclusion in the Staff Assessment regarding compliance with state water policy, the Applicant proposed a water conservation measure as SOIL&WATER-9 in comments to the Staff Assessment. Despite full compliance with applicable LORS, the Applicant agreed to conserve a portion of its water rights in order to satisfy staff's concerns over the project's proposed water use.

The Applicant's proposed water conservation plan is to sequester an amount of its water rights equal to the amount it withdraws on an annual basis for the life of the project. This voluntarily proposed "set-aside" is in addition to the adjustment by the Watermaster to account for a change in purpose in use and it is independent from any adjustment to the Centro Subarea's Free Production Allowance recommended by the Watermaster. As such, the Applicant proposes conservation beyond the adjudication's requirements to address staff's concerns with the quantity of water proposed for cooling tower use.

In the SSA, Part B issued May 25, 2010, staff proposed SOIL&WATER-11 to correspond to the Applicant's proposed conservation plan (and former SOIL&WATER-9). The Applicant generally agrees with this proposed condition, with the exception of the edits noted below. However, staff's calculations of the proposed sequestration presented in Soil & Water Table 8 are based on a misconception regarding the adjustment applied by the Watermaster to account for a change in purpose of use.[28] The portion of the FPA produced for the changed purpose of use is the amount the Watermaster adjusts upward (by the applicable multiplier, in this case 2:1). In effect, the Watermaster will assume that double the amount actually produced was produced to account for the increased consumptive rate of industrial use and subtract that amount from the Applicant's FPA for purposes of determining assessments. Revised calculations are shown below.

***Revised* Soil & Water Table 8**

Annual FPA (80% of Applicant's Base Annual Production Right: 80% of 10,478 afy) = 8382.4 afy		**FPA Sequestered Annually**		**Remaining FPA that can be Used by the AMS Project, Sold, or Banked (without accounting for carryover rights)**	
Annual Maximum Pumping	2,160 (counted as 4,320 with adjustment)	Under Maximum Pumping	2,160	Under Maximum Pumping + Sequesteration	1,902.4
Estimated Annual Average Pumping	1,700 (counted as 3,400 with adjustment)	Under Average Pumping	1,700	Under Average Pumping + Sequesteration	3,282.4
Annual FPA (60%) =6,286.8 afy		**FPA Sequestered Annually**		**Remaining FPA that can be Used by the AMS Project, Sold, or Banked**	

[28] SSA, Part B, at p. 5.9-42.

				(without accounting for carryover rights)	
Annual Maximum Pumping	2,160 (counted as 4,320 with adjustment)	Under Maximum Pumping	2,160	Under Maximum Pumping + Sequesteration	-193.20
Estimated Annual Average Pumping	1,700 (counted as 3,400 with adjustment)	Under Average Pumping	1,700	Under Average Pumping + Sequesteration	1,186.8

The revised Soil & Water Table 8 shows that the Applicant *does* currently have water rights and FPA sufficient to offset and sequester the project water use during nearly all years. The exception is in the hypothetical 60% FPA at 2,160 afy production "worst-case scenario" considered in the SSA, with a shortfall of only 193 afy. The production amount of 2,160 afy is a maximum estimate and production in most years will be only 1,700 afy. In addition, the Applicant will have carry-over rights in most years equal to the amount of FPA not produced, available until the following year free of any replacement water assessment. Taking into consideration the Applicant's carry-over rights (adding between approximately 1,100 and 3,200 afy to the FPA, depending on the rampdown and production amount the previous year), the Applicant will likely have water rights and FPA sufficient to offset and sequester the project water use in every year, including the "worst-case scenario."

It is important to note that the Watermaster recommends adjustments to a Subarea's FPA when production exceeds safe yield, evidenced in part by the change of water in storage. The Applicant's proposed water conservation plan is meant to provide an additional buffer to address staff's concerns with the proposed water use and will allow a greater amount of water to remain in storage in the Centro Subarea to avoid exceeding safe yield. Moreover, if the Applicant's production was in excess of its share of FPA, the Watermaster would charge assessments in order to purchase replacement and makeup water. Thus, the Applicant is already required to pay for over-production while doing more than its part to ensure that is not necessary; thus, to require additional payment to MWA as in proposed SOIL&WATER-12 is not only unnecessary but also inequitable.

10D.3 Proposed Licensing Conditions

The Applicant generally agrees with the CEC proposed Condition of Certification SOIL&WATER-11, with the exception of the edits noted below. The Applicant proposes to change the maximum amount that can be sequestered to 2,160 afy based on the above revised calculations. The other edits are for clarification purposes. The Applicant proposes deletion of CEC proposed Condition of Certification SOIL&WATER-12 because it was proposed to provide additional mitigation based on staff's conclusion that the full amount of water use could not be sequestered and the proposed water use is not in compliance with state water policy. However, as shown above, the Applicant does have

water rights and FPA sufficient to offset and sequester the project water use and is in full compliance with all applicable LORS and state water policy. Therefore, the mitigation proposed in SOIL&WATER-12 is unnecessary.

SOIL&WATER-11 As a conservation method, the project owner shall annually sequester a volume of Free Production Allowance (FPA) equal to the annual volume of groundwater pumped for the AMS project. This sequestration is subject to and defined by the following:

- Sequester means that the project owner shall, out of its ~~exercise option rights as identified in the AFC (total~~ing 10,478 BAP~~R) and~~ retain and refrain from exercising its groundwater FPA use rights which it is otherwise lawfully entitled to exercise~~ing~~ under the Mojave Basin Area Adjudication.

***[Rationale for Proposed Edits:** The Applicant has exercised the option to purchase the 874 afy identified in the AFC, Volume 4, and therefore owns 10,478 afy as a base annual production right.*]

- The maximum annual volume of groundwater that could be sequestered is ~~2,032~~ 2,160 acre-feet and at no time can be more than the difference between the FPA volume available and the annual volume of groundwater pumped.

***[Rationale for Proposed Edits:** As shown above, 2,032 is not the maximum that can be sequestered.]*

- Sequestration shall continue annually for the life of the project owner.

- ~~Sequestered FPA would count towards any additional ramp down that is imposed by the Watermaster pursuant to the Mojave Basin Adjudication.~~

***[Rationale for Proposed Edits:** The Applicant submits that this would interfere with the Watermaster's implementation of the adjudication. The Judgment sets forth the factors that the Watermaster considers when recommending an adjustment to any Subarea's FPA.]*

- The annual sequestration of FPA is not intended to affect the Watermaster's implementation of the Mojave Basin Adjudication.

- Sequestered water would not be considered by the Energy Commission to be produced water subject to any replacement water obligation under the Mojave Basin Adjudication.

Verification: The volume of FPA sequestered shall be documented in the Annual Compliance Report submitted to the CPM. This documentation shall include a table showing the annual and cumulative total FPA sequestered.

~~**SOIL&WATER-12** As a conservation method, the project owner shall contribute up to $50,000 annually, for the life of the AMS project, towards the Mojave Water Agency's (MWA) turf replacement program, high-efficiency toilet program, or other water conservation program as approved by the CPM. This contribution shall be made the same month each year as established by the first year's contribution.~~

~~The AMS project's contribution to the MWA conservation program shall be in an amount necessary to conserve the volume of project water use that is greater than what can be sequestered given the FPA available to the project owner on an annual basis. If the project owner can demonstrate that the annual or cumulative water conservation that is achieved equals or exceeds the project water use in excess of the sequestered FPA, then the project owner may reduce or eliminate the contribution of funds. Within the $50,000 limit, the project owner shall ensure that the amount contributed to the water conservation program is adjusted on an annual basis to maintain the required amount of water conservation.~~

~~If the project owner proposes to change or add water conservation programs that can be funded for the purposes of this condition, a plan must be provided showing which programs are proposed, how much water savings can be achieved, and how much funding is proposed. The plan shall be provided for CPM review and approval in consultation with the Mojave Water Agency prior to the proposed date of change in water conservation programs.~~

~~**Verification:** The project owner shall do the following:~~

~~1. The project owner shall submit to the CPM the following documentation as part of~~
~~the Annual Compliance Report:~~

~~a. A copy of the receipt from the MWA for the annual contribution; and~~
~~b. An accounting of the following:~~

~~i. The annual and cumulative volume of groundwater used by the project in acre-feet per year;~~
~~ii. The annual and cumulative volume of FPA sequestered by the project in acre-feet per year;~~
~~iii. The numerical difference between annual and cumulative totals in Items i and ii above; and~~
~~iv. The annual and cumulative monetary contribution and estimated annual and cumulative volume of water conserved by the project owner's contribution to MWA's turf replacement program, high-~~

~~efficiency toilet program, or other water conservation program approved by the CPM.~~

~~2. If the project owner proposes to reduce the amount of the annual contribution based on the water conservation achieved through previous contributions, the project owner shall provide a plan demonstrating how the adjusted amount will ensure the water conservation program meets the requirements of this condition. The plan shall be provided for CPM review and approval 60 days prior to the annual contribution anniversary date.~~

10D.4 Correlation to SA, SSA, and Hearing Topics

- **Section 5.9, Soil & Water Resources of Staff Assessment (March 15, 2010)**
- **Section 5.9, Soil & Water Resources of Supplemental Staff Assessment, Part B (May 21, 2010)**
- **Soil and Water Resources**

11.0 TRAFFIC AND TRANSPORTATION

11.1 Introduction

A. Name: Nicholas Abboud, PhD, PE, PTOE

B. Qualifications:

- B.S., Civil Engineering, Wayne State University, 1981
- M.S., Civil Engineering, Wayne State University, 1983
- Ph.D., Transportation Engineering, Auburn University, 2001
- Professional Engineer, Virginia, No. 29230,
- Civil Engineer, California, No. 66292
- Traffic Engineer, California, No. 2187
- Professional Traffic Operations Engineer, No. 1877
- See Resume included in Appendix A

C. Purpose: This testimony addresses traffic and transportation issues associated with the Abengoa Mojave Solar Project.

D. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

- Application For Certification, Volume 1, Section 5.13 [Exhibit 1]
- Application For Certification, Volume 3, Appendix H [Exhibit 1]
- Applicant's Comments to Staff Assessment [Exhibit 26]

E. Other Reports:

- Letter Report Re: Queuing Analysis for the SR-58 left turn lane at Harper Lake Road, from Nicholas Abboud to Matt Stucky, dated May 27, 2010

11.2 Summary of Testimony

A. Opening Statement

All the facts contained in this testimony are accurate and true to the best of my knowledge. I make this statement freely and under oath for the purpose of constituting sworn testimony in this proceeding.

B. Affected Environment

The project site is located approximately 60 miles north of the City of San Bernardino, 17 miles northwest of the City of Barstow, and nine miles northwest of the community of Hinkley. The project area is served by State Route 58 (SR-58), Interstate 15 (I-15), and a local street network.

C. Construction Impact

Potential traffic impacts to the local roadway network were assessed for the worst-case scenario which is identified in the work schedule to be Month 17 of the 26-month construction period. Based upon historic experience of similar projects, it is estimated that 20 percent of the workforce would carpool with average carpool vehicle occupancy of 2 persons per vehicle. The estimated number of workers at peak construction time reaches 1,162 workers per day. Two main work shifts are planned, the first starting between 6:00 & 8:00 AM and ending between 4:00 & 6:00 PM, and the second shift starting at 4:00 PM and ending at 2:00 AM. It is estimated that 42% of the construction workforce will be bussed to the project site from a park-and-ride staging lot located on Main Street on the outer edge of the City of Barstow. The maximum number of truck trips is expected to reach 67 one-way trips per day during the 26-month construction duration of the project, with the majority of the trips traveling between the Barstow rail yard and the project site during the off-peak hours.

The morning and evening peak traffic hours of the day have been determined to be 7:00 – 8:00 AM and 4:00 – 5:00 PM. Based upon the HCM 2000 guidelines, bus traffic was converted to passenger car equivalent units (PCEs) at a rate of 3 passenger cars for each bus. A summary of the project construction traffic trips is presented in Table T&T-1.

TABLE T&T-1
PROJECT TRIPS GENERATION
CONSTRUCTIONS PHASE – PEAK HOURS

Peak Period	Project Site		Park-and-Ride	
	Trips (In/Out)	PCE (In/Out)	Trips (In/Out)	PCE (In/Out)
AM (car)	300/0	300/0	169/0	169/0
AM (bus)	3/3	9/9	3/3	9/9
AM (Total)	**N/A**	**309/9**	**N/A**	**178/9**
PM (car)	0/300	0/300	0/169	0/169
PM (bus)	3/3	9/9	3/3	9/9
PM (total)	**N/A**	**9/309**	**N/A**	**9/178**

Source: Wilson & Company, Inc., Engineers & Architects; June 2009

Based upon the Mojave Solar Employment Commute Behavior analysis conducted by AECOM/EDAW, the following trip origination assumptions were used to distribute construction worker traffic over the study area network:

- 86% of the construction workers will originate from areas west of the project site and 14% will originate from areas east of the project site.
- 58% of the construction workers will drive directly to the project site.
- 42% of the construction workers will drive to the park-and-ride staging lot.

- All (100%) of the truck traffic between the Barstow rail yard and the project site will travel during the off-peak hours.

The projected Year 2012 Near-Term (construction phase) traffic volumes were derived by applying an average effective growth rate of 2% per year to the through traffic along SR-58 and Main Street (developed in consultation with Caltrans, County, and SANBAG staff) and by also including relevant traffic generated from approved cumulative projects. The resulting level of service analysis for the study roadways, intersections and Intersecting Lane Vehicles (ILV) show the study roadways and intersections to operate at acceptable LOS, and both freeway ramp junctions to operate "under capacity" as shown in Tables T&T-2, T&T-3, and T&T-4, respectively for the Near-Term Base Conditions.

TABLE T&T-2
ROADWAY LEVEL OF SERVICE
NEAR-TERM BASE CONDITIONS

Road	Segment	Volume	Peak Hour %	Directional Split	Lanes Per Direction	PHF	% HVF	Volume (pc/h/ln)	V/C	LOS
SR-58	Harper Lake Road to Lenwood Road	13,045	13.0%	0.55	1	0.92	20%	1,267	0.75	C
Main Street	SR-58 to Osborne Road	7,822	14.0%	0.54	2	0.92	20%	402	0.24	A

Source: Wilson & Company, Inc., Engineers & Architects; June 2009

TABLE T&T-3
PEAK HOUR INTERSECTION LEVEL OF SERVICE
NEAR-TERM BASE CONDITIONS

#	Intersection	AM		PM	
		Delay (Sec)	LOS	Delay (Sec)	LOS
1	SR-58 / Harper Lake Road(1)	13.0	B	17.1	C
2	SR-58 / Lenwood Road	4.0	A	4.3	A
3	Main Street / SR-58 SB Ramps	4.8	A	4.3	A
4	Main Street / SR-58 NB Ramps	10.9	B	11.5	B
5	Main Street / Parking Lot Driveway(1)	N/A	N/A	N/A	N/A

Source: Wilson & Company, Inc., Engineers & Architects; June 2009

(1) Indicates a one-way or two-way Stop Controlled Intersection. Delay and LOS are for stopped approach (worst).

TABLE T&T-4
RAMP JUNCTION CAPACITY ANALYSIS
NEAR-TERM BASE CONDITIONS

Ramp Junction	Peak Hour	ILV / Hour	Description
Main Street/SR-58 NB Ramps	AM	474	*<1200: (Under Capacity)*
	PM	558	*<1200: (Under Capacity)*
Main Street/SR-58 SB Ramps	AM	371	*<1200: (Under Capacity)*
	PM	547	*<1200: (Under Capacity)*

Source: Wilson & Company, Inc., Engineers & Architects; June 2009

The Near-Term Base Plus Project Construction conditions were determined by adding the peak construction worker traffic to the Near-Term Base traffic. The resulting level of service analysis for the study roadways, intersections and ILV analysis show the study roadways and intersections to operate at acceptable LOS, and both freeway ramp junctions to operate "under capacity" as shown in Tables T&T-5, T&T-6, and T&T-7, respectively, for the Near-Term Base Plus Project conditions.

TABLE T&T-5
ROADWAY LEVEL OF SERVICE
NEAR-TERM BASE PLUS PROJECT CONSTRUCTION

Road	Segment	Volume	Peak Hour Percent	Directional Split	Lanes Per Direction	PHF	% HVF	Volume (pc/h/ln)	V/C	LOS
SR-58	Harper Lake Road to Lenwood Road	13,965	13.0%	0.55	1	0.92	20%	1,357	0.80	D
Main Street	SR-58 to Osborne Road	8,662	14.0%	0.54	2	0.92	20%	445	0.26	A

Source: Wilson & Company, Inc., Engineers & Architects; June 2009

TABLE T&T-6
PEAK HOUR INTERSECTION LEVEL OF SERVICE
NEAR-TERM BASE PLUS PROJECT CONSTRUCTION

#	Intersection	AM					PM				
		Base		During Construction		Δ	Base		During Construction		Δ
		Delay (Sec)	LOS	Delay (Sec)	LOS		Delay (Sec)	LOS	Delay (Sec)	LOS	
1	SR-58 / Harper Lake Road(1)	13.0	B	33.3	D	20.3	17.1	C	31.3	D	14.2
2	SR-58 / Lenwood Road	4.0	A	4.1	A	0.1	4.3	A	4.6	A	0.3
3	Main Street / SR-58 SB Ramps	4.8	A	10.1	B	5.3	4.3	A	5.4	A	1.1
4	Main Street / SR-58 NB Ramps	10.9	B	10.9	B	0.0	11.5	B	11.5	B	0.0
5	Main Street / Parking Lot Driveway(1)	N/A	N/A	3.2	A	3.2	N/A	N/A	3.9	A	3.9

Source: Wilson & Company, Inc., Engineers & Architects; June 2009

Δ Change in intersection delay
(1) Indicates a one- (or two-) way Stop Controlled Intersection. Delay and LOS are for stopped approach (worst).

TABLE T&T-7
RAMP JUNCTION CAPACITY ANALYSIS
NEAR-TERM BASE PLUS PROJECT CONSTRUCTION

Ramp Intersection	Peak Hour	ILV / Hour	Description
Main Street/ SR-58 NB Ramps	AM	642	*<1200: (Under Capacity)*
	PM	577	*<1200: (Under Capacity)*
Main Street/ SR-58 SB Ramps	AM	521	*<1200: (Under Capacity)*
	PM	556	*<1200: (Under Capacity)*

Source: Wilson & Company, Inc., Engineers & Architects; June 2009

D. Project Impact during Plant Operation

During the operation and maintenance (O&M) phase, the Mojave Solar Project is expected to generate a maximum of 52 trips during the peak hours and a maximum of 250 trips per day. The project is also expected to generate 38 truck trips per month, mostly during off-peak traffic times.

Since the majority of the horizon year project traffic is expected to use the I-15 freeway, the following roadway and intersection were evaluated as part of the Horizon Year 2035 Base Plus Project scenario.

- Roadway: SR-58
- Intersection: SR-58 / Harper Lake Road

Other intersections along SR-58 including the interchange ramp junctions in Barstow were not evaluated, as no bussing operation would be taking place from Barstow, and the park-and-ride staging lot would no longer be utilized.

Using an average growth rate of 2% per year to determine the horizon year (O&M) traffic volumes along SR-58 and Main Street, the resulting level of service analysis show the study roadways and intersections to operate at acceptable LOS under Horizon Year 2035 Base Conditions as shown in Tables T&T-8 and T&T-9.

TABLE T&T-8
ROADWAY LEVEL OF SERVICE
HORIZON YEAR 2035 BASE CONDITIONS

Road	Segment	Volume	Peak Hour Percent	Directional Split	Lanes Per Direction	PHF	%HV	Volume (pc/h/ln)	V/C	LOS
SR-58	Harper Lake Road to Lenwood Road	18,602	13.0%	0.55	2	0.92	20.0 %	904	0.53	B

Source: Wilson & Company, Inc., Engineers & Architects; June 2009

TABLE T&T-9
PEAK HOUR INTERSECTION LEVEL OF SERVICE RESULTS
HORIZON YEAR 2035 BASE CONDITIONS

#	Intersection	AM		PM	
		Delay (Sec)	LOS	Delay (Sec)	LOS
1	SR-58 / Harper Lake Road(1)	15.2	C	25.0	C

Source: Wilson & Company, Inc., Engineers & Architects; June 2009
(1) Indicates a one-way or two-way Stop Controlled Intersection. Delay and LOS are for stopped approach (worst).

The analysis for Horizon Year 2035 Base Plus Project conditions was based on the added traffic from the project (O&M phase) to the 2035 Horizon Year Base traffic volumes. The analysis results shown in Tables T&T-10 and T&T-11 indicate that the study

roadway and intersection would operate at acceptable level of service under 2035 Horizon Year Base Plus Project conditions.

TABLE T&T-10
ROADWAY LEVEL OF SERVICE
HORIZON YEAR BASE PLUS PROJECT CONDITIONS

Road	Segment	Volume	Peak Hour %	Directional Split	Lanes Per Direction	PHF	HVF	Volume (pc/h/ln)	V/C	LOS
SR-58	Harper Lake Road to Lenwood Road	18,852	13.0 %	0.55	2	0.92	20.0 %	916	0.54	B

Source: Wilson & Company, Inc., Engineers & Architects; June 2009

TABLE T&T-11
PEAK HOUR INTERSECTION LEVEL OF SERVICE RESULTS
HORIZON YEAR BASE PLUS PROJECT CONDITIONS

#	Intersection	AM					PM				
		Base		With Project		Δ	Base		With Project		Δ
		Delay (Sec)	LOS	Delay (Sec)	LOS		Delay (Sec)	LOS	Delay (Sec)	LOS	
1	SR-58/Harper Lake Road(1)	15.2	C	15.7	C	0.5	25.0	C	31.6	D	6.6

Source: Wilson & Company, Inc., Engineers & Architects; June 2009

Δ Change in intersection delay
(1) Indicates a one-way or two-way Stop Controlled Intersection. Delay and LOS are for stopped approach (worst).

E. Cumulative Projects Impacts

The impact of cumulative projects refers to the incremental effect of other proposed projects (either current or reasonably foreseeable future projects) whose impact may compound or increase the incremental effect of the proposed project (Public Resources Code 21083 ; California Code of Regulations, title 14, 15064 (h), 15065 (c), 15130, and 15355). Based upon the recommendations of County and City staff, the following projects were assumed in this study to be cumulative projects for inclusion in the Near-Term Base conditions analysis:

1. Walmart Food Distribution Center, City of Barstow: a "high-cube" Warehouse/Distribution Center used for the storage and/or consolidation of manufactured goods prior to their distribution to retail locations or other warehouses. This cumulative project is located on the west side of Lenwood Road, North of Main Street and south of State Route 58 (SR-58).

2. Nursery Product LLC Composting Facility, County of San Bernardino: a 160-acre biosolid and green waste composting facility located just south of SR-58 between Helendale Road to the east, and the now defunct Hawes Auxiliary Airport site to the west.

3. Cambridge Home, City of Barstow: a proposed single-family residential development consisting of 426 single-family residential units and 43 acres of light industrial uses on approximately 152 acres.

Table T&T-12 presents the contribution of cumulative project to the study area roadway network. In an effort to present a worst-case scenario, the traffic contribution by the cumulative projects was added to the highest volume of construction worker traffic during the construction phase and thus evaluated as part of the Near-Term Base Plus Project Construction scenario, the results of which were presented earlier in this testimony.

E. Mitigation

Neither of the two phases (construction or O&M) of the Mojave Solar Project would have any significant impact on the local or regional roadway network. Thus, no mitigation measures would be warranted as a result of the Mojave Solar Project.

TABLE T&T-12
CONTRIBUTION OF CUMULATIVE PROJECT ONTO STUDY ROADWAY

Roadway	Projects and Traffic Contribution			
	Project #1 (AM/PM)	Project #2 (AM/PM)	Project #3 (AM/PM)	Total
SR-58	81/81	15/15	73/95	169/191
Main Street	3/15	0/0	81/97	84/112

Source: Wilson & Company, Inc., Engineers & Architects; June 2009

Notes:
Project #1: Wal-Mart Distribution Center
Project #2: Nursery Products Composting Facility
Project #3: Cambridge Home Residential Development

F. Area of Dispute

In the Staff Assessment (SA), CEC staff proposed the TRANS-4 Condition of Certification, in which the Applicant is required to lengthen the left-turn pocket on SR-58 at Harper Lake Road to approximately 300 feet. In the response to the Applicant's comments in the Supplemental Staff Assessment (SSA), Part A, CEC staff stated that these road improvements were needed based upon the traffic volumes provided in the Applicant's technical studies. A queuing analysis conducted by the applicant to determine the storage needs for the left turn traffic on SR-58 at Harper Lake Road based on the traffic anticipated by the project during construction indicates that lengthening of the left turn lane is not warranted. The study shows that the storage length needed to

accommodate the morning peak hour left turn traffic does not exceed two car-lengths. This conclusion was based on the 95th percentile queue as calculated using the nationally- and locally-accepted Highway Capacity Manual (HCM) methodology. The analysis concluded that the existing 90-foot long left turn lane along eastbound SR-58 at Harper Lake Road is of sufficient length to accommodate peak traffic demand during construction.

11.3 Proposed Licensing Conditions

The Staff Assessment (SA) for the project includes five proposed Conditions of Certification relating to traffic and transportation: TRANS-1 through TRANS-5. The Applicant accepts conditions TRANS-1, TRANS-2, TRANS-3, and TRANS-5 as proposed by the CEC. The Applicant's proposed changes to condition TRANS-4 as set forth below:

~~**TRANS-4** Prior to commencing construction activities, the project owner shall lengthen the left-turn pocket on SR-58 at Harper Lake Road to approximately 300 feet (or an alternative length as approved by Caltrans). This condition is necessary to safely accommodate the number of vehicles expected to access the site during peak construction period and will require coordination with, and plan approval by, Caltrans.~~

~~**Verification:** At least six months prior to the start of site mobilization, the project owner shall submit plans to Caltrans for approval and obtain encroachment permit. A copy of the plans and all correspondence to Caltrans shall be simultaneously submitted to the CPM. At least 30 days prior to site mobilization, the improvement shall be completed and subject to inspection by Caltrans. Prior to site mobilization, a copy of Caltrans' approval shall be provided to the CPM.~~

~~If Caltrans requests the pocket be made longer than 300 feet to accommodate traffic from other development projects in the area, then the applicant should only be responsible for a fair share proportion of the overall cost.~~

[Rationale for reconsideration and removal: As described elsewhere in this testimony, the traffic levels expected as a result of the Project (worst-case scenario, during the peak month of construction) do not warrant an extension of the left-turn lane from eastbound SR-58 to Harper Lake Road.]

11.4 Correlation to SA, SSA and Hearing Topics

- Staff Assessment, Section 5.10
- Supplemental Staff Assessment, Part A, Section 5.10
- Traffic and Transportation

TRAFFIC AND TRANSPORTATION

ATTACHMENT 1

WILSON
&COMPANY

701 B Street
Suite 1220
San Diego, CA 92101
619-330-5200
619-330-5201 Fax

Albuquerque
Colorado Springs
Denver
El Paso
Fort Worth
Houston
Kansas City
Las Cruces
Lenexa
Los Angeles
Phoenix
Rio Rancho
Salina
San Bernardino
San Diego
Wilson & Company
Latin America, LLC

May 27, 2010

Mr. Matt Stucky, PE
Abengoa Solar, Inc.
2030 Addison Street, Suite 420
Berkley, CA. 94704

Re: Queuing Analysis for the SR-58 left turn lane at Harper Lake Road

Dear Matt,

In response to California Energy Commission Staff Assessment TRANS-1 and TRANS-4, a queuing analysis for the left turn movement along eastbound SR-58 at the intersection of Harper Lake Road was conducted to assess the need for lengthening the existing left turn lane should the park-and-ride lot be located west of the SR-58/Harper Lake Road intersection.

The analysis was conducted using the Synchro computerized traffic analysis software based on the Highway Capacity Manual (HCM) 2000 methodology.

Assumptions used in the analysis:

- The morning peak (AM peak) period was chosen for the analysis as it represents the peak demand for left turns from eastbound SR-58 onto Harper Lake Road during the construction phase.

- All bus traffic was assumed to be coming from a park-and-ride lot to the west of the SR-58/Harper Lake Road intersection.

- Project traffic composition was assumed to be: 12% coming from the east and 88% coming from the west; of which 20% was assumed to carpool to the park-and-ride lot. This traffic composition translates to 68 vehicles going through the intersection from the east to get to the park-and-ride lot in the AM peak hour (on westbound SR-58), and additional 27 passenger car equivalents (9 buses) coming from the west on SR-58 and turning left onto Harper Lake Road.

- No other projects would be contributing to the traffic volumes at the study intersection during the project construction period.

Analysis Results:

Consistent with the HCM methodology, the 95th percentile (95th %) queue length was used to define the required length of the left turn lane on eastbound SR-58 at Harper Lake Road during construction for the AM peak period.

The analysis showed that the traffic volume on SR-58 would be fairly light during the AM peak hour amounting to approximately 500 vehicles per hour over two (2) through lanes of traffic in each direction of travel. This light traffic would afford the left turn traffic with sufficient number of acceptable gaps in the main line traffic stream to complete their turning maneuver with minimal delay.

The results also indicate that the intersection would enjoy ample surplus capacity even with the added project traffic, with the overall intersection capacity utilization (ICU) reaching 45% indicating that the intersection capacity would still be less than half utilized.

The resulting 95th % queue length for the left turning movement was approximately 40 feet or two (2) car-lengths. The existing eastbound SR-58 left turn lane at Harper Lake Road is 90 feet in length, and therefore, is of sufficient length to meet the expected left turn demand during construction. A printout of the Synchro analysis results is attached for your reference.

Conclusion:

Based on the assumptions stated above, the analysis results show that no additional lengthening of the left turn lane would be required to accommodate the project demands during construction.

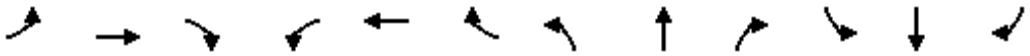
Please let us know if you have any questions, or if you wish to discuss this issue further.

Sincerely,

Nicholas Abboud, PhD, PE, PTOE
Transportation Engineering Manager

TRAFFIC AND TRANSPORTATION

ATTACHMENT 2



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	315	500	1	6	526	8	0	0	17	0	1	30
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	342	543	1	7	572	9	0	0	18	0	1	33
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	580			545			1560	1822	272	1560	1814	286
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	580			545			1560	1822	272	1560	1814	286
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	65			99			100	100	97	100	98	95
cM capacity (veh/h)	990			1021			52	50	726	54	50	711

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	342	272	272	1	7	286	286	9	18	34
Volume Left	342	0	0	0	7	0	0	0	0	0
Volume Right	0	0	0	1	0	0	0	9	18	33
cSH	990	1700	1700	1700	1021	1700	1700	1700	726	499
Volume to Capacity	0.35	0.16	0.16	0.00	0.01	0.17	0.17	0.01	0.03	0.07
Queue Length 95th (ft)	39	0	0	0	0	0	0	0	2	5
Control Delay (s)	10.5	0.0	0.0	0.0	8.6	0.0	0.0	0.0	10.1	12.7
Lane LOS	B				A				B	B
Approach Delay (s)	4.1				0.1				10.1	12.7
Approach LOS									B	B

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	45.3%	ICU Level of Service	A
Analysis Period (min)	15		

12.0 TRANSMISSION LINE SAFETY AND NUISANCE

12.1 Introduction

A. Name: David Larsen

B. Qualifications: Mr. Larsen is a Director with Navigant Consulting, Inc. He has a Bachelor of Science degree in Electrical Engineering and over 35 years of experience in transmission and resource planning, including overseeing the evaluation and planning of transmission projects and of the performance of interconnection studies for both renewable and conventional generating projects. Mr. Larsen's qualifications are as noted in his resume contained in Appendix A.

C. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

- Application for Certification, Volume 1, Section 5.14-Transmission Line Safety and Nuisance [Exhibit 1]

12.2 Summary of Testimony

A. Opening Statement

To the best of my knowledge, all of the facts contained in this Section of the Applicant's testimony (including all referenced documents) are true and correct. To the extent this testimony contains opinions, such opinions are my own based upon my professional judgment. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

B. Summary

The proposed MSP transmission line will interconnect with the Southern California Edison (SCE) 230-kV Kramer-Cool Water #1 transmission which is located adjacent to the southern border of the MSP Project site. The total length of the two proposed transmission lines (one from the new interconnection substation to each of the two power islands) is approximately 16,450 feet. All MSP-related transmission facilities are located within the MSP site boundaries except for a 200 foot long interconnection from the southwestern site boundary to the adjacent SCE transmission line.

This section discusses safety and nuisance issues associated with the proposed electrical interconnection of the MSP to the SCE 230-kV Kramer-Cool Water #1 transmission line.

1) **Electrical Clearances/Compliance with LORS**

The proposed MSP transmission interconnection will be designed to meet all relevant federal, state and local code and clearance requirements including minimum clearances

that are specified in the California Public Utilities Commission (CPUC) General Order 95 (GO-95) as well as any additional more restrictive clearances specified by applicable electric utilities, state regulators and local ordinances.

The proposed MSP will also comply with all applicable laws, ordinances, regulations and standards (LORS). Applicable LORs include those related to general regulations, design and construction requirements, aviation safety, communication interference, audible noise, hazardous nuisance and shock, electric and magnetic fields (EMF), and fire hazards. The MSP will comply with the applicable LORS during construction and operation.

2) Electrical Effects

The AFC discusses in detail the Electrical Effects of the proposed MSP including Aviation Safety, Radio and Television Frequency Communications, Audible Noise, Electric Shock Hazards, Fire Hazards and Electric and Magnetic Fields issues. This testimony only reiterates the conclusions and the discussions in the AFC are hereby incorporated by reference.

3) Aviation Safety

Federal Aviation Administration (FAA) Regulations, Part 77 establish standards to determining obstructions in navigable air space and sets forth requirements for notification of proposed construction. These regulations require FAA notification for any construction over 200 feet in height above ground level.

New towers associated with the MSP will be less than 200 feet tall and there are no public or military airports or helicopter-related facilities in close proximity to the MSP. The structures of the proposed MSP electrical transmission interconnection will pose no deterrent to aviation safety as defined in the FAA regulations.

4) Radio and Television Frequency Communications

The level of radio and television 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.

Due to the remote location of the MSP transmission line interconnection and the fact the substation and majority of the proposed transmission line interconnect would be located within the boundaries of the MSP project site, no adverse effects to local communication networks are anticipated.

5) Audible Noise

Corona may result in the production of audible noise from a transmission line and typically becomes a design concern for transmission lines having voltages of 345- kV and above. The proposed MSP transmission line is 230-kV, so little corona effect is expected. Additional information on corona noise (including insulators and hardware selected to minimize corona noise; pre- and post-project noise surveys performed to document ambient condition change caused by the line and procedures to investigate and resolve interference complaints) is included in AFC Section 5.8, Noise and the Noise subsection of this report.

6) Electric Shock Hazard

Hazardous shocks are those that could result from direct or indirect contact between an individual and the energized line, whether overhead or underground. The strength of the induced current depends on the electric field strength, the size and shape of the conducting object, and the object-to-ground resistance.

The MSP transmission interconnection will be constructed in conformance with CPUC GO-95 and Title 8 CCR 2700 requirements, Grounding procedures specified in the National Electrical Safety Code, American National Standards Institute and Institute of Electrical and Electronics Engineers will also be implemented. Hazardous shocks are unlikely to result from MSP construction, operation, or maintenance.

7) Fire Hazards

The proposed MSP 230-kV transmission interconnection lines will be designed, constructed, and maintained in accordance with the CPUC's GO-95, which establishes clearances from other man-made and natural structures as well as tree-trimming requirements to reduce/avoid fire hazards.

8) EMF

Transmission Line EMF Reduction

While the State of California does not set a statutory limit for EMF levels, the CPUC, which regulates electric transmission lines, mandates EMF reduction as a practicable design criterion for new and upgraded electrical facilities. As a result of this mandate, the regulated electric utilities have developed their own design guidelines to reduce EMF at each new facility. The CEC, which regulates transmission lines to the point of connection, requires generators to follow the existing guidelines that are in use by local electric utilities or transmission-system owners.

In keeping with the goal of EMF reduction, the interconnection of the MSP will be designed and constructed using the principles outlined in the SCE publication, "EMF

Design Guidelines for Electrical Facilities." These guidelines explicitly incorporate the directives of the CPUC by developing design procedures compliant with Decision 93-11-013 and GOs 95, 128, and 131-D. That is, when the transmission line structures, conductors, and rights-of-way are designed and routed according to the SCE guidelines, the transmission line is consistent with the CPUC mandate.

The EMF levels for the proposed MSP interconnection lines have been estimated to determine if the line will cause any significant increase above current levels. If required, the pre and post-interconnection verification measurements will be made consistent with IEEE guidelines and will provide sample readings of EMF at the edge of ROW. Additional measurements will be made upon request for locations of particular concern.

EMF Field Calculations

In accordance with IEEE standards, EMF levels were calculated at a three feet elevation above flat terrain using the SCE FIELDS program. For the calculations, the MSP transmission line was assumed to be loaded at 100 percent, which equates to an output level of 1000 amperes for the MSP with power being transmitted to Kramer and Cool Water Substations. Results of the EMF calculations are illustrated in AFC Figures 5.14-1 and 5.14-2

Summary of Electric and Magnetic Field Calculations

The majority of one of the two proposed MSP transmission lines between the interconnection switchyard and one of the two power blocks will be located adjacent to an existing transmission line corridor (See AFC Figures 2-3(g) and 2-3(j)). Existing electric fields for the existing corridor are estimated to be less than 0.1-kilovolts per meter (kV/m) at either edge of the existing ROW. The existing magnetic field levels are less than 15 milligauss (mG) at the left (southern) edge of the ROW (looking west-to-east down the existing double-circuit 230-kV line) and are approximately 25 MG at the right (northern) edge of the existing ROW.

The addition of the new MSP transmission line will not increase the electric field level at the northern edge of the existing corridor from the existing level of approximately 0.4-kV/m nor increase the electric field level at the southern edge of the ROW above approximately 0.52-kV/m. The addition of the MSP line will increase the magnetic field levels at the northern edge of the existing ROW from approximately 24.8 mG to approximately 25.5 mG while those on the southern edge of the existing ROW do not change. The estimated EMF at the northern edge of the "expanded" ROW will be approximately 27 kV/m and 39 mG, respectively.

The EMF levels for the proposed MSP interconnection will not result in significant EMF increases above current levels.

C. Mitigation Measures

No significant transmission line-related impacts were identified as a result of the MSP studies. The MSP will be designed, constructed, operated, and maintained in accordance with the applicable LORS and to minimize EMF. No additional mitigation is required for this area.

12.3 Proposed Licensing Conditions

The CEC Staff Assessment recommended that five Conditions of Certification (COCs) be adopted to address transmission line safety and nuisance issues. These COCs are identified as TLSN-1 to TLSN-5. The Applicant proposed no changes to these COCs.

12.4 Correlation to SA, SSA and Hearing Topics

- Staff Assessment, Section 5.11
- Transmission Safety and Nuisance

13.0 VISUAL RESOURCES

A. GENERAL

13A.1 Introduction

A. Name: Timothy Zack and Lee Anderson

B. Qualifications: The visual specialists' qualifications are as noted in their respective resumes contained in Appendix A.

C. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

- Application for Certification, Volume 1, Section 5.15, except sections regarding "Cooling Tower Exhaust Design Parameters and Plume Modeling" in Section 5.15.3.2, and except analysis of the "visual plume" in Section 5.15.5. [Exhibit 1]

To the best of our knowledge, all of the facts contained in this testimony (including all referenced documents) are true and correct. To the extent this testimony contains opinions, such opinions are our own. We make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

13A.2 Summary of Testimony

A. Affected Environment

1) Regional Setting

The Mojave Solar Project site is situated in unincorporated San Bernardino County in the Harper Lake Valley of the western Mojave Desert. The site is situated approximately five miles north of California SR 58 (the Barstow-Bakersfield Highway). The Mojave Desert is a subsection of the Basin and Range Physiographic Province, which is characterized by long, north-south-trending mountain ranges separated by broad valleys. With respect to regional geographic features, the Mojave Solar Project site is a large, flat planar landscape that slopes northeast toward Harper Dry Lake, with no distinctive geographic features onsite. Harper Dry Lake is a dry alkaline lakebed in the middle of this basin landscape, and the lakebed is situated northeast of the Mojave Solar Project site. Approximately eight miles northeast of the Project site, and beyond the dry lakebed, is Black Mountain, a wilderness area managed by the USDA Bureau of Land Management. Four miles east-southeast of the Project site is Lynx Cat Mountain, and along with an unnamed butte south of SR 58, these landforms create what is locally known as the Hinkley Divide. SR 58 is designated by Caltrans as an Eligible State Scenic Highway, but it is not Officially Designated. SR 58 is eligible for scenic highways status because plants indigenous to the area along the route occasionally have good scenic qualities when wildflowers are in bloom.

The existing SEGS VIII and IX are situated just northwest of the proposed Project site, north of and along Hoffman Road. SEGS VIII and IX utilize similar technology and

hardware to that which would be utilized at the Mojave Solar Project. Existing nighttime lighting levels and existing water vapor plumes at the existing SEGS VIII and IX solar plants would be similar to the expected future nighttime lighting and future water vapor plumes at the proposed Mojave Solar Project site.

The proposed Project site is located approximately nine miles northwest of Hinkley, CA, approximately 20 miles west-northwest of Barstow, CA, and approximately 11 miles east-northeast of Kramer Junction, which is located at the intersection of SR 58 and US 395.

2) Plant Site

The Mojave Solar plant site was formerly in agricultural use but at present is not in agricultural production. The site's topography is very flat, or planar, and ideal for the proposed solar-thermal application with very little earthwork grading. Elevations range from approximately 2025 to 2105 ft above mean sea level (amsl) across an area of more than three miles. The plant site does not contain significant scenic resources and its overall level of scenic quality is considered to be low. The plant site is comprised mainly of Fallow Agriculture-Ruderal and Fallow Agriculture with Saltbush Scrub Re-Growth. There is one parcel of 160-acres within the Project site that is still actively farmed.

The proposed Project site is approximately 1,765 acres in size and is situated on a large, flat desert plain in the Western Mojave Desert. The existing site is composed of large, fallow agricultural fields which previously have been irrigated crop lands (reportedly alfalfa for former dairy farms at Lockhart Ranch). As seen on aerial photo-graphs, each one-mile section of land at the Project site has four large circular crop fields, the result of center pivot irrigation. As seen on the ground, this same landscape simply looks like a single large flat plain of dry crop vegetation (fallow agricultural land). This land was originally sited as SEGS XI and XII and is located next to the existing SEGS VIII and IX facilities that were constructed in the 1990s. Because of the past agricultural operations, there are no native grasses, shrubs, or trees on the Project site. Existing evergreen tree windbreaks can be seen readily on the ground and on aerial photos, and are found in both Alpha and Beta sites. These windbreaks tend to run either north-south or east-west. The Beta power block would occupy the site of one of these windbreaks.

The Project site was specifically selected because of the past agricultural modifications to the landscape and the Project was configured to minimize environmental impacts. The approximately 1,765-acre plant site is vacant and significantly disturbed from past and current agricultural activities. The few remaining agricultural structures would be demolished and associated materials would be removed.

Photographs of the site in its current condition are presented in Section 2.0 of the AFC.

The Mojave Solar plant site has distant views to and from Black Mountain, which is approximately eight miles northeast of the site. Overall, visibility of the plant site and its surrounding area is very limited because of the flat terrain on the site, and because of small undulations in the Mojave Desert plain, much of the Project site is blocked from view by intervening topography. Local visibility of the plant site is shown in the AFC in Figure 5.15-1 Regional Visibility of the Project. The greatest potential for public views of the Mojave Solar Project site is from Harper Lake Road, two to three miles north of SR

58, headed northbound. The Project site is not visible from SR 58, an Eligible State Scenic Highway.

Harper Lake Road crosses under the existing SCE 230-kV and LADWP 500-kV transmission lines before intersecting the Plant Site. The proposed Hinkley Substation site, on the south edge of the Project site and more than one mile east of Harper Lake Road, is where the Project would interconnect with the regional transmission system. Other viewing opportunities are from scattered rural residences, Harper Lake Road, Lockhart Ranch Road, and the BLM watchable wildlife area on the southwest shore of Harper Dry Lake, at the Harper Dry Lake Marsh Area of Critical Environmental Concern (ACEC). Additionally, long distance views to the plant site would be available from higher elevations of the Black Mountain Wilderness, although there are no trails within this wilderness, according to local BLM officials (Bradley Mastin, 2009). Most recreation activity occurs in Black Canyon and at the northern extent of the wilderness, where extensive petroglyphs have been found. The Project site would not be visible from the northern extent of Black Mountain Wilderness, according to the Figure 5.15-1: Regional Visibility of the Project Map.

The area surrounding the plant site is very lightly populated. There are scattered rural residences in the vicinity of the plant site, but no occupied residences on the plant site. Approximately 10 rural residences and small farms are located in the vicinity within one mile of the Project site (see Land Use Section in the AFC). The nearest residence with views to the plant site is located on the south side of Lockhart Ranch Road, across the road from the eastern portion of the Alpha Plant. The other closest residences are located approximately 1/4 mile north of the western portion of the Alpha site, and approximately 1/4 mile west of the western portion of the Beta site. These residences would have views at a distance of one mile or more from the Project's two power blocks, where the facility's largest structures and equipment would be located.

During site investigations conducted in the immediate vicinity of the proposed Project, the visual analysts noted that most of these rural residences have views of the Project site. The majority of these viewers would have direct, unobstructed views to the Project site; however, a number of these homes have vegetative screens (evergreen windbreaks) that minimize current views to the site. A few of these residences may have views that are partially obscured due to the presence of adjacent residences in the foreground; other residences are partially obscured by existing vegetative screening and windbreaks.

3) Electric Transmission Line

Figure 5.15-1 in the AFC also shows the location of the transmission line route and its local visibility, which is the same as the Plant Site. As with the plant site, the greatest potential for public views of the transmission line is from Harper Lake Road, Lockhart Ranch Road, and the BLM watchable wildlife area. Other viewing opportunities are from local residences. The proposed transmission line would not be visible from the Black Mountain Wilderness because of the long distances involved and the size of the transmission line. The transmission line route would cross through a landscape that does not contain significant scenic resources, and overall levels of scenic quality are considered low.

B. Description of the Project

The Project would use well-established, parabolic trough solar thermal technology to produce electrical power, which uses a steam turbine generator (STG) fed from solar steam generators (SSG). SSGs receive heat transfer fluid (HTF) from solar thermal equipment comprised of arrays of parabolic mirrors that collect energy from the sun. The Project would have a combined nominal electrical output of 250 megawatts (MW) from twin, independently-operable solar fields, each feeding a 125-MW power block. The plant sites, identified as Alpha (the northwest portion of the Project area) and Beta (the southeast portion of the Project area), would be 884 acres and 800 acres respectively and joined at the transmission line interconnection substation to form one full-output transmission interconnection. The major project structures to be installed at the Mojave Solar Project site, which is approximately 1,765 acres in size, would be two fields of parabolic solar troughs, two power blocks, and a substation interconnect to an existing overhead transmission line adjacent to the south side of the project. Figure 2-3 in the Project Description in the AFC shows the layout of proposed Project facilities.

1) Solar troughs:

The solar troughs are parabolic mirrors that focus the sun's energy onto a heat transfer pipe. The parabolic troughs are supported by structures (pylons) that connect the parabolic troughs to the tracking mechanism, with concrete pier foundations and spread footings set on a flat and leveled base of native desert soil. The top of the mirrors reflect light and take on the color of that is reflected back to the viewer. If the reflected image is the sky, mirrors appear blue, white or gray, depending on sky color. If the mirrors are aimed toward the horizon, the reflected image is of the soil color, which is tan to gray, as experienced in a site visit to the nearby existing SEGS VIII and IX facilities.

2) Power Blocks:

The Project would include a warehouse and control/admin building located in each power block. The design and construction of the buildings will be consistent with normal building standards. Other plant site "buildings" would include the water treatment building, as well as a number of pre-engineered enclosures for mechanical and electrical equipment. The two power blocks are identical, and would be composed of large, rectangular, prefabricated metal buildings with shallow gable and/or shallow shed roofs. Walls would be a warm pallet of light tan colors sympathetic to the desert context.

3) Solar Collector Assembly Buildings:

There would be two solar collector array assembly buildings in the northeast portion of the Alpha solar field. The design and construction of the buildings will be consistent with normal building standards, and would be composed of large, rectangular, pre-fabricated metal buildings with shallow gable and/or shallow shed roofs. Walls would be a warm pallet of light tan colors sympathetic to the desert context.

4) Transmission line:

The overhead transmission lines within the project site would be light weight steel monopoles or concrete monopoles, light gray in color.

5) Water Storage Tanks:

There would be a number of covered water tanks on each site including a 1,930,000-gallon Raw Water storage tank for short-term backup cooling water supply, with a portion (360,000 gallons) dedicated to the plant's fire protection water system and a 1,930,000- gallon Service Water storage tank. There would also be a 164,500-gallon storage tank for storage of demineralized water.

6) Roads, Fencing, and Security:

Access to the Project will be provided along Harper Lake Road and Lockhart Road. Road widths and pavement types will be designed and constructed to satisfy the requirements of the County of San Bernardino Transportation Department and the San Bernardino County Fire Marshall. All-weather, paved access will be provided to both power islands for emergency and fire access. Only a small portion of the overall plant site would be paved with asphalt, primarily the site access road and portions of the power block (paved parking lot and roads encircling the STG and SSG areas). In total, each power island would be approximately 20 acres with approximately 1.75 acres of paved area. Fencing would be galvanized gray chain link fence, six to eight feet tall.

7) Grading and Drainage:

The proposed Project site is located in the arid Mojave (average annual rainfall in the site vicinity is reported as less than seven inches). The existing topography of the Project site is an average slope of 1%, with existing site elevations ranging from approximately 2025 to 2105 feet amsl. The property has sheet drainage/run-off and during infrequent large precipitation events, and is largely fallow agricultural land. The solar field areas would be graded generally following the existing contours of the site as planar tiers to accommodate the installation of the solar field components. Stormwater on the solar field area would drain by sheet flow and allowed to settle in the solar fields and percolate. Site runoff is not anticipated from the solar field. The Project's power islands and solar field areas will be graded to allow for a balanced distribution of material, so there would be no requirement to truck large quantities of earth materials to or from the site.

Drainage channel crossings on Harper Lake Road and Lockhart Road will be constructed to convey the 100-year storm runoff flows beneath the roadway to maintain 24-hour access to the power islands. Access to the solar fields will be provided via fair-weather crossings along the channel bottoms. These crossings will provide vehicular access during fairweather, while allowing drainage flows to cross the roadways during periods of storm runoff.

8) Onsite Transmission Lines:

The entire length of the transmission gen-tie line is located on the project site and would be installed on approximately 23 new steel/concrete monopoles from the Alpha Plant site and approximately nine from the Beta Plant site. The poles are expected to average approximately 80 feet in height (maximum pole height of 110 feet), with a span length expected to average approximately 500 feet.

9) On-Site Interconnection Substation:

The interconnection substation would be located on the project site in the SW corner of the Beta site. An Interconnection Station would be constructed at the boundary of the project to intertie to the Kramer-Cool Water 230 kV transmission line. The station will utilize tubular aluminum alloy 1200A bus. Final switchyard and/or substation equipment would be determined during final engineering of the proposed interconnection. The interconnection is proposed on the project site and would extend to a point under the adjacent power lines in the transmission right-of-way.

10) Lighting System:

The Project's lighting system would provide operations and maintenance personnel with illumination in both normal and emergency conditions. The system would consist primarily of AC lighting, but would include DC lighting for activities or emergency egress required during an outage of the plant's AC electrical system. The lighting system would also provide AC convenience outlets for portable lamps and tools. Lighting would be designed to provide the minimum illumination needed to achieve safety and security objectives and would be shielded and oriented to focus illumination on the desired areas and minimize additional nighttime illumination in the site vicinity.

C. Impacts of the Project

Impacts of the project from the eight key observation points (KOPs) are summarized below.

We agree with Staff that the proposed Abengoa Mojave Solar (AMS) project would be seen from the sparsely developed area adjacent to the proposed project site which includes the existing Solar Electric Generating Systems (SEGS VIII and IX) projects, about ten private residences in the immediate area, and the Harper Dry Lake Watchable Wildlife Area maintained by the Bureau of Land Management (BLM) near the northeastern corner of the proposed project site. The project would be virtually unseen from State Route 58, which is five-plus miles south of the project. The proposed transmission line would be visible among three existing transmission lines along the southern boundary of the project site. The project would change the existing character of the 1,765-acre project site from a primarily open, partially abandoned agricultural landscape to a highly human-altered, industrial landscape very similar to the adjacent SEGS VIII and IX developments. The change in character would be evident to the few people who live in the immediate area, to employees at the SEGS VIII and IX facilities, and to those who visit the Harper Dry Lake Watchable Wildlife Area. Due to its visual isolation from substantial numbers of the public, overall visual effects of the project would be very limited.

We agree with the Staff conclusion that the project would introduce a less-than-significant "Aesthetic" Impact under the California Environmental Quality Act and Guidelines. We agree with Staff's conclusions about Aesthetic Impacts that are discussed under Staff Report sections VISUAL CHARACTER OR QUALITY, LIGHT AND GLARE, and PUBLICLY VISIBLE WATER VAPOR PLUMES. We agree with Staff that the project would be consistent with federal, state, and local LORS pertaining to visual resources.

We agree with Staff that with implementation of Staff recommended conditions of certification, aesthetic, light and glare impacts from the project would be less-than-significant in the short and long term.

We agree with Staff that due to Mojave Solar Project's very restricted viewshed, potential cumulative impacts of the project would be limited and less-than-significant.

13A.3 Proposed Licensing Conditions

Staff recommends four conditions of certification for the project that they believe would minimize impacts under the California Environmental Quality Act and Guidelines to the greatest extent possible, and would comply with applicable ordinances pertaining to aesthetics and preservation and protection of sensitive visual resources.

These conditions (VIS-1 to VIS-4, described on pages 5.12-35 to 5.12-39 of the Supplemental Staff Assessment, Part A) address surface treatments of project facilities, off-site landscape screening, temporary and permanent exterior lighting, and perimeter screening.

The Applicant has reviewed the Conditions of Certification (VIS-1 to VIS-4) set forth in the SSA and we find them acceptable in concept. However, the Applicant proposes the following edits to three of the four visual resource conditions for clarity, consistency, and simplification.

STAFF PROPOSED CONDITIONS OF CERTIFICATION AND PROPOSED REVISIONS (in red)

As a general comment, the Applicant believes that, as time is of the essence, it is imperative that specific timeframes for approval be included in the Conditions so that the project will not be unnecessarily delayed. In addition, changes proposed by the Applicant provide flexibility by moving requirements from the condition language to the verification section.

Proposed Revisions to VIS-1

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**, other than surfaces that are intended to direct or reflect sunlight,** so that their colors minimize visual intrusion and contrast by blending with the rural landscape in both color and value and their colors and finishes do not create excessive glare.

The project owner shall submit to the Compliance Project Manager (CPM) for 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, wall, 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 written procedure to ensure proper treatment maintenance for the life of the project.

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 the CPM. Subsequent modifications to the treatment plan are prohibited without CPM approval.

Verification: At least 90 days prior to specifying to the vendor the colors and finishes **for each set** of ~~the first~~ structures or buildings that are surface treated during manufacture, the project owner shall submit the proposed treatment plan to the CPM for review and approval.

If the CPM determines that the plan requires revision, the project owner shall provide to the CPM a plan with the specified revision(s) for review and approval by the CPM before any treatment is applied. Any modifications to the treatment plan must be submitted to the CPM for review and approval. **The review of any subsequent revisions shall be completed by the CPM within fifteen (15) days of receipt of the revisions.**

Prior to the start of commercial operation, the project owner shall notify the CPM that surface treatment of all listed structures and buildings has been completed and they are ready for inspection and shall submit one set of electronic color photographs from KOPs 1, 2, 3, 4, 5, 6, 7, and 8 analyzed in the Staff Assessment.

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.

Proposed Revisions to VIS-2

OFF-SITE LANDSCAPE SCREENING

This condition assumes that the off-site landscape screening is something that is desired by residential land owners **(not renters or lessees)** within 0.5 miles of the project boundary. If so, the Applicant will provide it, but the land owners need to be responsible for watering, weeding, and maintaining the landscape screening as part of their own ongoing property management and property maintenance.

VIS-2 The project owner shall develop and implement a plan to reduce permanent views of the project from residential properties located within 0.5 mile of the project boundary by installing off-site landscape planting on the residential properties if the landowner so desires **and requests implementation of the off-site landscape screening in writing**. The landscape planting shall reduce views of the project and exposure to glare to a reasonable level.

The project owner shall submit to the CPM for review and approval a screening plan providing proper implementation that will satisfy these requirements. The plan shall include:

A. A detailed plan at a reasonable scale such that all information is legible, and elevations and/or section drawings showing the relationship of the screening to the project site. The plan, elevations and/or sections shall clearly demonstrate how the view-reducing ~~reducing~~ requirements stated above shall be met. The plan shall provide a detailed plant list including quantities and sizes of materials to be used and an installation schedule demonstrating installation of as much of the screening as early in the construction process as is feasible in coordination with project construction;

B. Plant establishment procedures, including a plan for routine care and monitoring of plant materials **will be provided by the project owner to each landowner. The project owner will provide for** ~~and~~ replacement of installed plants that fail to thrive for a period of five years from installation, **if the landowner has provided proper and diligent watering, weeding, and maintenance**; and

C. Documentation that a landowner declines to have landscape screening installed on his property in the event they choose not to participate in the screening program.

D. The plan shall not be implemented until the project owner receives final approval from the CPM.

Verification: The screening plan shall be submitted to the CPM for review and approval at least 90 days prior to installation.

If the CPM determines that the plan requires revision, the project owner shall provide to the CPM a revised plan for review and approval by the CPM. **The review of any subsequent revisions shall be completed by the CPM within fifteen (15) days of receipt of the revisions.**

The project owner shall notify the CPM within seven days after completing the screening installation that the screening is ready for inspection.

The project owner shall report maintenance activities, including replacement of plants that fail to thrive for the previous year of operation for a period of five years, in each Annual Compliance Report.

Proposed Revisions to VIS-4

PERIMETER SCREENING

VIS-4 The project owner shall develop and implement a screening plan that reduces direct visibility of the SCA mirrors to traffic on Harper Lake Road north of Lockhart Road, to traffic on Lockhart Road from Harper Lake Road to the eastern boundary of the Beta solar field, to residents living within one mile of the west boundary of the Beta solar field, and to visitors of the Harper Dry Lake Watchable Wildlife Area. The plan shall utilize sufficient setbacks of the SCAs from roads and 10-foot high slatted fencing to eliminate public exposure to hazardous levels of reflection, and to minimize public exposure to nuisance glare. The screening shall be designed to minimize glare from the project as seen by motorists and local residents during all times of year and periods of the day. Fence slats shall be of a non-reflective tan or other color designed to blend with the visual background in order to minimize color contrast of the fence.

The project owner shall submit to the CPM for review and approval a screening plan providing proper implementation that will satisfy these requirements. The plan shall include:

A. A detailed plan at a reasonable scale such that all information is legible, and elevations and/or section drawings showing the relationship of the screening to the road and SCAs from locations on Lockhart Road. The plan, elevations and/or sections shall clearly demonstrate how the glare-reducing requirements stated above shall be met. The plan shall provide a detailed installation schedule demonstrating installation of as much of the screening as early in the construction process as is feasible in coordination with project construction;

B. Maintenance procedures, including a plan for routine annual or semiannual debris removal and repair of slatted fencing for the life of the project;

C. A procedure for monitoring and replacement of damaged screening for the life of the project; and

D. The plan shall not be implemented until the project owner receives final approval from the CPM.

Verification: The screening plan shall be submitted to the CPM for review and approval at least 90 days prior to installation.

If the CPM determines that the plan requires revision, the project owner shall provide to the CPM a revised plan for review and approval by the CPM. **The review of any subsequent revisions shall be completed by the CPM within fifteen (15) days of receipt of the revisions.**

The project owner shall notify the CPM within seven days after completing the screening installation that the screening is ready for inspection.

The project owner shall report maintenance activities, including replacement of damaged or destroyed screening for the previous year of operation in each Annual Compliance Report.

13A.4 Correlation to SA, SSA and Hearing Topics

- Staff Assessment, Section 5.12
- Supplemental Staff Assessment, Part A, Section 5.12
- Visual Resources

13.0 VISUAL RESOURCES
B. IMPACTS FROM SOLAR COLLECTOR ARRAYS

13B.1 Introduction

A. Name: Frederick Redell, PE

B. Qualifications: Mr. Redell's qualifications are as noted in his resume contained in Appendix A.

C. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

- Application for Certification, Volume 1, Section 2.0 [Exhibit 1]
- Applicant's Written Response to CEC Data Request Set 1B (1-86), dated November 25, 2009, Response to Data Requests 66-71[Exhibit 4]

To the best of my knowledge, all of the facts contained in this Section of the Applicant's testimony (including all referenced documents) are true and correct. To the extent this testimony contains opinions, such opinions are my own based upon my professional judgment. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

13B.2 Summary of Testimony

This testimony presents information related to the potential visual impacts from the Project's solar collector arrays (SCA), the mirrored, parabolic trough structures. The majority of the Applicant's testimony related to Visual Resources is presented elsewhere. This brief section is provided to enter into the record the Applicant's responses to Data Requests 66 through 71 from Set 1B, which are not specifically addressed in other sections of the Applicant's testimony. Mr. Redell is adopting this testimony, which is based on information developed by Abengoa Solar Inc.

The SCA are designed to concentrate solar radiation on the Heat Collection Element (HCE), which is coincident with the focal point of the parabolic mirrors. The fraction of the energy that hits the receiver out of the energy that is reflected from the mirror surface is called optical intercept, and the collector to be deployed in the Project will have an intercept factor of 0.97. To an observer who is not on the axis of the collector, an image of the illuminated HCE would appear. The brightness (luminance) of the reflection from the collector/HCE system depends on the reflectivity properties of the HCE and has been estimated to be between 0% and 3.1% of the incident solar radiation. The Applicant is not aware of reports of adverse glare effects or worker safety issues resulting from glare at the nearby Solar Energy Generation System (SEGS) XI and XII facilities, which utilize similar technology.

13B.3 Proposed Licensing Conditions

For Conditions of Certification related to Visual Resources and visual screening of the Project, see General Testimony for Visual Resources, Section 13A.

13B.4 Correlation to SA, SSA and Hearing Topics:

- Staff Assessment, Sections 5.12
- Supplemental Staff Assessment, Part A, Section 5.12
- Visual Resources

13. VISUAL RESOURCES
C. VISUAL PLUME

13C.1 Introduction

A. Name: Gregory S. Darvin

B. Qualifications: Mr. Darvin is a Meteorologist with over sixteen years of consulting experience conducting air quality permitting and modeling assessments for new and modified industrial energy-related sources. He has a B.A. degree in Geography and is a M.S. Candidate in Atmospheric Science. His qualifications are summarized more completely in the attached resume (Appendix A).

E. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

- Application for Certification, Volume 1, Section5.15, paragraphs regarding "Cooling Tower Exhaust Design Parameters and Plume Modeling" in 5.15.3.2 and analysis of the visual plume in 5.15.5 [Exhibit 1]
- Applicant's Written Response to CEC Data Request Set 1B (1-86), Dated November 25, 2009, Responses to Data Requests 72 and 73 [Exhibit 4]

To the best of my knowledge, all of the facts contained in this testimony (including all referenced documents) are true and correct. To the extent this testimony contains opinion, such opinion is my own. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

13C.2 Summary of Testimony

This testimony presents information related to the visual impacts of the plumes from the Project's cooling towers that may, at times, be visible. The majority of the testimony related to Visual Resources is presented elsewhere. This section is provided to enter into the record those portions of Section 5.15 of the AFC and other filings on this topic that are not addressed elsewhere in the Applicant's testimony.

A cooling tower modeling analysis was conducted using the Seasonal/Annual Cooling Tower Impact Program (SACTIP, Version 11-01-90) and three years of Daggett, CA meteorological data. Model simulations indicate that visible plumes will occur, but will be moderate in size (height and length). The probability of formation of long visible plumes in excess of 150 meters is about five percent. No plume fogging or rime icing is predicted to occur in the general vicinity of the project site. Based on these results, the formation of a visual plume was determined to be insignificant.

A. Affected Environment

The project will include the use of two, six-linear-cell, wet, mechanical draft, cooling towers, one for each power block, in order to adequately address the need to reject increased heat to the atmosphere from the proposed project. The air leaving the cooling towers is usually saturated with moisture and warmer than the ambient air, causing a wet exhaust plume to be created. The saturated exhaust plume may be visible or not depending on the specific meteorological conditions. This plume will also vary in size depending on meteorological conditions and operational factors. Potential issues associated with cooling tower plumes include the presence of visual plumes and the occurrence of ground level fogging and/or icing episodes that involve the ground contact of visible plumes. In order to evaluate the effects on the local and regional environment, a modeling analysis was conducted to simulate the cooling tower plumes from the proposed project using three (3) years of meteorological data, collected at Daggett, California. The Seasonal/Annual Cooling Tower Impact Program (SACTIP, Version 11-01-90) was used to assess potential impacts from the cooling tower. SACTIP was developed by Argonne National Laboratory[29] for the Electric Power Research Institute (EPRI) to address the following potential adverse impacts of cooling towers:

- Plume visibility
- Deposition of cooling tower drift
- Ground-level fogging and icing
- Shadowing by the plume & reduction of solar energy

B. Operational Impacts

The SACTIP results for all seasons are summarized in Table 1 below. Impacts are consistent between the seasons. This can be accounted for by the limited variation in seasonal tower characteristics and the lack of extreme seasonal meteorological ranges. The annual values indicate that the majority of visible plume lengths will be less than 50 meters (164 feet). Modeling results indicate that plume formation will occur 99 percent of the time during valid visible hours but only at locations immediately adjacent to the cooling tower and always within the facility boundary. Larger downwind visible plume lengths are possible, but the downwind visible plume length will be less than 150 meters for 95 percent of all the hours where a visible plume will form. This results in a plume length exceeding 150 meters for only five percent of the time during all four seasons. When translated into total hours for the season, on average, 217 hours per year will have plume lengths up to but not exceeding 150 meters. SACTIP also predicts that the probability that a visible plume height will exceed 20 meters is less than five percent. The average heights are 20 meters with a median plume radius of 20 meters.

[29] Argonne National Laboratory, 1984. User's Manual: Cooling-Tower -Plume Prediction Code. Prepared for Electric Power Research Institute, 3412 Hillview Avenue, Palo Alto, CA 9404, EPRI CS-3403-CCM, April, 1984.

TABLE 1 Seasonal Plume Characteristics from SACTIP

Season	*Annual*	*Winter*	*Spring*	*Summer*	*Fall*
Plume Characteristics (meters)					
Median Length	50	50	50	50	50
Median Height	20	20	20	30	20
Median Radius	20	20	20	20	20

1) **Ground level fogging and icing conditions**

A primary focus of the current study is to assess the potential for ground-level fogging on nearby areas. The potential for fogging was assessed with SACTIP. Potential fogging conditions can occur when atmospheric conditions allow the cooling tower plume to generate a cloud that contacts the ground. This can occur under periods of high humidity and favorable temperatures and stabilities with the fog being nucleated or generated by the cooling tower plume. Should fog be generated across a highway or other thoroughfare, it may become a potential hazard and mitigation measures such as signs and traffic assistance may be needed. In order for fogging to affect roadway operations, the cooling tower plume must touchdown on the road surface and be condensed. This requires high winds (low plume rise), the right wind direction, low dew-point depression, and low temperatures.

SACTIP was run with all hours of the three- year database, including nighttime and low-visibility hours. There was only one hour a year of occurrences of predicted fogging from the cooling tower, considering all wind directions. Results for rime icing show that no impacts are expected to occur.

13C.3 Proposed Licensing Conditions

There are no licensing conditions related to visual plume formation. See General Testimony for Visual Resources, Section 13A, for Conditions of Certification related to other visual impacts.

13C.4 Correlation to SA, SSA and Hearing Topics

- Staff Assessment, Section 5.12
- Supplemental Staff Assessment, Part A, Section 5.12
- Visual Resources

14.0 WASTE MANAGEMENT

14.1 Introduction

A. **Name:** Brad Merrell

B. **Qualifications:** Mr. Merrell's qualifications are as noted in his resume contained in Appendix A.

C. **Prior Filings:** In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

- Application for Certification, Volume 1, Section 5.16 [Exhibit 1]
- Application for Certification, Volume 2, Appendix I, Phase 1 Environmental Site Assessment [Exhibit 1]
- Applicant's Written Response to CEC Data Request Set 1B (1-86), Dated November 25, 2009, Responses to Data Requests 78, 79, 80, 83, 84, 85, and 86 [Exhibit 4]
- Surface Soil Sampling, dated January 26, 2010 [Exhibit 13]
- Site Material Sampling Report, dated April 5, 2010 [Exhibit 20]
- Site Sampling Analysis, dated April 16, 2010 [Exhibit 25]
- Information Provided to the Regional Water Quality Control Board – Lahontan Region for Report of Waste Discharge Application, dated April 16, 2010 [22]
- Applicant's Comments on Staff Assessment [Exhibit 26]

To the best of my knowledge, all of the facts contained in this Section of the Applicant's testimony (including all referenced documents) are true and correct. To the extent this testimony includes opinions, such opinions are my own based upon professional judgment. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

14.2 Summary of Testimony

A. Summary of Waste Disposal

- **Non-Hazardous Solid Waste Disposal Sites:** Non-hazardous solid waste generated at the Project site during both the construction and operation phases will be taken offsite for recycling or disposal to a permitted Class III landfill. There are five Class III landfills located in San Bernardino County within approximately 100 miles of the Project site.
- **Hazardous Waste Disposal Sites:** Hazardous waste generated at the facility will be taken offsite for recycling or disposal by a licensed and permitted hazardous waste transporter to a permitted treatment, storage, and disposal facility (i.e.,

Class I landfill). There are two major operating hazardous waste (Class I) landfills in California: Clean Harbors Buttonwillow Landfill in Kern County with an estimated 34 years of operational life remaining and Chemical Waste Management Landfill located in Kettleman Hills, King County with an estimated 30 years of operational life remaining.

B. Affected Environment

The property is located approximately halfway between the City of Barstow and Kramer Junction (Highway 395 / Highway 58 junction) in unincorporated San Bernardino County. Historical research revels the parcels assessed have historically been used for agricultural production and cattle ranching since at least the 1930's. The majority of the area is significantly disturbed from past agricultural and ranching activities which ceased in the Project area in approximately 1999.

A Phase I ESA was prepared by qualified professional staff in May 2009 in order to identify, to the extent feasible, recognized environmental conditions (RECs) relevant to development of the Project. The Phase I ESA concluded that there is possibly some minor surface hydrocarbon contamination from previous land uses. Site evidence concluded that the previous underground storage tanks had previously been removed. No indication of a significant release or spill, or areas of serious environmental concern were noted on the Project or adjacent properties. Due to the age of the abandoned existing structures on-site, it was noted that there was a possibility of lead and asbestos containing materials at the building locations.

A Site Material Sampling Report was prepared wherein the existing buildings on-site were sampled for lead and asbestos, the on-site fallow agricultural area soils were sampled for pesticide and herbicide residues, and areas of possible hydrocarbon contamination outlined in the Phase I ESA were sampled for residue. This report identified some abandoned on-site buildings containing lead and asbestos materials as well as evidence of hydrocarbon contamination in the area of a previous underground storage tank. Areas of contamination noted in the report will be remediated in accordance with local ordinances and regulations prior to construction activities in those areas.

C. Construction Impacts

Both hazardous and nonhazardous waste will be generated during construction. Most of the hazardous waste generated during Project construction can be recycled. The small quantities of hazardous waste that cannot be recycled are not expected to significantly impact the capacity of the Class I landfills located in California.

Contaminated soils identified onsite will be segregated, sampled, and tested to determine appropriate disposal /treatment options. If the soil is classified as hazardous, the San Bernardino County Fire Department will be notified and the soil will be hauled to a Class I landfill or other appropriate soil treatment and recycling facility, if required.

Non-hazardous solid waste generated from Project construction will be the responsibility of the construction contractor's. Typical management practices for this material include recycling when possible, proper storage of waste to prevent wind dispersion, and routine pick-up and disposal to approved local Class III landfills. Solid wastes from Project

construction are not expected to significantly impact the capacity of the Class III landfills in San Bernardino County.

Wastewater generated at the construction site will include sanitary wastes, dust suppression drainage, and equipment wash water. Construction-related sanitary wastes, collected in portable self-contained chemical toilets, will be pumped periodically. Potentially contaminated equipment wash water will be contained at designated wash areas and transported to a wastewater treatment facility via a licensed hauler.

D. Operational Impacts

The operation of the MSP is expected to generate sanitary wastewater, non-hazardous wastes, and small quantities of hazardous wastes. The project will include bioremediation/land farm units to treat soil contaminated with HTF in the event of a leak or spill. The bioremediation/land farm area will be designed in accordance with Lahontan Regional Water Quality Control Board (RWQCB) requirements.

General facility drainage will consist of plant raw water use such as area washdown, equipment leakage, and drainage from facility equipment areas. Water from these areas will be collected and routed to oil/water separators for recycling and reuse.

Sanitary wastewater will be processed through onsite septic systems consisting of septic tanks and leach fields. These systems will be designed in accordance with County of San Bernardino Environmental Health requirements.

Process wastewater from cooling tower blowdown (i.e., discharge) will be piped to onsite surface impoundments (evaporation ponds) for dewatering. The ponds are designed so that the residual solids will not require removal for the duration of the Project's operating life. If solids removal is necessary for pond maintenance reasons, the removed solids will be shipped to an appropriate offsite disposal facility. The surface impoundments will be designed in accordance with Lahontan RWQCB requirements.

E. Cumulative Impacts

No projects have been identified in the vicinity of the proposed project that would create significant cumulative waste management impacts.

F. Mitigation

The handling and management of wastes generated at the Project will follow an approach of reduction, recycling, treatment, and disposal. Maintenance-derived wastes will be recycled to the extent practical. Those maintenance-derived wastes that cannot be recycled will be transported for disposal at a Class III landfill.

Domestic wastes, including office paper, newsprint, aluminum cans, plastic, glass containers, and other non-hazardous solid waste material, will be recycled to the extent practical. The remaining solid wastes will be removed on a regular basis by a permitted waste hauler for disposal at a Class III landfill. Due to the relatively small quantity of non-hazardous wastes generated by the Project in comparison to the relative capacities of the local Class III landfills, the project will not adversely impact available landfill capacity and can be consider insignificant.

Sanitary waste generated at the MSP will be sent to an onsite septic system and leach field, there will be no offsite liquid discharges from the Project.

The owner will prepare and implement a detailed Construction Waste Management Plan for all wastes generated during Project construction as well as a detailed Operation Waste Management Plan for all wastes generated during MSP operations. Spill control and management procedures will be included in the detailed Hazardous Waste Management Plan to be developed for the project.

Prior to onsite construction activities, construction employees will receive waste training, specifically on the Construction Waste Management Plan to ensure compliance with Federal, State, and Local requirements emphasizing the protection of workers, the public, and the environment. As the project transitions from construction to operation, facility employees will be trained on the Operation Waste Management Plan, including waste minimization.

The applicant will obtain a hazardous waste generator identification number from the Department of Toxic Substances control (DTSC) prior to generating any hazardous waste during construction and operations.

14.3 Proposed Licensing Conditions

The Applicant agrees with the proposed Conditions of Certification, WASTE-2 – WASTE-12. The Applicant agrees with proposed Condition of Certification WASTE-1 in theory, but proposes edits as noted below.

Proposed Revisions to Waste-1

The Applicant is proposing edits to the text to clarify the existence or non-existence of the underground storage tank (UST). The Phase I ESA found evidence that the underground tanks had been previously removed. Soil sampling found evidence of soil contaminated with hydrocarbons in the assumed tank locations. As part of the soil remediation, the existence or non-existence of the USTs will be verified and if found, they will be removed in accordance with San Bernardino County Fire Department requirements. In addition, the Applicant is proposing edits in order to provide approval authority to the CPM rather than the County pursuant to the Commission's exclusive authority under Public Resources Code section 25500.

WASTE-1 Prior to the removal of any ~~the~~ underground storage tanks (USTs) found on site, the project owner shall submit a copy of the information typically required to obtain a permit to ~~from~~ the San Bernardino County Fire Department for review and comment. The CPM and the San Bernardino County Fire Department must acknowledge ~~review~~ receipt of the plans for the removal~~project~~ prior to ~~permit issuance~~CPM approval. ~~After receiving approval from the CPM, t~~The project owner shall obtain ~~a permit~~ approval for removal of all located USTs from the CPM.

Verification: No less than sixty (60) days prior to commencement of site mobilization, the project owner shall provide the plans to remove the underground storage tanks to the CPM for review and approval. The project owner shall inform the CPM via the monthly compliance report, of the data when all USTs were removed from the site.

14.3 Correlation to SA, SSA and Hearing Topics:

- Staff Assessment, Section 5.13
- Supplemental Staff Assessment, Part A, Section 5.13
- Waste Management

15.0 WORKER SAFETY

15.1 Introduction

A. Name: Frederick Redell, P.E.

B. Qualifications: Mr. Redell's qualifications are as noted in his resume contained in Appendix A.

C. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

- Application for Certification, Volume 1, Section 5.18 [Exhibit 1]
- Applicant's Written Response to Data Request Set 1A, Responses 92 and 93 [Exhibit 3]
- Applicant's Comments on Staff Assessment [Exhibit 26]

To the best of my knowledge, all of the facts contained in this Section of the Applicant's testimony (including all referenced documents) are true and correct. To the extent this testimony contains opinions, such opinions are my own based upon my professional judgment. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

15.2 Summary of Testimony

This testimony describes or outlines the systems and procedures that will be implemented to provide occupational safety and health protection for MSP workers in accordance with all applicable requirements, and includes descriptions of the health and safety programs that will be used during both Project construction and operation. The section also provides information on the Project's planned fire prevention and protection program.

A. Environmental Impacts

Workers on the Project may be exposed to hazards during construction, operation, and maintenance activities. Impacts that could adversely affect Project personnel, including individuals employed directly by the Project as well as employees of contractors, vendors, or others working on-site, during both Project construction and operations are referred to as potential impacts to worker safety. Implementation of appropriate engineering and administrative controls and use of personal protective equipment can minimize impacts to workers. Since hazards, impacts, and control measures are similar for the construction and operations of the Project, many of the health and safety programs and plans will be developed prior to construction and revised as the Project transitions to operations. Section 5.18.3.1 (Construction and Operations Health and Safety), 5.18.3.2 (Construction Health and Safety) and 5.18.3.3 (Operations Health and Safety) of the AFC discuss the health and safety programs and plans specified for both (or each) phase of the project.

Programs implemented that will apply to both the construction and operations phases include a hazard analysis, Injury and Illness Prevention Plan (IIPP), Personal Protective Equipment (PPE) program, and safety training programs.

Programs that will be developed and implemented during the construction phase of the Project include a construction fire protection and prevention program and an emergency action program and plan.

Other programs that will be developed and implemented during the operations phase of the Project include an operations fire protection and prevention program and a site-specific, operations phase emergency action plan.

B. Fire Protection System

Fire protection systems are provided to limit personnel injury, property loss, and Project downtime resulting from a fire. The systems include a fire protection water system and portable fire extinguishers.

The Project's fire protection water system will be supplied from a dedicated 360,000-gallon portion of the 1,930,000-gallon Service Water storage tanks located in each of the two power islands. One electric and one diesel-fueled backup firewater pump for each power island, each with a capacity of 3,000 gallons per minute, will deliver water to the fire protection water-piping network. A smaller electric motor-driven pump jockey pump will maintain pressure in the piping network. If the jockey pump is unable to maintain a set operating pressure in the piping network, the fire pump starts automatically.

The piping network will be configured in a loop so that a piping failure can be isolated with shutoff valves without interrupting the supply of water to a majority of the loop. The piping network will supply fire hydrants located at intervals throughout the power plant site, a sprinkler deluge system at each unit transformer, HTF expansion tank and circulating pump area and sprinkler systems at the STG and in the operations and administration buildings. Portable fire extinguishers of appropriate sizes and types will be located throughout the Alpha and Beta Plant sites.

Fire protection for the solar field will be provided by zoned isolation of the HTF lines in the event of a rupture that results in fire. The HTF will be allowed to extinguish itself naturally, since the remainder of the field is of nonflammable material (aluminum, steel, and glass).

C. Cumulative Impacts

As other projects considered for potential cumulative effects will be responsible for complying individually with applicable worker safety requirements, no cumulative impacts on worker safety are expected as a result of the Project.

15.3 Proposed Licensing Conditions

The Supplemental Staff Assessment (SSA), Part A for the project includes eight Conditions of Certification relating to worker safety: WORKER SAFETY-1 through WORKER SAFETY-8. The Applicant accepts conditions WORKER SAFETY-1, WORKER SAFETY-2, WORKER SAFETY-3, WORKER SAFETY-7, and WORKER SAFETY-8 as proposed by CEC staff. The Applicant's proposed changes to conditions WORKER SAFETY-4, WORKER SAFETY-5, and WORKER SAFETY-6 are set forth below:

~~**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 Condition of Certification Worker Safety-3, and for implementing all appropriate Cal/OSHA and Energy 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 60 days prior to the start of construction, the project owner shall~~
~~provide proof of its agreement to fund the Safety Monitor services to the CPM for review~~
~~and approval.~~

[Rationale for Edits and request for reconsideration and removal: The Applicant wishes to repeat the request to remove this condition for the following reason: For construction, the Applicant will use an EPC contractor who observes OHSAS 18001 requirements which requires a very proactive HSE program with representation on behalf of the project. Project owner requires a safety person with each Subcontractor and a dedicated full time safety person when each group exceeds 15 people and incremental as designed by our criteria. A Safety Monitor is not necessary to maintain Cal/OSHA and Energy Commission safety requirements. As such, the addition of a Safety Monitor appears to be an unnecessary cost. Considering that CAL/OSHA has the right to inspect at any time, Applicant is unclear what function and benefit to the project the Safety Monitor would offer that the CSS, Site Construction Team, and Site Safety Teams could not provide.]

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 first responders who are certified in first aid and CPR requirements. During operations, all power plant employees shall be trained in its use. The training program shall be submitted to the CPM for review and approval.

Verification: At least 30 days prior to the start of site mobilization, the project owner shall submit to the CPM proof that a portable automatic external defibrillator (AED) has been purchased ~~exists on site~~ and a copy of the training and maintenance program for review and approval. When site mobilization occurs for construction, the project owner shall be able to demonstrate to the CPM that the AED exists on site.

[Rationale for Edits: The Applicant takes no issue with the requirement to supply this life safety device. However, site mobilization is the first point in time when facilities that could store the AED would exist on the Project site. With no facilities or personnel on site prior to mobilization, much less 30 days prior to the start of site mobilization, the Applicant would not be able to comply with the verification component as proposed by CEC staff.]

WORKER SAFETY-6 The project owner shall either (1) reach an agreement with the San Bernardino County Fire Department regarding funding of its project-related share of capital costs to provide appropriate equipment as mitigation of project-related impacts on fire protection, HazMat, and/or EMS services along with an annual payment to maintain and provide these services, **or**, if no agreement can be reached after 60 days of negotiation shall (2) fund its share of the capital costs in an~~the~~ amount to be determined by the CPM following submission of proposals and supporting documents from the project owner and the county. If the amount is determined by the CPM, either the project owner or the county shall have the right to appeal this determination to the Commission. ~~of $350,000 plus provide an annual payment of $100,000 to the SBCFD for the support of additional fire department staff commencing with the date of site mobilization and continuing annually thereafter on the anniversary until the final date of power plant decommissioning.~~

Verification: At least 30 days prior to the start of site mobilization, the project owner shall provide to the CPM either a copy of the agreement or submit documentation showing that negotiations failed and that the CPM is empowered to determine the appropriate amount.~~that the $350,000 payment and the first annual payment has been made.~~

In the annual compliance report submitted to the CPM, the project owner shall provide documentation that the annual payment has been made unless an agreement is reached with the KCFD that an annual payment is not required.

[Rationale: The Applicant wishes to repeat the opinion that by setting a fixed amount in the condition of certification, CEC staff makes reasonable negotiation with the county impossible because the Applicant has no incentive to agree to more than the specified amount and county has no incentive to agree to anything less. Applicant believes it is best to leave the matter to negotiation subject to oversight by the CPM without prejudicing the outcome in this manner.]

15.4 Correlation to SA, SSA and Hearing Topics

- Staff Assessment, Section 5.14
- Supplemental Staff Assessment, Part A, Section 5.14
- Worker Safety

16.0 GEOLOGY AND PALEONTOLOGY

A. GEOLOGIC RESOURCES

16A.1 Introduction

A. Name: Gregory Farrand

B. Qualifications: Mr. Farrand's qualifications are as noted in his resume contained in Appendix A.

C. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

- Application for Certification, Volume 1, Sections 5.5 and 5.12. [Exhibit 1]
- Application for Certification, Volume 2, Appendix B. [Exhibit 1]

To the best of my knowledge, all of the facts contained in this Section of the Applicant's testimony (including all referenced documents) are true and correct. To the extent this testimony contains opinions, such opinions are my own based upon my professional judgment. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

16B.1 Summary of Testimony

A. Affected Environment

The proposed Abengoa Mojave Solar project (AMS) site is a 1,765-acre parcel within southern California's Mojave Desert, southwest of Harper Dry Lake in San Bernardino County, California. The Harper Valley is an alluvial valley located approximately 8 miles northwest of Hinkley, California. The proposed generating facility site is relatively flat (approximate elevation ranges between 2,000 and 2,100 feet). This area is underlain by Quaternary age alluvial sediments and is within an active seismic region.

The most significant geologic hazard at the AMS site is seismic ground shaking. The active Lenwood-Lockhart-Old Woman Springs fault is located approximately 2,300 feet southwest of the site. According to a probabilistic seismic hazard model for California (California Geological Survey, 2003) peak horizontal ground accelerations having a 10 percent probability of exceedance in 50 years can be estimated to be approximately 0.3g (30 percent of gravity) which can be considered low to moderate when compared to some of the more seismically active areas of California.

No geologic resources of recreational or scientific value were identified in the vicinity of the project site.

B. Construction Impacts

Construction of the AMS will require minor grading and excavation, thereby minimizing alteration of the terrain of the project site. Impacts to the geologic conditions involve dust generation, changes in drainage, cuts, and fills. Since the site is generally level, site grading is not expected to adversely impact the geologic environment. The generating facility and all of the associated linear facilities will be designed and constructed in

accordance with the requirements of all applicable federal, state, regional, and local laws, ordinances, regulations, and standards.

C. Operational Impacts

The project will be designed and constructed in accordance with the requirements of all applicable federal, state, regional and local laws, ordinances, regulations, and standards. This will minimize any operational impacts to a level of insignificance.

D. Summary of the Cumulative Impacts

The construction and operation of the AMS will not produce any significant adverse cumulative impacts to geologic resources.

E. Mitigation

AMS and linear facilities will be constructed in accordance with the California Building Code and consistent with the standards adopted by the County of San Bernardino Building Department, minimizing the exposure of people to risks associated with seismic events.

The design and construction of the AMS and linear facilities will include measures that will limit impacts to less than significant levels. With the implementation of the proposed project mitigation measures and the proposed Conditions of Certification, including standard engineering design recommendations, the project will comply with all applicable LORS.

16A.3 Proposed Licensing Conditions

The Staff Assessment (SA) for the project includes three proposed Conditions of Certification relating to geologic resources: GEN-1, GEN-5, and CIVIL-1 in Facility Design. GEN-1 requires a written, design level Soils Engineering Report that specifically addresses the potential for liquefaction, settlement, dynamic compaction, subsidence, and the presence of expansive clays at the site. GEN 5 requires that prior to the start of grading, the project owner assign at least one California registered civil engineer, a soil, geotechnical, or civil engineer experienced in soils engineering, and an engineering geologist, and assigns the responsibilities for each. CIVIL 1 requires that the project owner provide the Chief Building Official for review the design of drainage structures, grading plan, erosion and sedimentation control plan, related calculations and specifications, and soils, geotechnical, or foundation investigation reports. Design and construction of the proposed facility in accordance with the requirements of GEN-1, GEN 5, and CIVIL 1 will ensure that the facility will be in compliance with the applicable federal, state, and local laws, ordinances, regulations, and standards (LORS).

16A.4Correlation to SA, SSA and Hearing Topics

- Staff Assessment, Section 6.2
- Geologic Resources (Geology and Paleontology)

16.0 GEOLOGY AND PALEONTOLOGY

B. PALEONTOLOGICAL RESOURCES

16B.1 Introduction

A. Name: Cara Corsetti and Jessica DeBusk

B. Qualifications: Ms. Corsetti's and Ms. DeBusk's qualifications are as noted in their resumes contained in Appendix A.

C. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

- Application for Certification, Volume 1, Section 5.9 [Exhibit 1]
- Application for Certification, Volume 2, Appendix E [Exhibit 1]
- Application for Certification, Volume 4, Data Adequacy Supplement, Worksheet (submitted under confidential cover) [Exhibit 2]
- Applicant's Written Response to CEC Data Request, Set 1 (1-93), dated November 23, 2009, Response to Request 75 (submitted under confidential cover) [Exhibit 3]

To the best of our knowledge, all of the facts contained in this testimony (including all referenced documents) are true and correct. To the extent this testimony contains opinions, such opinions are our own. We make these statements and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

16B.2 Summary of Testimony

A. **Affected Environment**

The results of the paleontological analysis (museum records searches, literature reviews, geology map review, and pedestrian survey) concluded that the majority of the MSP plant site is immediately underlain by Quaternary younger alluvium of Holocene age that is considered to have a low paleontological sensitivity. Quaternary older alluvium, which dates to the Pleistocene, is likely present only in the subsurface throughout the project area. The northeastern portion of the plant site is considered an area of high sensitivity as it is underlain by Quaternary lake bed deposits, which may also be present in the subsurface. As with alluvium, surficial lake bed deposits likely date to the Holocene but at depth, these sediments date to the Late Pleistocene.

Museum collections records at the San Bernardino County Museum (SBCM) revealed that 20 fossil localities have been previously recorded and collected within the MSP site boundaries. An additional 29 localities have been documented north and west of the project area and within a one mile radius. These localities yielded specimens of freshwater invertebrates and terrestrial small vertebrates as well as indeterminate large mammal remains. All specimens were of extant species and no time-diagnostic taxa were identified from any of these localities; therefore, the age of the material cannot be conclusively determined.

The Natural History Museum of Los Angeles County (LACM) reports at least 11 vertebrate fossil localities have been previously recorded greater than one mile and southwest of the Project area within Quaternary alluvium and older alluvium. These localities yielded specimens of small vertebrates including snake, pocket mouse, rat, gopher, rabbit, and lizard. An additional locality, located to the southeast near the community of Manix, yielded extensive faunal remains including specimens of minnow, pond turtle, aquatic birds, and terrestrial mammals.

No paleontological resources were discovered on the surface of the Project area as a result of the pedestrian survey.

B. Construction Impacts

Construction of the Project has the potential to result in the destruction of sub-surface paleontological resources via breakage and crushing related to ground disturbing activities; ground disturbance has the potential to adversely impact an unknown quantity of fossils that may occur on or underneath the surface in areas containing paleontologically sensitive geologic units. Surficial and very shallow excavations related to the construction of the Project are unlikely to result in adverse impacts to significant paleontological resources, but deeper excavations into the subsurface of the Project site (three feet in depth) may potentially have an adverse impact on paleontological resources without proper mitigation measures. Various activities during construction will require excavations deeper than three feet, e.g., foundations/footings for equipment in the power block, footings for solar array structures, and drainage channels.

C. Operational Impacts

Operational impacts to paleontological resources typically include those effects related to the continuing implementation of activities within a specific project area. The operation of the MSP will not result in an adverse impact to paleontological resources because no new roads will be constructed. Additionally, the MSP plant site will be fenced thereby decreasing public access and opportunities for the loss of paleontological resources through vandalism and unlawful collecting.

D. Cumulative Impacts

In general, for scientifically significant paleontological resources that may be present within the Project area, the potential for the Project to contribute to significant cumulative impacts is low with the implementation of measures to avoid or salvage the resources. The proposed mitigation measures will effectively recover the value to science and society of significant fossils, if any, that would otherwise be destroyed by surface disturbing actions.

E. Mitigation

Although no significant Project adverse impacts on paleontological resources have been identified, mitigation measures have been developed to ensure that the potential adverse impacts of MSP ground disturbance on paleontological resources are less than significant. Implementation of proposed Conditions of Certification PAL 1 through PAL-7 (e.g., proper planning, employee training, professional paleontologist monitoring in areas of high paleontological sensitivity) will ensure that fossils that may be encountered would not be adversely impacted (destroyed), rendering them permanently unavailable.

16B.3 Proposed Licensing Conditions

Applicant agrees with the proposed Conditions of Certification PAL-1through PAL-7.

16B.4 Correlation to SA, SSA and Hearing Topics

- Staff Assessment, Section 6.2
- Paleontological Resources (Geology and Paleontology)

17.0 POWER PLANT EFFICIENCY

17.1 Introduction

A. Name: Frederick Redell, PE

B. Qualifications: Mr. Redell's qualifications are as noted in his resume contained in Appendix A.

C. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

- Application for Certification, Volume 1, Section 2.0 [Exhibit 1]

To the best of my knowledge, all of the facts contained in this Section of the Applicant's testimony (including all referenced documents) are true and correct. To the extent this testimony contains opinions, such opinions are my own based upon my professional judgment. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

17.2 Summary of Testimony

A. Facility Summary

Mojave Solar LLC (herein "MSLLC" or "Applicant"), is proposing to construct, own and operate the Mojave Solar Project (herein "MSP" or "Project"). The Project is a solar electric generating facility proposed on approximately 1,765 acres in unincorporated San Bernardino County, California approximately nine miles northwest of Hinkley, CA. The site is largely fallow agricultural land specifically sited and configured to minimize environmental impacts. This land was originally sited as Solar Electric Generating Stations (SEGS) XI and XII and is located next to the existing SEGS VIII and IX facilities.

The Project will implement well-established parabolic trough technology to solar heat a heat transfer fluid (HTF). This hot HTF will generate steam in solar steam generators (SSGs), which will expand through a steam turbine generator (STG) to produce electrical power.

The Project will have a combined nominal electrical output of 250 megawatts (MW) from twin, independently-operable solar fields, each feeding a 125-MW power island. The plant sites will be 884 acres and 800 acres respectively and joined at the transmission line interconnection substation to form one full-output transmission interconnection. An additional 81 acres shared between the plant sites will be utilized for receiving and discharging offsite drainage improvements.

The sun will provide 100 percent (%) of the power supplied to the Project through solar-thermal collectors; no supplementary fossil-based energy source (e.g., natural gas) is proposed for electrical power production. However, each power island will have a natural-gas-fired auxiliary boiler to provide equipment freeze protection and HTF freeze protection. The auxiliary boiler will supply steam to HTF heat exchangers as needed during offline hours to keep the HTF in a liquid state when ambient temperatures fall below its freezing point of 54 degrees Fahrenheit. Each power island will also have a diesel engine-driven firewater pump for fire protection and a diesel engine-driven backup generator for power plant essentials.

B. Plant Efficiency

The proposed solar thermal plant will use far less fossil fuel than other types of thermal power plants, and no such fuel will be used for electrical power production.

Efficiency is built into the Project design. The Project solar field design will employ the latest generation of Heat Collection Elements (HCEs); ball joint assemblies for Solar Collector Array (SCA) connections for reduced failures, lower head loss and lower heat losses over the previously used flexhose designs; and current state-of-the-art, low-iron content mirrors and a reflectivity maintenance program to maintain mirror efficiency. The solar field is sized to optimize performance with the selected STG size. As mentioned in the Facility Summary above, minimal fossil fuel is used by the Project – none for electricity generation, and otherwise only for HTF and equipment freeze protection and on-site vehicles.

Typical measures of power plant efficiency used for fossil-fuel based plants are not applicable to this project. Rather than applying fuel efficiency standards; the CEC evaluates land use efficiency. The CEC staff calculated the power-based and energy-based solar land use efficiency of the Project and found that the proposed project would occupy less than six acres per MW of power output, which is about one-quarter of that of some other solar power technologies. The CEC staff also found that the land use efficiencies compared very favorably with other solar power plant projects that have progressed significantly through the CEC siting process.

17.3. Proposed Licensing Conditions

The Staff Assessment (SA) for the project recommends no Conditions of Certification related to power plant efficiency.

17.4 Correlation to SA, SSA and Hearing Topics

- Staff Assessment, Section 6.3
- Supplemental Staff Assessment Section, Part B, Section 6.3
- Power Plant Efficiency

18.0 POWER PLANT RELIABILITY

18.1 Introduction

A. Name: Frederick Redell, PE

B. Qualifications: Mr. Redell's qualifications are as noted in his resume contained in Appendix A.

C. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

- Application for Certification, Volume 1, Section 2.0 [Exhibit 1]
- Application for Certification, Volume 2, Appendix J [Exhibit 1]
- Applicant's Written Response to CEC Data Request Set 1 (1-93), dated November 23, 2009, Response to Request 89 [Exhibit 3]

To the best of my knowledge, all of the facts contained in this Section of the Applicant's testimony (including all referenced documents) are true and correct. To the extent this testimony contains opinions, such opinions are my own based upon my professional judgment. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

18.2 Summary of Testimony

This section discusses the expected facility availability, equipment redundancy, water availability, and project quality control measures.

Mojave Solar LLC (herein "MSLLC" or "Applicant"), is proposing to construct, own and operate the Mojave Solar Project (herein "MSP" or "Project"). The sun will provide 100 percent (%) of the power supplied to the Project through solar-thermal collectors; no supplementary fossil-based energy source (e.g., natural gas) is proposed for electrical power production. However, each power island will have a natural-gas-fired auxiliary boiler to provide equipment freeze protection and HTF freeze protection. The auxiliary boiler will supply steam to HTF heat exchangers as needed during offline hours to keep the HTF in a liquid state when ambient temperatures fall below its freezing point of 54 degrees Fahrenheit (°F). Each power island will also have a diesel engine-driven firewater pump for fire protection and a diesel engine-driven backup generator for power plant essentials.

Overall annual availability of the proposed Project facilities is expected to be a minimum of 95 percent, excluding non-daylight hours. The Project's capacity factor depends on the local solar insolation, but is estimated to be approximately 600,000 to 630,000 megawatt-hours (MWh) per year net (both Plants combined) while operating for approximately 3,024 hours per year. This production estimate was made using the Solar Advisor Model software developed and maintained by the National Renewable Energy Laboratory.

Water for the Project will be supplied from onsite groundwater wells drawing from adjudicated water rights owned by the Applicant. A packaged water treatment system will be used to treat the water to meet potable standards since the source is brackish. No offsite backup cooling water supply is planned; the use of multiple onsite water supply wells, redundancy in the well equipment, and reserve water storage will provide an inherent backup in the event of outages affecting one of the onsite supply wells. The aquifer has been characterized as prolific and

studies indicated that the health of the basin will not degrade during the life the Project. The Soil and Water Resources section of the Applicant's testimony describes these studies.

A battery-based, direct current (DC) power supply system will provide power for critical control circuits, power for control of the 13.8-kV, 4.16-kV and 480-V switchgear, and power for DC emergency backup systems. Proposed emergency backup systems include DC lighting and DC lube-oil and seal-oil pumps for the steam turbine-generators. Redundant capability is provided for critical Distributed Control System (DCS) components such that no single component failure will cause a plant outage.

To ensure the desired project reliability and availability is achieved, the Applicant will use an Engineering, Procurement and Construction (EPC) firm with an appropriate Quality Control (QC) program. Operations and Maintenance QC methods have been developed to ensure plant reliability once the plant is in operation. These include involving experienced operations personnel in the design review process, proper selection and training of operations and maintenance personnel, preparation and use of an Operations and Maintenance Manual, managing an inventory of spare parts to minimize downtime in case of equipment breakdown, scheduled and documented equipment and system inspections, and preventive regular maintenance and planned outages. Plant operational reliability will further be secured with its operation by the Owner's Operations & Maintenance Company, headed by individuals experienced in the solar power industry. The Owner's O&M Company will develop, implement and continuously improve a customized Quality Management System (QMS) based on internationally recognized standards such as ISO9001:2000 and ISO 14000.

18.3 Proposed Licensing Conditions

The Staff Assessment (SA) for the project recommends no Conditions of Certification related to power plant reliability.

18.4 Correlation to SA, SSA and Hearing Topics

- Staff Assessment, Section 6.4
- Supplemental Staff Section, Part B, Section 6.4
- Power Plant Reliability

19.0 TRANSMISSION SYSTEM ENGINEERING

19.1 Introduction

A.Name: David Larsen

B.Qualifications: Mr. Larsen is a Director with Navigant Consulting, Inc. He has a Bachelor of Science degree in Electrical Engineering and over 35 years of experience in transmission and resource planning, including overseeing the evaluation and planning of transmission projects and of the performance of interconnection studies for both renewable and conventional generating projects. Mr. Larsen's qualifications are as noted in his resume contained in Appendix A.

C.Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

- Application for Certification, Volume 1, Sections 2.4.3 –Electrical System Description, Section 2.6 – Transmission Lines Description, Design and Operation [Exhibit 1]
- Application for Certification, Volume 3, Appendix N - Interconnection System Impact Study [Exhibit 1]
- Application for Certification, Volume 4, Data Adequacy Supplement, Pages 10-13 and Attachments E1 and E2 [Exhibit 2]
- Applicant's Written Responses to CEC Data Request, Set 1 (1-93) dated November 23, 2009, Responses to Data Requests 90 and 91. [Exhibit 3]
- Applicant's Comments on Staff Assessment [Exhibit 26]
- Transmission Appendix to the Applicant's Comments on Staff Assessment - Environmental Analysis for the Lockhart Substation Interconnection and Communication Facilities [Exhibit 26]
- Interconnection Facility Studies [Exhibit 18]

19.2 Summary of Testimony

A. Opening Statement

To the best of my knowledge, all of the facts contained in this Section of the Applicant's testimony (including all referenced documents) are true and correct. To the extent this testimony contains opinions, such opinions are my own based upon my professional judgment. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

B. Summary

1) Affected Environment

Mojave Solar LLC (herein referred to as Applicant), is proposing to construct, own and operate the Mojave Solar Project (MSP). The MSP is a solar electric generating facility proposed on approximately 1,765 acres in unincorporated San Bernardino County, California approximately nine miles northwest of Hinkley, CA. The site is largely fallow agricultural land specifically sited and configured to minimize environmental impacts.

The MSP will have a combined nominal electrical output of 250 megawatts (MW) from twin, independently-operable solar fields, each feeding a 125-MW power island. The plant sites, identified as Alpha (the northwest portion of the area) and Beta (the southeast portion of the area), will be 884 acres and 800 acres respectively and joined at the transmission line interconnection substation to form one full-output transmission interconnection. A new substation will also be developed on the MSP project site.

2) Proposed Transmission Interconnection

The proposed MSP transmission line will interconnect with the Southern California Edison (SCE) 230-kV Kramer-Cool Water #1 transmission which is located adjacent to the southern border of the MSP Project site. The total length of the two proposed transmission lines (one from the new interconnection substation to each of the two power islands) is approximately 16,450 feet. All MSP-related transmission facilities are located within the MSP site boundaries except for a 200 foot long interconnection from the southwestern site boundary to the adjacent SCE transmission line. The MSP is located approximately 32 transmission-miles west of the Cool Water generating facility and approximately 13 transmission-miles east of the Kramer interconnection substation.

In order to interconnect the MSP to the Coolwater–Kramer 220-kV line, SCE proposes to construct the new Lockhart Substation and associated facilities (including fiber optic cable routes located outside the MSP site). The Lockhart Substation is proposed to be located within the footprint of the MSP site, as would the associated generation tie line connections and the distribution line for the substation's light and power. However, a portion of the interconnection to the 220-kV line, the proposed 200 foot long "transmission line loop," would be located partially outside the limits of the MSP boundary and within the existing SCE right-of-way for the Kramer to Coolwater 220-kV line. A discussion of the potential environmental impacts of the proposed Lockhart Substation and associated facilities are included in other sections of this document.

3) Electrical System Description

All of the net power produced by the proposed facility is currently expected to be delivered to the statewide transmission grid through the MSP's interconnection with the

existing Kramer-Cool Water 230 kV transmission line. Roughly 10% of the MSP's output will be used onsite for plant auxiliaries such as pumps, control systems, and general facility loads including lighting and heating, ventilation, and air conditioning (HVAC). Some of the power needed for on-site uses will be converted from alternating current (AC) to direct current (DC) for power plant control systems and emergency backup systems such as lube oil pumps and the STG turning gear.

4) Transmission Interconnection System Impact and Facility Study Reports

The MSP Interconnection System Impact Study (ISIS) was completed in coordination with the California Independent System Operator (CAISO) and is located in Appendix N of the AFC. A draft Interconnection Facilities Study (IFS) for the Project (dated October 30, 2009) was made available to the Project on November 2, 2009 and the final Interconnection Facilities Study was made available on November 20, 2009. With respect to short-circuit studies and potential breaker upgrades/replacements, the IFS states that circuit breaker evaluations concluded that the Project does not trigger any upgrades or replacements of circuit breakers but aggravates pre-Project conditions that identified the need to replace or upgrade a number of circuit breakers ranging from 500-kV to 115-kV at various locations. As a result the IFS identified certain "Case B" additions/upgrades that might be required by the Project if certain other projects in the queue ahead of the Project were to withdraw from the queue. The draft and final IFS's were submitted to the Commission under confidential cover.

In accordance with the final FS, the Applicant made the decision to proceed with the MSP using the Special Protection System (SPS) pending completion of any necessary network upgrades by SCE. The SPS upgrade installation involves minimal ground disturbance and will be carried out under the full control of SCE. Under the SPS, SCE will upgrade existing, or install new, communication lines and poles without upgrading existing transmission lines within the existing right of ways. As a result, the installation of SPS should have minimal environmental impacts.

Subsequent to the completion of the Facilities Study, work has been initiated on a Large Generator Interconnection Agreement (LGIA) for the MSP.

As a separate process, SCE is leading the permitting effort for the transmission improvements beyond the Project-specific interconnection to the statewide system.

19.3 Proposed Licensing Conditions

The CEC Supplemental Staff Assessment (May 25, 2010) recommended that eight Conditions of Certification (COCs) be adopted to address transmission line safety and

nuisance issues. These COCs are identified as TSE-1 to TSE-8. The Applicant proposed no changes to these COCs.

19.4 Correlation to SA, SSA and Hearing Topics

- Staff Assessment, Section 6.5
- Supplemental Staff Assessment, Part B, Section 6.5
- Transmission System Engineering

20.0 ALTERNATIVES

20.1 Introduction

A. Name: Frederick Redell, P.E.

B. Qualifications: Mr. Redell's qualifications are as noted in his resume contained in Appendix A.

C. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

- Application for Certification, Volume 1, Section 4.0 [Exhibit 1]
- Application for Certification, Volume 4, Data Adequacy Supplement [Exhibit 2]
- Applicant's Written Response to CEC Data Request Set 1A (1-93), dated November 23, 2009, Responses to Requests 40-47 [Exhibit 3]
- Applicant's Written Response to CEC Data Request Set 1B (1-86), dated November 25, 2009, Responses to Requests 50-53 [Exhibit 4]
- Applicant's Comments on Staff Assessment [Exhibit 26]

To the best of my knowledge, all of the facts contained in this Section of the Applicant's testimony (including all referenced documents) are true and correct. To the extent this testimony contains opinions, such opinions are my own based upon my professional judgment. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

20.2 Summary of Testimony

A. Alternatives Screening

This testimony discusses alternatives to the Mojave Solar Project. The California Environmental Quality Act (CEQA) requires that "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, and evaluate the comparative merits of the alternatives" [14 CCR. 15126.6(a)]. According to the CEQA Guidelines [14 CCR 15126.6 (c)], further analysis on a given alternative is not necessary if:

1. The alternative fails to meet most of the basic project objectives, or
2. The alternative would not avoid or substantially lessen significant environmental impacts of the proposed project, or
3. The alternative is not "feasible." Per 14 CCR 15126.6(f)(1), the factors that should be taken into account in determining whether an alternative is feasible are:
    a) Site suitability
    b) Economic viability
    c) Availability of infrastructure

d) Land use/land use plan consistency or regulatory jurisdictional limitations, and
e) Site Control

In order to implement this screening process for selecting the Project site, the Applicant needed to define the Project objectives, identify the potential significant environmental impacts associated with the proposed Project, and further define the feasibility criteria.

a. Project Objectives

Project objectives are presented in Section 2.2 of the AFC and are restated here as follows:

- To help achieve the State of California renewable energy objectives and to support the state's electric utility requirements with the long term production of renewable electric energy,
- To safely and economically construct, operate and maintain an efficient, reliable, and environmentally-sound power generating facility,
- To develop a Project using up-to-date and improved versions of an already-proven renewable energy technology, minimizing technical risk and improving the financial viability of the project,
- To maximize the renewable energy from a site with an excellent solar resource, appropriate slope and grading, availability of water rights and availability of transportation and other infrastructure in order to minimize the cost of renewable energy for consumers,
- To reduce or eliminate potentially significant adverse environmental impacts by locating away from sensitive noise and visual receptors and sensitive species,
- To electrically interconnect to suitable electrical transmission while minimizing environmental impacts associated with interconnection and minimizing cost, and
- To develop a site with close proximity to natural gas infrastructure in order to minimize environmental impacts and cost.

b. Design to Minimize the Potential for Significant Impacts

Sections 5.2 through 5.18 of the AFC assess in detail MSP's impacts in the full range of environmental topical areas. With the implementation of identified mitigation measures, environmental impacts from the Project would be less than significant in all topic areas. The issues with the greatest potential for impacts that were used as a basis for alternatives screening were Biological, Cultural and Paleontological Resources, Water Resources, Traffic and Transportation, and Visual Resources.

Alternatives that could not avoid or substantially lessen potential Project impacts in these areas were dropped from further analysis. Because of the size, nature, and relative remoteness from population centers of CSP facilities, AFC analyses indicate that impacts in environmental issue areas other than those identified above are minor and readily mitigable.

c. Site Feasibility Criteria Defined

To meet the project objectives as noted above requires an available site that meets the following criteria:

- Site Suitability in terms of solar resource, size and shape, and slope.
- Economic Viability – The project needs to be economically viable and competitive with other renewable technology projects, including wind, geothermal, and other solar projects. To be viable, the site should be located on property currently available at a reasonable cost and have good solar resources. Sites with excellent solar resources may be able to carry somewhat higher mitigation costs or infrastructure costs.
- Minimization of Environmental Impacts – The site should be located in an area that has been previously disturbed in order to minimize environmental impacts such as impacts to species biological resources.
- Availability of Infrastructure – To minimize cost and potential environmental impacts, the site needs to be located in an area where it can be interconnected with an existing transmission system that minimizes interconnection upgrade costs and "pancaked" transmission rates and avoids the need for new, project–specific, dedicated transmission lines. The site also needs good access to water for power plant cooling and access to a natural gas pipeline.
- Site Control – The land for the power plant site and linear facilities has to be available for purchase or lease prior to investment into detailed environmental studies.

As described in the sections below, application of the above criteria eliminated all other potential project locations from being carried forward for more detailed analysis. This is largely because the proposed Project site is clearly superior to any of the alternative sites from an environmental impact perspective due to the use of a previously-disturbed site and a relatively short transmission line.

B. No Project Alternative

Under the No Project alternative, the Project would not be constructed, and the electrical power that would have been generated will be generated by other facilities, presumably natural-gas-fired generation. In addition, the lack of generating capacity from the Project would reduce the reliability of California's electricity supply. Because the Project facilities would not exist, its direct environmental impacts would not occur. In such circumstances, however, indirect impacts would result in greater fossil fuel consumption and ultimately additional air pollution (with associated health impacts) and green-house emissions. Because solar power generation is closely coupled to peak load periods of the day, if fossil fuel-fired peaking units such as simple-cycle gas turbines and other rapid starting equipment (e.g., reciprocating engines) were to meet the same power needs of MSP, they would produce higher levels of air emissions than a solar thermal power plant. The No Project alternative does not support the State's RPS program goals and the nation's drive for energy independence; and as such, would not be an appropriate choice since No Project means that the proposed solar Project would not be developed. The

purpose of the Project is to generate renewable solar power and provide electric power to California's electrical users. The No Project alternative does not provide the additional power needed in California in a manner that assists the state in meeting its renewable power and greenhouse gas reduction goals.

C. Site Alternatives

The identification and description of alternative sites is presented in more detail in Section 4.0 of the AFC. The following table provides a summary of the alternative sites evaluated, along with the reason each site was dropped from further analysis.

Alternative Site	Reasons Dropped from Further Analysis
Superior Dry Lake	Lack of consistency with Project Objectives: • Includes BLM land and private land which makes site control difficult/uncertain; lengthy electrical interconnection needed; lengthy natural gas line needed; minimal transportation accessibility. Environmental Impacts: • Large undisturbed areas required for development, increasing the likelihood of biological impacts.
Coyote Dry Lake	Lack of consistency with Project Objectives: • Includes BLM land and private land which makes site control difficult/uncertain; topography less than ideal for development; Environmental Impacts: • Small to medium sized undisturbed areas required for development, increasing the likelihood of biological impacts.
Bristol Dry Lake	Lack of consistency with Project Objectives: • Marginal solar resource; BLM land which makes site control difficult/uncertain; lengthy electrical interconnection needed; minimal transportation accessibility. Environmental Impacts: • Large undisturbed areas required for development, increasing the likelihood of biological impacts.

Alternative Site	Reasons Dropped from Further Analysis
Imperial Valley	Lack of consistency with Project Objectives: • Marginal solar resource; lacks transmission capacity. Environmental Impacts: • Similar disturbed nature of site compared to proposed site; therefore, no environmental advantage when compared to proposed site.
Imperial Valley East	Lack of consistency with Project Objectives: • Marginal solar resource; BLM land which makes sites control difficult/uncertain; lacks transmission capacity. Environmental Impacts: • Large undisturbed areas required for development, increasing the likelihood of biological impacts.
Northwest of Blythe	Lack of consistency with Project Objectives: • BLM land which makes site control difficult/uncertain. Environmental Impacts: • Large undisturbed areas required for development, increasing the likelihood of biological impacts.

D. Site Layout Alternatives

Upon selecting the site area to develop, further studies including detailed biological studies were conducted in and around the project area to understand the placement of equipment to arrive at the least impactful project while still meeting the project objectives. Three general development areas were considered for development of the MSP, and as presented in Section 4.0 of the AFC, a final layout was determined by utilizing those areas with negligible biological and site control issues.

E. Power Generation Facility Design Alternatives

Alternatives considered for several aspects of the proposed design of the power generation facility are addressed in detail in Section 4.0 of the AFC. The evaluations of alternative heat rejection (cooling) technologies and alternative approaches for disposing of non-sanitary wastewater are repeated here..

1. Heat Rejection (Cooling) Technology Alternatives

As proposed, the power generating equipment will utilize wet cooling technology. The adjudicated groundwater at the site is brackish and will serve as makeup to the cooling tower. Other cooling technology approaches were considered including dry and wet/dry hybrid.

Wet cooling uses circulating water to condense steam turbine exhaust in a shell and tube heat exchanger (condenser). The warm circulating water then travels to a mechanical-draft wet cooling tower, where heat is dissipated through evaporation of the circulating water and contact with ambient air. Makeup water is added to compensate for the evaporated water.

Dry cooling technology uses an air-cooled condenser (ACC) that cools the steam turbine exhaust using a large array of fans that force air over finned-tube heat exchangers. No water is evaporated in this cooling process.

Capital Cost and Performance Comparison

Wet Cooling technology has a performance advantage over Dry Cooling for the Project. Performance is enhanced because Wet Cooling relies primarily on evaporation to remove heat from the circulating water. Since evaporation occurs at the dew point temperature (the air temperature at 100 percent humidity), Wet Cooling achieves lower condenser back-pressure than Dry Cooling, which is unable to operate below dry bulb temperatures (ambient air temperature). Dry bulb temperatures are generally much higher than dew point temperatures (especially in regions such as the Mojave Desert). As the dry bulb temperature increases and humidity decreases, the Wet Cooling system becomes more efficient as a heat rejection method. This is the reason that Wet Cooling systems are even more efficient than Dry Cooling systems in areas with low humidity, as is the case at the Project site. When the cooling tower performance is coupled with the cycle efficiency, it is clear that Wet Cooling in arid areas results in improved project performance and maximization of the solar resource.

The lower condensing temperatures achieved with Wet Cooling systems result in improved cycle performance. This is because the lower temperatures result in lower steam turbine generator (STG) back-pressures, which increase the STG's generation output. Conversely, the requirement to operate at the higher temperatures and higher STG backpressures associated with Dry Cooling would adversely affect the Project's power output. A wet-cooling tower would be physically smaller than an air-cooled condenser (ACC) because water is more efficient as a heat exchange medium than air. Dry Cooling requires much more surface area and very high flow rates of air to remove the same amount of heat as a Wet Cooling system. In addition, an ACC system has higher auxiliary loads due to the significant number of fans. However, an ACC would not need cooling water circulating pumps and circulating piping as would be needed for a wet tower, and would require a smaller water treatment system (a small (~10%-of-normal-size) wet-cooling tower would be needed for cooling other plant equipment even if an ACC was used for the Project, as discussed previously in the cooling technologies description).

Capital cost estimates are lower for Wet Cooling as compared with Dry Cooling. An ACC system is more expensive than the equipment needed for a Wet Cooling system (condenser, cooling tower, circulating water pumps and piping). In addition, the lower steam cycle efficiency of a Dry-Cooled facility requires increased steam flow in order to maintain the same power output. This results in the need to increase the size of the steam generation and feed water heater systems. Additionally, the HTF flow rate necessary for the Dry Cooling option increases HTF piping sizes, the amount of HTF needed, and associated systems.

The table below summarizes the cost impacts associated with the Project proceeding as Dry Cooled. The comparison was completed without changing the solar field size. The solar field for CSP projects is typically sized to maximize the output of the project over a wide range of months to better utilize the variable resource throughout the day and year, creating a firmer output. Thus, in summer months when the solar resource is at a maximum, portions of the solar field are not utilized. Additionally, given the site control and biological constraints, solar field upsizing was not considered an option or necessary for the Project.

In addition to capital costs, operating costs have also been considered for comparison. Wet Cooling operating costs include the cost of pumping makeup cooling water (not needed for Dry Cooling) and higher power requirements for circulating pumps and water treatment activities. However, Wet Cooling systems require less parasitic load for fans compared to Dry Cooling.

Cost Impacts Associated with Dry Cooling (Based on Entire Project)

Impact Component	Impact (Benefit)
Initial Capital Cost Impacts	
Add ACC, Remove Main Circulating Water System, Reduced Size of Wet-Cooling tower[1]	$14,550,000
Increased Steam and Feed Water System Sizes	$13,130,000
Reduced Water/Waste Water Treatment System Sizes	($2,560,000)
Increased HTF Piping, HTF Volume and Associated Systems	$11,590,000
Decrease in Evaporation Pond Size	($1,400,000)
Electrical and I&C System Additions	$1,420,000
Civil Work	($2,910,000)
Operating Impacts[2]	
Net Generation Impact for Dry Cooling[1,3,4,5]	$22,630,000
Cost of Water Extraction[4,5]	($910,000)
Cost of Water Treatment (chemicals and consumables)[4,5]	($3,310,000)
Net Impact of Dry Cooling (PV 2010)	$52,230,000

[1] ACC Assumes two 18 bay systems for each Plant; additional sizes were considered with similar results, all resulting in a detrimental cost impact associated with Dry Cooling.
[2] O&M Staffing and maintenance of equipment assumed similar.
[3] Annual net generation for the Dry Cooled design is based on an hour-by-hour study of the Project's output; the same manner used to estimate the Project's output when Wet Cooled. Result is a reduction in performance of 13,500 MWh.
[4] Assumes $0.15/kWh cost of energy.
[5] Assumes 8% Internal Rate of Return (IRR) over a 30-year term to arrive at Present Value (PV) in 2010.

Comparison of Other Impacts

Dry cooling would involve an ACC structure approximately 130-150 feet in height, which would have greater impacts on visual resources than a wet-cooling tower and furthermore is precluded by the 60-feet height restrictions on the site because of the nearby Edwards Air Force Base. Because an ACC requires more and larger fans than a

Wet system, an ACC would produce greater noise emissions than the proposed Wet-Cooling system, with potential impacts on employees, neighbors, and nearby wildlife.
Furthermore, the use of Dry Cooling is approximately 5% less efficient than Wet Cooling. This loss of efficiency means that for every 20 power plants built using dry cooling, one exists solely to compensate for the energy production lost as a result of using this method of cooling.
In conclusion, based upon the information presented above and the use of concentrating solar trough technology, the applicant has concluded that the use of Dry Cooling will likely render the Project non-competitive and economically unsound. Moreover, because the Wet Cooling proposal here would use brackish groundwater, the Dry Cooling option would not result in any savings of inland fresh water. Finally, the Dry Cooling option would increase visual and noise impacts of the Project without a substantial offsetting environmental benefit and is therefore inconsistent with the Project objectives.

2. Wastewater Disposal Alternatives

Wastewater treatment effluent consists of concentrated brine resulting from several cycles of reuse in the wet cooling tower followed by a series of wastewater treatment processes. MSP plans to employ evaporation ponds for wastewater treatment effluent disposal. An alternative to evaporation ponds would be a zero liquid discharge (ZLD) system consisting of a brine concentrator, a crystallizer, and supporting water treatment equipment such as pumps, tanks, filters, mixing tanks, piping, control system, etc.
Both evaporation ponds and a ZLD system eliminate the wastewater treatment effluent waste. The evaporation ponds accomplish this by using solar energy to evaporate wastewater into the atmosphere, leaving the solids in the pond. The evaporation ponds require no energy input (other than solar energy, a renewable resource), and as currently planned, the ponds would be constructed with sufficient capacity that they would not require offsite transport of the dewatered salts during the intended life of the Project. Because the ponds would be lined and wildlife impacts would be carefully monitored (and measures taken to protect wildlife), potential pond impacts are considered minimal.
Alternatively, a ZLD system would concentrate the water treatment effluent stream to produce a wet solid waste product that would require regular offsite truck transport to an appropriately permitted disposal facility. The ZLD system uses an external heat source (e.g., steam or electricity) to evaporate the water. Within the ZLD system, the water removal and crystallization processes occur in closed vessels; the wet solids are removed and stored in containers prior to off-site disposal. The crystallizer has minimal potential for groundwater impacts and wildlife exposure to ponds would not exist; and thus there would be no need for groundwater monitoring or wildlife protection measures.
The crystallizer may use steam or electricity from the power plant and/or the power grid, due to the cycling nature of the solar plant compared with the more continuous operation of the ZLD system. The reduction in plant energy output (either by reducing the available steam or utilizing electricity) would be expected to be a small fraction of the net plant output in the summer and a more significant percentage in the winter, ultimately reducing the overall net energy produced by the project. Additionally, a ZLD system requires significant amounts of electric power to drive the process in addition to the energy needed to heat the process. These demands reduce the available electrical output, decrease the overall net efficiency of the power facility, and would most likely require

additional energy purchase during the Project's non-power-generating hours. The evaporation ponds require minimal electrical power and result in higher plant efficiency.
No significant environmental issues have been identified with either option. The evaporation ponds will be required to undergo permitting review from the Lahontan Regional Water Quality Control Board (RWQCB) for issuance of Waste Discharge Requirements (WDR) and will be required to meet stringent regulatory requirements in terms of construction, materials, leak detection, etc. to ensure appropriate protection to underlying groundwater.
Based on the information above it was determined that mechanical ZLD systems are not an economically-sound nor environmentally preferable alternative to evaporation ponds. In addition, using solar energy to generate steam in order to power a mechanical ZLD system is not an optimal use of renewable energy compared to using solar energy directly (for evaporation).

F. Water Supply Alternatives

The groundwater resource available to the Applicant through the ownership of adjudicated water rights provides for a viable economic plant design which is required for the project to remain attractive to potential utility customers. The Project has emphasized water conservation measures in its facility design to minimize water consumption associated with the use of Wet Cooling. Additionally, the groundwater is brackish and not considered acceptable for drinking water purposes.
Nonetheless, a search was conducted to identify a possible alternative source of cooling water for the Project. This search included inquiries to numerous wastewater treatment facilities in a large radius around the MSP site. The potential candidates for water supply to the facility include the City of Barstow, the Town of Adelanto, and the Victor Valley Wastewater Reclamation Authority.

Discussions with potential reclaimed water suppliers resulted in the conclusion that suppliers desire the Project to return groundwater back to them as potable water. Given the brackish quality of the groundwater, it would have to be treated to be potable. Moreover, return of groundwater would require a bidirectional pipeline (supply reclaimed water/return groundwater) since the groundwater adjudication only allows for physical conveyance of water out of the sub-basin surrounding the Project area rather than a transfer of rights to another sub-basin. This physical conveyance would be either by truck or pipeline. Truck transport was rejected as a cost-prohibitive and infeasible alternative, particularly given the brackish quality of the well water on site.
Ultimately, the pipeline hydraulic characteristics were determined for each option and pipeline designs were created. Cost of construction was determined and ranges from approximately $15 million (M) to $18M depending on the origin but escalates to $27M to $49M when considering a bidirectional pipeline. When including the associated operations and maintenance of the pipeline (the life cycle cost), the cost escalates to $29M to $35M for a single supply pipeline and $54M to $94M for a bidirectional pipeline.
Based on the cost information above it was determined that a reclaimed water source is not an economically sound alternative. In addition, utilizing an offsite source of water would still require a backup source to be identified, which would be groundwater, thus the cost of wells would not be eliminated, further making this alternative economically

unsound. Moreover, based on the nature of installing a pipeline of significant length, it is more likely that additional unnecessary environmental impacts would result, which is inconsistent with the Project objectives and would likely be environmentally undesirable. Lastly, in reviewing the potential for utilizing reclaimed wastewater for the Project's water supply, it was determined that the seasonal supply of reclaimed water from the wastewater plants evaluated do not align with the seasonal demands of the Project. In order to overcome the seasonal variations between supply and demand, the Project or the reclaimed water supplier would need to store approximately 370 AF (121,000,000 gallons) of water each winter to support the Project for use in the summer. The cost and practical nature of this storage is inconsistent with the Project Objectives and would further make this alternative economically unsound.

20.3 Proposed Licensing Conditions

The Staff Assessment (SA) for the project recommends no Conditions of Certification related to alternatives.

20.4 Correlation to SA, SSA and Hearing Topics

- Staff Assessment, Section 7
- Alternatives

APPENDIX A

DECLARATIONS AND RESUMES

Declaration of
Nicholas Abboud

I, Nicholas Abboud, declare as follows:

1. I am presently employed by Wilson & Company, Inc. Engineers & Architects as Transportation Engineering Manager.

2. A copy of my professional qualifications and experience are attached hereto and incorporated herein by reference.

3. The attached testimony on Traffic & Transportation was either prepared by me or under my direction for the Mojave Solar project based on my independent analysis, supplements thereto, data from reliable 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 herein.

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: May 14, 2010 Signed: 

At: San Diego, California

NICHOLAS ABBOUD, PHD, PE, PTOE

Transportation Engineering Manager

YEARS OF EXPERIENCE	TOTAL 25 WITH FIRM 5
EDUCATION	B.S., Civil Engineering, Wayne State University, 1981 M.S., Civil Engineering, Wayne State University, 1983 Ph.D., Transportation Engineering, Auburn University, 2001
LICENSES AND REGISTRATIONS	Professional Engineer, Virginia, No. 29230, Civil Engineer, California, No. 66292 Traffic Engineer, California, No. 2187 Professional Traffic Operations Engineer, No. 1877
ORGANIZATIONS, TRAINING, PUBLICATIONS, AWARDS	Institute of Traffic Engineers (ITE), Transportation Research Board (TRB)

Dr. Abboud has 25 years of experience in traffic engineering and safety research in the private and public sectors. Project experience includes design and evaluation of traffic control devices, traffic operations, traffic impact analysis, and safety improvements.

REPRESENTATIVE PROJECT EXPERIENCE

Traffic Impact and Engineering

Mojave Solar Project. Solar-to-Thermal Energy Plant – near Barstow, CA

Traffic Engineer for a proposed 250 Megawatt solar to thermal energy plant in the Mojave Desert in Southeast California. Dr. Abboud was contracted by Abengoa Solar for the preparation of a traffic impact study and completion of the Traffic & Transportation section of the AFC application for the California Energy Commission. The solar thermal energy plant is located in a rural area once dedicated solely to agriculture and is accessed by two-lane roadways north of SR-58.

Portola Center - City of Lake Forest, CA

Dr. Abboud prepared a traffic impact assessment of the Portola Center project, a residential and commercial development located in the City of Lake Forest, north of SR-241 and west of El Toro Road. The project proposes to build 480 single-family residential (SFR) units, 367 multi-family residential (MFR) units, and over 40,000 SF of commercial space. The study evaluated the near-term and long-term impacts of the project and identified mitigation measures necessary to ensure an acceptable level of project impacts.

Traffic Study Solana Beach Train Station Mixed-Use Project - San Diego, California

Project Manager for the City of Poway's Transportation Master Element update. The Updated TME of the General Plan will set forth goals, policies and strategies, which promote effective use of existing transportation facilities and development of new ones. Synchro/SimTraffic computer software is being used for network wide analysis, with VISSIM software being used for conducting micro-level analysis of key Focus Area facilities to identify recommended Transportation Master Element roadway classifications and revisions. On-going coordination with City and SANDAG staff is underway to calibrate and validate the SANDAG regional transportation model for application to the Master Transportation Element update, as well as application of the traffic model to test and evaluate alternative roadway classifications.

North Coast Interstate 5 Freeway Improvement Project - San Diego, California

Assisted SANDAG and Caltrans District 11 in providing traffic forecasting and operational analyses for the I-5 North Coast Improvement Project, which extends from the I-5/I-805 merge in the south to Camp Pendleton in the north. As a significant regional transportation Improvement, the project includes freeway widenings and HOV/managed lanes with provision of direct access ramps (DARs). Required development of peak hour traffic forecasts for existing, no-build, and variety of build conditions. Individual mitigation programs were developed for each of the cities A total of 26 interchanges and 130 intersections were analyzed using the Synchro/SimTraffic software. Analyses were used to refine ramp and adjacent intersection configurations.

Port of San Diego Freeway Access Improvement Project - San Diego, California

Lead Traffic Engineer for advanced planning study to improve local freeway access. Lead the development and analysis of alternative traffic scenarios for addressing issues related to truck access to/from the 10th Avenue and National City Marine Terminals in San Diego. Traffic assessments were conducted under existing and future year conditions, with the goal of improving traffic safety in the areas surrounding the Port terminals and on the roadways and freeways used by truck traffic. Traffic engineering analyses and simulations were conducted with HCS and Synchro/SimTraffic software to determine the effectiveness of each alternative scenario. Required extensive coordination between the Cities of San Diego and National City, Caltrans, San Diego Association of Governments, and the US Navy.

Marine Corps Air Station (MCAS), Miramar, California

Project Manager for preparation of traffic assessment and traffic improvement plan for military installation. Conducted capacity analysis including levels of service, delays and queues; traffic control device evaluation: signing, markings and traffic signals; safety studies: sight distances, traffic conflicts, pedestrian crossings, and highway lighting; and geometric design evaluation: turning radii, vertical and horizontal curvature; and traffic signal phasing and timing optimization.

Balboa Corridor Study - San Diego, California

Managed the evaluation of existing and forecast conditions for the 3.5-mile corridor between I-5 and I-805. Identified deficiencies and recommended improvements. Tasks included Traffic Operations elements, such as traffic signal coordination using Synchro/SimTraffic, improvements to levels of service, queues and delays; traffic safety, such as evaluation of traffic accident patterns throughout the corridor for a 3-year period and conducting speed studies; design elements, such as consolidation of existing median openings, landscaping median, number of lanes needed, intersection configuration modifications, and new traffic signals; new pedestrian and bicycle facilities (bike lanes, non-contiguous sidewalks, and landscaped parkways); and coordination with community stakeholders, including local residents, planning group, task force, owners of two regional shopping centers and other commercial businesses, and two elementary schools.

Rosecrans Corridor Study - San Diego, California

Managed the evaluation of conditions for the 5-mile corridor west of I-5 and identified deficiencies. Tasks included Traffic Operations elements, such as traffic signal coordination using Synchro/SimTraffic, improvements to levels of service, queues and delays; traffic safety, such as evaluation of traffic accident patterns throughout the corridor for a 3-year period and conducting speed studies; design elements, such as number of lanes needed, intersection configuration and traffic signal modifications; and coordination with community stakeholders, including local residents and merchants, planning group, and task force.

Traffic Calming

Development of the City of San Diego Traffic Calming Manual

Nick was an active member in the Project Working Group responsible for the development of the region's first comprehensive traffic calming manual for the City of San Diego. This handbook provides a comprehensive look at the various types of traffic calming measures, their applicability, effectiveness and potential impacts, in addition to cost.

Traffic Calming Alternatives on Elfin Forest Road – San Marcos, California

Led the evaluation of traffic calming alternatives on Elfin Forest Road through the San Elijo Development in San Marcos. Evaluated a number of alternatives including: 1) Vertical displacement measures, such as speed bumps, speed humps, speed tables, raised intersection; 2) Horizontal displacement measures, such as choker, center island narrowing; and 3) Psycho-perception measures, such as optical speed bars and visual narrowing of travel way. The study recommended two treatments: a speed table and an optical speed bar pattern, with design recommendations of the transverse marking stripe pattern, and the speed table.

Roundabout Feasibility and Design

Successfully evaluated and designed of roundabouts utilizing the following resources:

A. FHWA Roundabouts Guide

B. Caltrans Design Information Bulletin (DIB 80-01)
C. Manual on Uniform Traffic Control Devices (MUTCD)
D. RODEL roundabout software
E. aaSIDRA roundabout analysis software

Designed roundabouts with emphasis on the design-safety relationship by ensuring appropriate low travel speeds and tight fastest travel paths, adequate intersection and stopping sight distances, proper turning radii & truck apron design for the design vehicle, bicycle and pedestrian accommodation, adequate lighting, and clear signing and marking guidance to motorists. In addition, roundabouts at freeway ramp junctions accounted for proper operation of the on-ramp meters.

I-5/Birmingham Drive Interchange Ramp Junctions – Encinitas, CA

Evaluated the feasibility of two single-lane roundabouts at the two ramp junctions of this interchange in the City of Encinitas in San Diego County: one five-legged roundabout and one tear-drop shaped roundabout. Report is under review by Caltrans & FHWA.

I-5/Santa Fe Drive Interchange Ramp Junctions – Encinitas, CA

Evaluated the feasibility of two-lane turbo roundabouts at the two ramp junctions of this interchange. The study provided a comparative analysis of roundabout versus signalized intersection alternatives.

La Jolla Boulevard – San Diego, CA

Evaluated the feasibility of five single-lane roundabouts along La Jolla Boulevard in the City of San Diego with a comparative analysis of traditional traffic control alternatives (signal, stop sign). All five roundabouts are operational.

State Route 67 – Ramona, CA

Performed comparative analysis of roundabout and signalization treatments at two intersections along SR-67 in the community of Ramona. The comparison measures of effectiveness included delays, queues, and environmental and right-of-way impacts.

Traffic Management Plans

Bird Rock Traffic Management Plan - San Diego, California

Project Engineer for the development a traffic management plan for the Bird Rock area to address traffic operations and safety, traffic calming, walkability and commercial revitalization. The plan included the implementation of 5 modern roundabouts on the major street (La Jolla Blvd) and a number of neighborhood traffic calming measures, including mini-roundabouts, neighborhood traffic circles, new landscaped medians, intersection bulbouts, partial street closure, intersection re-configuration, median slow points, in-roadway warning lights (IRWL) at crosswalks, street narrowings using striping, bike lanes, and diagonal and parallel parking. Intensive coordination among citizen groups, commercial businesses and City Council. Research statewide and nation-wide state of the practice application of newer traffic calming devices such as in-pavement flashing lights, in-lane rumble strips, and optimal design of truck aprons.

Streeter Avenue Grade Separation – City of Riverside, CA

Led Traffic Engineer for the preparation of a Traffic Impact Study for existing, near-term and long-term scenarios, with and without the grade separation, in accordance with CEQA standards. The project involved grade separation of rail tracks over a depressed roadway, Streeter Avenue, developing detour routes, temporary construction traffic plan and identification of safe pedestrian access. A temporary roadway will also be constructed east of the project to divert the Streeter Avenue traffic away from the construction site.

Valley View Grade Seperation – City of Santa Fe Springs, CA

Developed a Construction Traffic Management Plan (TMP) documenting the impact of the Valley View Avenue grade separation construction on the local transportation users, including the traveling public, local neighborhood, and local businesses, in addition to ensuring continuity of vehicle, bicycle and pedestrian facilities. The TMP included temporary roadway diversion and detour plans for traffic control during construction and the associated traffic impact in accordance with the California MUTCD.

Declaration of
LEE ROGER ANDERSON

I, LEE ROGER ANDERSON, declare as follows:

1. I am presently a 3DScape Associate, and am currently the Senior Visual Analyst.

2. A copy of my professional qualifications and experience are attached hereto and incorporated herein by reference.

3. I helped prepare the attached testimony on Visual Resources for the Mojave Solar project based on my independent analysis, supplements thereto, data from reliable 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 herein.

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: May 14, 2010 Signed: 

At: Medford, Oregon

3DSCAPE

Lee Roger Anderson
Senior Visual Analyst

Education

Master of Landscape Architecture
Iowa State University, Ames, Iowa

B.S. in Landscape Architecture
Iowa State University, Ames, Iowa

Relevant Experience

Lee Roger Anderson has more than 36 years experience in visual resource analysis, visual resource management, environmental planning, site planning, master planning, recreation planning, and landscape architecture. In addition he possesses vast experience supporting:

- Applications For Certification, (AFC); Visual Resources
- Environmental Impact Reports, (EIR); Visual Resources
- Environmental Impact Statements, (EIS); Visual Resources

He has also served a host of regulatory agencies including, but not limited to: Federal Energy Regulatory Commission (FERC); USDA Forest Service; USDI Bureau of Land Management; California Public Utilities Commission (CPUC); and California Energy Commission (CEC).

Representative Projects

- Abengoa Mojave Solar Power Plant Project AFC #09-AFC-5. Visual resource assessment and computerized visual simulations for new solar farm on 1,765 acre. San Bernardino Co, CA.
- Genesis Solar Energy Project AFC #09-AFC-8. Visual resource assessment and computerized visual simulations for new solar farm on 1,800 acres. Riverside County, CA.
- Alta Oak Creek Wind Energy Project EIR. Visual resource assessment and computerized visual simulations for 350 new wind turbine generators. Kern County, CA.
- Pacific Wind Energy Project EIR. Visual resource assessment for up to 250 new wind turbine generators. Kern County, CA.
- Tehachapi Renewable Transmission Project, Segments 4-11 EIR/EIS. (TRTP 4-11) Visual resource assessment and computerized visual simulations. Tehachapi Wind Resource Area to Mira Loma Substation. Kern, Los Angeles, and San Bernardino Counties, CA.

- Antelope Transmission Project, Segments 2 & 3 EIR (TRTP 2-3). Visual resource assessment and computerized visual simulations. Kern and Los Angeles Counties, CA.
- Antelope-Pardee 500kV Transmission Project EIR/EIS (TRTP 1). Visual resource assessment and computerized visual simulations. Lancaster to Santa Clarita, LA County, CA.
- Riverway Substation Project visual resource assessment and computerized visual simulations for a Mitigated Negative Declaration. Visalia, Tulare County, CA.
- Lompoc Wind Energy Project EIR. Visual resource assessment and computerized visual simulations for 90 new wind turbine generators. Santa Barbara County, CA.
- Dillon Wind Energy Project EIR. Visual resource assessment and computerized visual simulations for 45 new wind turbine generators. Palm Springs and Riverside County, CA.
- Liberty XXIII Renewable Energy Power Plant EIR. Visual resource assessment and computerized visual simulations for new bio-fuel power plant. City of Banning, CA.
- Lake Elsinore Advanced Pump Storage Transmission Project EIR (LEAPS). Visual resource assessment and computerized visual simulations. Orange County, CA.
- Amendment to CEC License for Blythe Energy Transmission Line Project. Land use study, visual resource assessment, visual simulations. Blythe to Julian Hinds, CA.
- Oil and Gas Environmental Impact Statement, Scenic Quality and Recreation Resources, with complete GIS Analysis, Los Padres National Forest, Santa Barbara, CA.
- AT&T Fiber Optic Cable Project, EA and Initial Study, at Shasta Lake National Recreation Area and in Castle Crags State Park, Shasta County, California.
- EIS & EIR for Celeron/All American and Getty Pipeline Projects, from Santa Barbara, CA to Freeport, TX., for California State Lands Commission and USDI-BLM.
- Construction monitoring and mitigation compliance monitoring of the All American Pipeline, in Los Padres NF and Gaviota St Park, Santa Barbara County, CA.

Declaration of
Richard B. Booth

I, Richard B. Booth, declare as follows:

1. I am presently employed by Tetra Tech EC, Inc., as a Supervising Project Manager.

2. A copy of my professional qualifications and experience are attached hereto and incorporated herein by reference.

3. The attached testimony on Public Health was either prepared by me or under my direction for the Mojave Solar project based on my independent analysis, supplements thereto, data from reliable 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 herein.

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: May 24, 2010 Signed: 

At: Shingletown, CA.

Mr. Richard Booth
Supervising Project Manager

EXPERIENCE SUMMARY

Mr. Booth has over 34 years of experience in the field of air quality engineering and environmental pollution control consulting. He has served as a project manager and team member on a wide variety of air, water, and solid and hazardous waste environmental and regulatory permitting projects for the energy and industrial sectors throughout California and the nation. He has been involved in numerous projects for the utility and independent power producer sectors, as well as the pulp and paper, wood products, and minerals industries. He has extensive experience in the areas of air quality related to minor and major new source permitting, NSR and PSD permitting, RACT-BACT-MACT-LAER determinations, cost effectiveness evaluations, Title IV/V permitting, air toxics evaluations, air dispersion modeling, health risk assessment, emissions inventory preparation (criteria and toxic pollutants, and greenhouse gases), regulatory compliance, rule development, and impact analysis. He has conducted historical ambient air quality assessments; background air quality assessments; detailed emissions calculations for criteria and toxic pollutants; detailed impacts analysis addressing project impacts to NAAQS, SAAQS, PSD increments, Class I area impacts, visibility, regional haze, and deposition; in-depth regulatory compliance analysis; mitigation assessment; and multiple pathway health risk assessments. In addition, he has **prepared a wide range of environmental and regulatory documents such as RMP's, SPCC's, SWPPP's,** Phase I ASTM site assessments, multi-media environmental compliance audits, acquisition due diligence documents, critical issues analysis documents, and CEQA/NEPA documents.

EDUCATION

Various Coursework, Environmental Impact Analysis, California State University, 1981
BA, Natural Science, California State University, 1976
AA, Pre-Engineering, American River College, 1969

TRAINING

Project Management Training Course: Level 100, October 2001 (TtEC)
Project Management Training Course: Level 200, February 2002 (TtEC)
Project Management Training Course, Project Management Institute, 1996.
Sales Training Course: March 2002 (TtEC)
Loss Control Course: Det Norske Veritas, March 2002 (TtEC)
Supervisory Training Course: Supervising in the Matrix, November 2002 (TtEC)
ASTM Site Assessment and Transaction Screen: Re-certification, February 2003 (TtEC)

CORPORATION PROJECT EXPERIENCE

RECENT PROJECT MANAGEMENT EXPERIENCE

Liberty Energy, Inc., Liberty V, XX, and XXIII, Air Quality Technical Assessments and Permitting Applications, Southern California Sites
Serving as current project manager for the air quality and public health permitting and analysis for three (3) bio-solids power plants rated at 15 to 22 MW each, located in the southern California (Riverside, Imperial, and Kern Counties). Each facility is subject to CEQA, as such, TTECI is preparing the air quality and public health technical assessments for inclusion in the CEQA documents, as well as the air quality permitting applications and public health (risk assessments) for each facility. Mr. Booth is currently responsible for the preparation of the air quality and public health analyses for each plant.

Enpower Corp., LM6000 Turbine Project, Wadham Energy Facility, Williams, CA.
Serving as the current project manager for the WELP-LM6000 project located in the northern portion of the Central Valley of California. The LM6000 project is a 46 MW modification consisting of a simple cycle gas turbine addition at the existing Wadham Energy facility. Mr. Booth is responsible for the air quality and public health analyses for the project, and the management of other sub-contractors involved in the environmental analysis for the project.

Calpine Corporation, Inland Empire Energy Center Application for Certification, Calpine IEEC, Romoland, CA
Served as interim project manager for the 670 MW combined-cycle power plant facility proposed to be located in southwest Riverside County, CA. Prepared the hazardous materials, hazardous waste, and worker safety sections of the AFC. The AFC document was prepared under the direction of Foster Wheeler Environmental, and was submitted to the CEC on August 17, 2001. The project was deemed data adequate on 12-19-01, and is currently under construction. Mr. Booth is currently serving as the project manager for the construction monitoring tasks for biology, cultural, paleontological, and air quality per the requirements of the California Energy Commission conditions of certification.

City of Rialto-Municipal Airport Closure, Rialto,CA
Mr. Booth served as the TtEC project manager for the extensive series of environmental site assessments undertaken for the Rialto Municipal Airport closure and sale. The site assessments included detailed historical assessments, site surveys, regulatory agency research, and sampling and analysis programs. The project team consisted of a mix of inter-company staff as well as subcontractors. The assessments were conducted as part of the federally approved closure of the airport facilities in anticipation of future residential and commercial development. The project included assessments of both airport and non-airport adjacent properties.

Enpower Corporation, Oildale Energy and Wadham Energy Plants, Bakersfield and Williams, CA
Mr. Booth is presently the project manager for the environmental services contracts for Enpower Corporation's California energy facilities located in Bakersfield and Williams. These facilities consist of a 50 MW gas turbine facility and 20 MW biomass facility. Current services being provided consist of a wide range of regulatory support and compliance tasks, federal MACT compliance, emissions inventory preparation, monitoring, reporting, and recordkeeping, environmental auditing, Title V permitting, etc.

RECENT PROJECT EXPERIENCE

BPAE-Watson Cogeneration Expansion Project, Carson, Ca.
Co-authored the air quality and public health sections of the Application for Certification (AFC) for the new GE 7FA turbine/HRSG expansion at the Watson Cogeneration power plant, and co-authored the air application for the project for submittal to the South Coast AQMD. The Watson project is a single 85 MW combined cycle turbine/HRSG. The air quality sections contained an in-depth analysis of existing and background air quality, BACT analysis, emissions quantification for a wide variety of operational scenarios, hazardous pollutant quantification, regulatory compliance analysis, and mitigation (emission reduction credit) analysis. The public health sections of the AFC, and the permitting applications for both projects, contained a detailed analysis of hazardous pollutant emissions, exposure assessment, and complete multiple-pathway cancer risk analysis. Analyses for acute and chronic health affects were prepared as well as a population cancer burden analysis.

Gateway West Transmission Line EIS Project, Idaho Power/PacifiCorp, Wyoming and Idaho
Prepared the air quality analysis for the transmission line EIS which included; the analysis of the regional setting, project definition, project regulatory compliance analysis, project emissions for both construction

and operations phases, conformity analysis, and cumulative impacts analysis for operation of the transmission line.

Alta Vista Solar Project, eSolar, Lancaster, Ca.
Co-authored the air quality and public health sections of the Application for Certification (AFC) for an 80 MW solar power plant, and prepared the air application for submittal to the Mohave Desert AQMD for the project. The Alta Vista project is an 80 MW heliostat/mirror solar project. The air quality sections contained an in-depth analysis of existing and background air quality, BACT analysis, emissions quantification for the identified operational scenarios, hazardous pollutant quantification, regulatory compliance analysis, and mitigation (emission reduction credit) analysis. The public health sections of the AFC, and the permitting applications for both projects, contained a detailed analysis of hazardous pollutant emissions, exposure assessment, and complete multiple-pathway cancer risk analysis. Analyses for acute and chronic health affects were prepared as well as a population cancer burden analysis.

MMC Energy, Chula Vista and Escondido Turbine Upgrade Projects, Chula Vista and Escondido, Ca.
Co-authored the air quality and public health sections of the Application for Certification (AFC) for two 46 MW simple cycle turbines upgrades at the Chula Vista power plant, and co-authored the air applications for both Chula Vista and Escondido upgrade projects. The Escondido project is a single 46 MW simple cycle turbine upgrade (non-CEC). The air quality sections contained an in-depth analysis of existing and background air quality, BACT analysis, emissions quantification for a wide variety of operational scenarios, hazardous pollutant quantification, regulatory compliance analysis, and mitigation (emission reduction credit) analysis. The public health sections of the AFC, and the permitting applications for both projects, contained a detailed analysis of hazardous pollutant emissions, exposure assessment, and complete multiple-pathway cancer risk analysis. Analyses for acute and chronic health affects were prepared as well as a population cancer burden analysis.

Edison Mission Energy, Walnut Energy Center and Sun Valley Energy Projects, Applications for Certification, City of Industry and Sun City, CA.
Co-authored the air quality and public health sections of the Applications for Certification (AFC) for two 500 MW simple cycle power plants to be located within the jurisdiction of the South Coast Air Quality Management District (southern California). The air quality sections contained an in-depth analysis of existing and background air quality, BACT analysis, emissions quantification for a wide variety of operational scenarios, hazardous pollutant quantification, regulatory compliance analysis, and mitigation (emission reduction credit) analysis. The public health sections of the AFCs contained a detailed analysis of hazardous pollutant emissions, exposure assessment, and complete multiple-pathway cancer risk analysis. Analyses for acute and chronic health affects were prepared as well as a population cancer burden analysis.

PREVIOUS EXPERIENCE

Calpine Corporation, Russell City Energy Center Application for Certification, Hayward, CA
Co-authored the California Energy Commission Application for Certification (AFC) air quality and public health sections, and the Bay Area AQMD permit application package, for the proposed 600 MW combined cycle power plant facility to be located near Hayward, CA., in the east San Francisco Bay region. The documents contained the following types of analyses: (1) historical ambient air quality assessment, (2) establishment of background air quality for the project, (3) detailed emissions calculations **for criteria and toxic pollutants, (4) "top-down" best available control technology analysis, (5) detailed** impacts analysis addressing project impacts to NAAQS, SAAQS, PSD increments, Class I area impacts,

visibility, regional haze, and deposition, (6) in-depth regulatory compliance analysis, (7) mitigation assessment, and (8) multiple pathway health risk assessment.

Calpine Corporation, Vineyard Energy Center NOI Application, Vineyard, UT
Co-authored the Utah DEQ-Air Division permit application package, for the proposed 978 MW combined cycle power plant facility to be located near Vineyard UT., northwest of the Orem-Provo urban area. The document contained the following types of analyses: (1) historical ambient air quality assessment, (2) establishment of background air quality for the project, (3) detailed emissions calculations for criteria and toxic pollutants, **(4) "top-down" best available control technology analysis, (5) detailed impacts analysis** addressing project impacts to NAAQS, SAAQS, PSD increments, Class I area impacts, visibility, regional haze, and deposition, (6) in-depth regulatory compliance analysis, (7) mitigation assessment, and (8) multiple pathway health risk assessment.

US Forest Service, Sioux Ranger District Oil and Gas Leasing EIS, South Dakota
Primary author of the air quality affected environment and environmental consequence analyses for the proposed oil and gas leases within the Sioux Ranger District, in Harding County, South Dakota. The EIS, as currently structured, is a multi-disciplinary document which addresses the Forest Service concerns surrounding future oil and gas leases on their managed units within the district. The air quality portion of the EIS includes a detailed analysis of the regional climate and weather data, emissions inventory, background air quality, and emissions estimates for the various activities associated with oil and gas exploration and development. The analysis considers direct and indirect emissions impacts, and cumulative impacts, as well as addressing consistency with the established Forest Plan and compliance with the adopted air quality program in the State of South Dakota.

Silicon Valley Power, PICO Power Project Application for Certification, Santa Clara, CA.
Co-authored the air quality and public health section of the Application for Certification (AFC) for a 135 MW combined cycle power plant to be located in the south San Francisco Bay area in the city of Santa Clara, CA. The air quality section contains an in-depth analysis of existing and background air quality, BACT analysis, emissions quantification for a wide variety of operational scenarios, hazardous pollutant quantification, regulatory compliance analysis, and mitigation (emission reduction credit) analysis. The public health section of the AFC contains a detailed analysis of hazardous pollutant emissions, exposure assessment, and complete multiple-pathway cancer risk analysis. Analyses for acute and chronic health affects were prepared as well as a population cancer burden analysis.

County of Modoc, Alturas Power Project Fatal Flaws Analysis, Alturas, CA.
Prepared the air quality issues analysis for a proposed 300 **MW "clean coal" technology project utilizing** gasification fluid bed and combined cycle turbine systems. The air issues analysis presented discussion on the following applicable regulatory programs; California Energy Commission jurisdictional issues, PSD and NSR permitting issues, BACT issues, ERC (offset) issues, local air district regulatory compliance issues, Class I area impact issues, stack height and FAA issues in the context of site location and the proximity of the Alturas airport, emissions estimates, and the potential for pre- and post-construction monitoring. In addition, the analysis presented data on local and regional climate, existing air quality, and dispersion modeling screening impacts for the project emissions.

County of Modoc, Canby Biomass Project Critical Issues Analysis, Canby, CA.
Prepared the critical issues analysis with regard to air issues for a proposed 3 MW biomass power production project located in Canby, CA. The analysis included discussion of the following; local and regional climate, existing air quality, existing county emissions inventory, regulatory compliance review, NSR and PSD permitting issues, ERC (offset) requirements, BACT issues, emissions quantification, and the potential for pre- and post-construction monitoring.

Calpine Corporation, Critical Issues Analyses-Various Sites, California
Prepared the critical issues analyses for various proposed power production, power storage, and LNG processing sites in California as follows: Pajaro (Monterey County), Hesperia (San Bernardino County), Milpitas (Santa Clara County), Humboldt Bay LNG (Humboldt County), Regenesys System (Bay Area). Each of these analyses included discussion of the following; California Energy Commission jurisdictional issues, PSD and NSR permitting issues, BACT issues, ERC (offset) issues, local air district regulatory compliance issues, Class I area impact issues, emissions estimates, and the potential for pre- and post-construction monitoring. In addition, the analyses presented data on county statistics, local and regional climate, existing air quality, regional emissions inventory data, and risk management issues.

Enron North America, Las Vegas Cogeneration LP, Air Permitting, Las Vegas, NV.
Prepared the PSD air permitting document for the 240 MW expansion of the existing Las Vegas Cogeneration LP facility. The expansion was comprised of four (4) LM6000 Sprint turbines with unfired HRSG's, and two (2) steam turbines. The permit application document contained analyses of background air quality, BACT evaluations, detailed air quality impacts evaluation (dispersion modeling) for the Las Vegas Valley, Lake Mead National Recreation Area, and the Grand Canyon regions, as well as a detailed regulatory analysis, mitigation analysis, PSD increment, endangered species, soils, and vegetation analyses. The application document also analyzed a proposed increase in operating hours for the existing LM6000 turbine and cooling tower.

CalEnergy, Inc., CalEnergy Minerals-Mineral Recovery Project, Calipatria, CA.
Prepared the air quality documentation and permit support package for a proposed mineral (zinc) recovery facility utilizing spent geothermal brine from four (4) existing geothermal power plants located in the Salton Sea KGRA (known geothermal resource area). The mineral recovery process involved ion exchange, purification, solvent extraction, electrowinning, and ingot production and handling processes. The air document included analyses of existing climate and meteorology, background air quality, process BACT evaluations, emissions quantifications, detailed dispersion modeling and impacts analyses, and a regulatory compliance evaluation.

UAE Energy Operations Corporation, Oildale Energy LLC, Air Permitting, Bakersfield, CA.
Prepared the permitting document for the replacement of the existing LM5000 turbine with a new LM6000 Sprint turbine. Negotiated with local air district to allow the turbine upgrade as a "functionally identical replacement". Support documentation included emissions evaluations and comparisons for both turbines, operational analysis, and permit compliance analysis.

Williams Co., Air Permitting, New Mexico, Colorado, Wyoming
Participated as a team member on a wide variety of permitting projects for the Williams Co. (Field Services Division) for sources such as gas gathering and distribution lines, gas processing plants, compressor stations utilizing internal combustion engines and gas turbines. These projects involved both major and minor sources, as well as existing source modifications, and Title V permitting.

Simpson Paper Company, Mill Title V Applications, Various Locations in California and Vermont
Prepared the Title V applications and support documents for three (3) non-integrated paper mills and one (1) integrated pulp and paper mill. The mills were as follows:

- Shasta Mill, Anderson, CA. Integrated Pulp/Paper Mill
- Ripon Mill, Ripon,, CA. Non-integrated Paper Mill
- Centennial Mill, Gilman, VT. Non-integrated Paper Mill
- San Gabriel Mill, Pomona, CA. Non-integrated Recycled Paper Mill

These applications and support documents contained all required Title V application elements including, but not limited to; listing of permitted and non-permitted equipment and systems, emissions

quantifications, regulatory analysis and compliance review for all applicable requirements, monitoring and compliance strategy, and reporting and record keeping strategies.

PREVIOUS EMPLOYERS

ENV Environmental – Sr. Consultant
Tetra Tech EC, Inc. – Sr. Air Quality Scientist
Foster Wheeler Environmental Corporation – Sr. Air Quality Scientist
RTP Environmental Associates, Inc. - Associate
CARNOT Technical Services – Manager, Air Group
Energy Systems Associates – Sr. Regulatory Affairs Analyst
Shasta County Air Quality Management District – Air Pollution Control Officer
Butte County Air Pollution Control District – Deputy Air Pollution Control Officer

PUBLICATIONS & PRESENTATIONS

Booth, R.B. 2001. Emission Control Requirements: An Industrial Perspective. Council of Industrial Boiler Operators-Annual Conference. San Diego, California.

Greenway, A., R. Booth, et.al. 2000. Contributing author. Environmental Permitting Handbook. McGraw-Hill, New York. Chapters 11 and 17.

Greenway, A., R. Booth, et al. 1998. Contributing author. Risk Management Planning Handbook. Government Institutes. Chapter 6.

Booth, R.B. 1994. Nitrogen Dioxide Emissions Reductions and the Clean Air Act of 1990: A Regulatory Update. AIChE 24th One-Day Technical Meeting. Anaheim, California.

Booth, R.B. 1994. Fuel Oil Cleaning as a Risk Reduction Strategy for Utility Units Firing Residual Fuel Oils. Electric Power Research Institute. EPRI-AWMA Acid Rain Conference, Phoenix, Arizona.

Booth, R.B., M. McDannel. 1993. Summary of Air Toxic Emission Values from Small Coal-Fired Fluid-bed Boilers. A24. Air and Waste Management Association-Annual Conference. Denver, Colorado.

Booth, R.B., K. Skipka, P. Neil. 1993. Clean Air Act: Title III Air Toxic Regulations Update. Ninth Annual IEA Environmental Compliance Conference. San Diego, California.

Booth, R.B. 1993. Potential Pollutant Offsets from the Electrification of Stationary Internal Combustion Engines-Independent Research Project. Unpublished Manuscript.

Booth, R.B., M. McDannel. 1992. Summary of Air Toxic Emission Values from Utility Boilers Firing Residual Fuel Oil or Natural Gas. 92-132.01. Air and Waste Management Association-Annual Conference.

Booth, R.B., D. Czerniak, E. Mazzi, D. Feenstra. 1991. Guidelines for Selection and Application of the Most Cost-Effective NOx Control Technologies for Gas, Oil, and Coal Fired Boilers. American Power Conference. Chicago, Illinois.

DISCIPLINE CODES

24 Environmental Scientist, Y

SKILL SET

AIR SCIENCES

Air Quality Engineering
Air Quality Evaluations
Air Quality Permitting
Air Toxics
Ambient Monitoring
Atmospheric Science
BACT Analysis
Combustion Specialist
Dense Gas Dispersion
Dispersion Modeling
Economic Analysis
Emission Inventories
Environmental Impact Statements
Meteorology
Permitting Strategy
Programming
BARCT Analysis
RACT Plans
Regulatory Analysis
Regulatory Compliance
Risk Assessment
Risk Management
Software Development
Source Testing
Stack Testing
Title V

HEALTH RISK

Environmental Assessments
Environmental Impact Studies
Fate & Transport Modeling - Air (In & Outdoor)
Human Health Risk Evaluation

REGULATORY AFFAIRS

Air Operating Permits
Air Permitting
Air Toxics
CAA
CAA Permits
CEC Siting Regs.
Clean Air Act
Compliance Audits
Due Diligence
Emergency Planning
Emission Inventorying
Environmental Assessment
Environmental Assessments for Property Transactions (Phase I & II)
Environmental Audits
Environmental Compliance Audits
Environmental Impact Statement
Environmental Site Assessments
Environmental Training
Hazardous Waste
Management
Multi-Media Environmental Audits
NESHAPs
NPDES
NPDES Stormwater permitting & Facility Compliance Inspections
NSPS
NSR
Oil Pollution Act
Operating Permits (Title V)
OSHA PSM
Permitting (Air, Water & Hazardous Waste)
Phase I ASTM
Pre-Acquisition Audits
Regulations Development
Regulatory Trainer
Risk Analysis
Risk Management
Plans/Process Safety Disaster Planning
Stormwater
Stormwater Permitting
SPCC Plans

SOCIAL SCIENCE

Land Use
Siting

TECHNICAL EXPERTISE

Regulatory Permitting
Served as Project Manager and team member on a variety of regulatory permitting projects throughout California and the United States. These projects involved New Source Review and/or Prevention of Significant Deterioration permitting activities, Title III, Title IV, and Title V permitting projects, dispersion modeling, impact analyses, control technology evaluations, and agency liaison. Clients included biomass and fossil fuel-fired power plants, combustion turbine facilities, waste-to-energy plants, pulp and paper mills, resource recovery facilities, vehicle assembly plants, and a wide variety of industrial and commercial operations. Extensive experience in federal, state, and local agency air quality regulation development and analysis, preparation of emissions inventories, air quality planning issues, enforcement and compliance practices. RACT/BACT/LAER determinations, and cost effectiveness evaluations. Excellent knowledge of the Clean Air Act Amendments of 1990 and the implementing regulations issued to date. Participated as the primary author in the preparation of a definitive analysis of the impact of CAA provisions on residual fuel-oil use by electric utilities across the nation.

Air Toxics
Served as Project Manager and primary author for over 30 air toxic emissions inventory plans and emissions reports pursuant to the California AB2588 Air Toxics Hot Spots Act. Clients included fossil fuel-fired power plants, biomass and waste-to-energy plants, resource recovery plants, surface coating operations, chemical milling facilities, and petroleum product storage terminals.

Supervised and participated in the preparation of a wide variety of multiple pathway health risk assessments. These assessments contained discussions pertaining to hazard identification, exposure assessment, dose-response assessment, and risk characterization. Also included were detailed treatments of acute and chronic health effects, substance toxicity, environmental fate, exposure routes, and environmental transport modeling.

Regulatory Compliance and Environmental Audits
Managed numerous projects dealing with regulatory compliance issues such as permit language negotiation, plume abatement studies, emissions offset acquisition and analysis, and variance preparation. Extensive experience in regulatory rulemaking review and analysis. Prepared a number of source specific environmental audits dealing with cross media impacts, i.e., air, water, solid waste, hazardous materials handling, hazardous waste, land use issues, noise. Conducted numerous Phase I Site Assessments and environmental due diligence reviews for the acquisition of a wide variety of industrial facilities, including power plants, medical services and medical equipment manufacturing facilities, mineral recovery facilities, etc. Extensive experience in the preparation of compliance audits and plans, and Risk Management Plans. Moderate experience in such areas as NPDES point source permitting, Section 401, 402, and 404 permitting, and Endangered Species Act consultations.

RELATED COMPANY INFORMATION

Payroll Number: 504632
Employment Status: P6/part-time
Preferred First Name: Richard or Rick
Office Location: Shingletown, Ca. (Irvine-Main Office)
Hire Date: August 2005
Years with Other Firms: 29
Years with Current Firm: 5
Total Years Experience: 34
Supervisor: Robert Donati
Office Phone: (530) 474-1893
Cell Phone: (530) 515-9040
Fax: (530) 474-1893
E-mail Address: rick.booth@tetratech.com
Other E-mail Address (if any): altitude3000@gmail.com
Resume Last Revised: 05/1/2010

Declaration of
Theodore G. Cooley

I, Theodore G. Cooley, declare as follows:

1. I am presently employed by AECOM as Archaeologist.

2. A copy of my professional qualifications and experience are attached hereto and incorporated herein by reference.

3. I prepared the attached testimony on Archaeological Resources for the Mojave Solar project based on my independent analysis, supplements thereto, data from reliable 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 herein.

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: May 17, 2010 Signed: Theodore G. Cooley

At: San Diego, California

THEODORE COOLEY, RPA
Archaeologist

EDUCATION
M.A. Anthropology, California State University, Los Angeles, 1982

B.A., Anthropology, California State College, Long Beach, 1970

AFFILIATIONS
Society for American Archaeology

Register of Professional Archaeologists

CERTIFICATIONS AND APPROVALS
County of San Diego Certified Consultant List for Archaeological Resources

City of San Diego, Certified Principal Investigator for Monitoring Projects

County of Riverside Certified Cultural Resources Consultant Principal Investigator

County of Orange Certified Cultural Resources Consultant Principal Investigator

Approved lists in San Luis Obispo, Santa Barbara, Ventura, and Los Angeles Counties

SPECIAL TRAINING
40-Hour HAZWOPER Training

Mr. Cooley has more than 39 years of experience in archaeological resource management. He has directed test and data recovery investigations, monitoring programs, and archaeological site surveys of large and small tracts, and has prepared reports for various cultural resource management projects. He is well-versed in NHPA, NEPA, and CEQA regulations and processes. Mr. Cooley also has extensive experience with Native American consultation and monitoring for archaeological field projects involving human remains and reburial-related compliance issues.

PROJECT EXPERIENCE

Boulder Oaks, Sycamore/Goodan, and Lusardi Open Space Preserves and Regional Parks, Cultural Resources Inventories, San Diego County, CA
Supervisory Archaeologist
CLIENT: County of San Diego Department of Parks and Recreation
Supervisory Archaeologist for Phase I pedestrian survey and cultural resource inventories of Open Space Preserves and Regional Parks in unincorporated central San Diego County. The projects involved the identification and documentation of prehistoric and historic resources, built environment features, and existing infrastructure to assist the Department of Parks and Recreation in resource management. Inventory reports included extensive archival research and historical narrative, an inventory of identified sites, and management guidelines for potentially significant cultural resources developed in consultation with Native Americans where appropriate. Work performed prior to joining EDAW.

State Route 94 Operational Improvements Inventory and Evaluation, San Diego County, CA
Supervisory Archaeologist
CLIENT: Parsons Brinkerhoff
Supervisory Archaeologist of cultural resources field survey efforts, and documentation and evaluation related to proposed operational improvements along an 18-mile stretch of State Route 94 in San Diego County. Development of Caltrans-format documentation for archaeological and built environment resources. Work performed prior to joining EDAW.

Southern California Edison As-Needed Archaeological Services, Statewide
Supervisory Archaeologist
CLIENT: Southern California Edison
Supervisory Archaeologist for surveys, resource identification, documentation, testing, and evaluation efforts related to Southern California Edison infrastructure replacements and development throughout the state on both private and public lands, including BLM, USACE, and USFS. Project involved completion of State of California DPR forms, assessment of resource significance according to NRHP eligibility and CEQA significance criteria, and management recommendations. Work performed prior to joining EDAW.

Blackwater West Cultural Resources Phase I and Phase II Studies, Potrero, CA
Supervisory Archaeologist
CLIENT: Blackwater USA
Supervised the survey of an approximately 850-acre area in eastern San Diego County and the test excavation of identified prehistoric sites. Supervised the archaeological documentation, Extended Phase I testing, and Phase II

testing efforts under the County of San Diego Guidelines implemented in September 2006. Work performed prior to joining EDAW.

Circle P Ranch Housing Development Project, San Diego County, CA
Principal Investigator
CLIENT: Private
Principal Investigator for a Phase I cultural resources inventory and survey, and extended Phase I site testing program, involving a prehistoric and historic site, CA-SDI-17,910/H, located within the approximately 15-acre project property near Valley Center, San Diego County, California. Project duties consisted of supervision of fieldwork personnel, interaction with Native American monitors, and supervision and participation in the analysis and technical report preparation. The program was conducted under CEQA and local guidelines of the County of San Diego for the implementation of CEQA. Work performed prior to joining EDAW.

Blossom Valley Housing Development Project, San Diego County, CA
Principal Investigator
CLIENT: Private
Principal Investigator for a Phase I cultural resources inventory and survey, and extended Phase I site testing program, involving a prehistoric site, CA-SDI-17,968 within the approximately 50-acre project property in Blossom Valley, San Diego County, California. Project duties consisted of supervision of fieldwork personnel, interaction with Native American monitors, and supervision and participation in the analysis and technical report preparation. The program was conducted under CEQA and local guidelines of the County of San Diego for the implementation of CEQA. Work performed prior to joining EDAW.

Jacumba Community Park Restroom Facility National Register and CEQA Testing Program, San Diego County, CA
Principal Investigator
CLIENT: County of San Diego Department of Public Works (DPW)
Principal Investigator for a National Register and CEQA significance-testing program conducted at prehistoric archaeological site CA-SDI-17,979, to be impacted by the construction of a restroom facility within the Jacumba Community Park. Directed all project archaeological activities including analysis and report preparation. The project required interaction with DPW personnel and with Native American monitors. Work performed prior to joining EDAW.

Goleta General Plan EIR Cultural and Paleontological Resources Section, Santa Barbara County, CA
Task Manager
CLIENT: City of Goleta
Task Manager for, and participant in, the preparation of the cultural resources section of the EIR for the Goleta General Plan. The project required the gathering and synthesis of background information, existing conditions, paleontological data, and regulatory requirements, and interaction with local individuals and interest groups, and with personnel of the City of Goleta. Work performed prior to joining EDAW.

Big Sandy Casino, Fresno County, CA
Supervisory Archeologist
CLIENT: Big Sandy Rancheria
Supervisory Archeologist for a field survey and cultural resources site-testing program at a location for a proposed gaming facility near Friant, Fresno County, California. Project responsibilities included assisting in the supervision of field survey and site testing, and participation in report preparation.

30-inch Recycled Water Pipeline, Reservoir, and Pump Station, San Diego, CA
Principal Investigator
CLIENT: Otay Water District
Principal Investigator for a Historic Properties Inventory and Survey for a 6.1-mile 30-inch recycled water pipeline route, and for a reservoir site pump station, located in southeastern San Diego County, California. A National Register and CEQA significance-testing program was conducted at prehistoric archaeological site CA-SDI-17,668 to be impacted by the construction of the recycled water pipeline. Directed all project archaeological activities including analysis and report preparation. The project required interaction with the Otay Water District and private contractor personnel, and with Native American monitors. Work performed prior to joining EDAW.

Emerald Oaks Housing Development Project, Ramona, CA
Supervising Archaeologist/Co-Principal Investigator
CLIENT: Private
Project Supervising Archaeologist and Co-Principal Investigator for a cultural resources survey and extended Phase I site boundary testing and Phase II evaluation program involving five prehistoric sites within the 311-acre project property in Ramona, California. Project duties consisted of supervision of fieldwork personnel, and supervision and participation in the analysis and technical report preparation. The program was conducted under CEQA and local guidelines of the County of San Diego for the implementation of CEQA. Work performed prior to joining EDAW.

Crosby Estate Golf Course Development, San Diego County, CA
Supervising Archaeologist
CLIENT: Starwood Development Company
Project Supervising Archaeologist for a cultural resources evaluation and site-indexing program involving the C.W. Harris Site Complex and other adjacent historic and prehistoric sites within the project property and adjacent Open Space areas, in San Diego County, California. Project duties consisted of direction of fieldwork, monitoring of construction activities, and supervision and participation in the analysis and technical report preparation. The program was conducted for U.S. Army Corps of Engineers (USACE) 404 Permit compliance. Work performed prior to joining EDAW.

As-Needed Surveys for Geotechnical and Water Facility Construction Projects, San Diego, CA
Project Manager and Principal Investigator
CLIENT: San Diego County Water Authority
Project Manager and Principal Investigator for six archaeological survey and/or monitoring projects conducted over a three-year period. The programs, all situated in western San Diego County, California, consisted of evaluations through background research and field surveys of proposed drilling/boring sites, pump stations, and other facility locations, and, when required, monitoring of drilling/boring and facility construction operations situated in areas determined as sensitive. The Project included background research, field surveys, preparation of technical reports, interaction with Water Authority engineers for project redesign, and interaction with construction personnel for successful monitoring. Work performed prior to joining EDAW.

Oak Country Estates, Ramona, CA
Supervising Archaeologist/Co-Principal Investigator
CLIENT: Private
Project Supervising Archaeologist and Co-Principal Investigator for a cultural resources survey and extended Phase I site boundary testing and Phase II evaluation program involving 30 mostly late-prehistoric sites within the 648-acre project property in Ramona, California. Project duties consisted of supervision of fieldwork personnel, and supervision and participation in the analysis and technical report preparation. The program was conducted under

CEQA and local guidelines of the County of San Diego for the implementation of CEQA. Work performed prior to joining EDAW.

San Luis Rey Land Outfall Pipeline Alternatives Constraints Study, Oceanside, CA
Supervising Archaeologist/Co-Principal Investigator
CLIENT: Tetra Tech EM, Inc.
Principal Investigator, and overall Field Supervisor for this archaeological resource inventory and constraints study program, conducted in compliance with CEQA. The purpose of this Project was to assess the relative cultural resources impacts within four alternative route corridors for a proposed additional outfall pipeline from an existing inland water treatment plant to the ocean through the City of Oceanside, San Diego County, California. The project was conducted as a subcontractor for Tetra Tech EM, Inc., the primary contractor working for the City of Oceanside, and consisted of background research, spot check field survey of the alternative alignment corridors, and completion of the project data analysis and technical report preparation. Work performed prior to joining EDAW.

Davis-Eagle Property Archaeological Survey and Constraints Study, Ramona, CA
Supervising Archaeologist/Co-Principal Investigator
CLIENT: Private
Project Supervising Archaeologist and Co-Project Manager of an archaeological survey of 1,231 acres for a development constraints analysis, located near Ramona in San Diego County, California. The project required the discovery and recordation of all cultural resources on the property to provide data for an analysis of the constraints that cultural resources might represent, relative to future development of the property. Served as over-all supervisor of archaeological field and site recordation activities, co-managed the project, and conducted the cultural resources constraints analysis and report preparation. Work performed prior to joining EDAW.

San Pasqual Reclaimed Water Project Cultural Resources Inventory Study, San Diego, CA
Principal Investigator
CLIENT: City of San Diego Water Department
Principal Investigator for a cultural resources study of 8.15 miles of reclaimed water pipeline route and 12 acres of water tank facility construction in the City of San Diego, California. Project responsibilities included background research, field survey direction, and technical report preparation. The Project was conducted under CEQA and local guidelines of the City of San Diego for the implementation of CEQA. Work performed prior to joining EDAW.

Point Magu State Park Water Pipeline Route Archaeological Survey, Ventura County, CA
Principal Investigator
CLIENT: California State Department of Parks and Recreation
Principal Investigator for cultural resources survey of an 8-mile water pipeline route along Big Sycamore Canyon in Point Magu State Park, Ventura County, California. Project responsibilities included background research, field survey direction, GPS site location, and technical report preparation. The program was conducted under CEQA, prior to joining EDAW.

Malibu Creek State Park Archaeological Survey, Los Angeles County, CA
Principal Investigator
CLIENT: California State Department of Parks and Recreation
Principal Investigator for cultural resources survey of the 94-acre Tapia Park Sub-unit within Malibu Creek State Park, Los Angeles County, California. Project responsibilities included background research, field survey direction, GPS site location, and technical report preparation. The program was conducted under CEQA, prior to joining EDAW.

Cleveland National Forest Archaeological Overview, CA
Researcher/Document Co-Author
CLIENT: U.S.D.A. Forest Service
Participated in the preparation of the "Archaeological Overview for the Cleveland National Forest, California." The project consisted of a review and assessment of existing archaeological resources data on file at the Cleveland National Forest. Project responsibilities included participation in background research, data analysis, and technical report preparation. The Project was conducted in compliance with Section 110 of the NHPA of 1966, as amended. Work performed prior to joining EDAW.

Ramona Soils Source Project, Ramona, CA
Principal Investigator
CLIENT: County of San Diego Department of Public Works
Principal Investigator for Phase I survey of a 30-acre property and Phase II testing/evaluation program of prehistoric site CA-SDI-16,386 and historic site CA-SDI-16,399, located in the Ramona area of San Diego County, California. Supervised all project archaeological activities including data analysis and report preparation. The Project required interaction with the Native America Heritage Commission and with County of San Diego Department of Public Works personnel. Work performed prior to joining EDAW.

Naval Submarine Base Point Loma Data Recovery Project, San Diego, CA
Researcher/Document Co-Author
CLIENT: U.S. Navy, Southwest Division
Co-Author of the technical document "Archaeological Data Recovery Report For a Portion CA-SDI-48 at Buildings 139 and 158, Naval Submarine Base, San Diego." The Project consisted of a data recovery program conducted at National Register prehistoric archaeological site CA-SDI-48, located on the Point Loma Naval Submarine Base, San Diego, California. The program was conducted for the Navy through Southwest Engineering Facilities Division. Project responsibilities included participation in background research, data analysis, and report preparation. Work performed prior to joining EDAW.

Metromedia Fiber Optic Line Project, CA
Project Archaeologist
CLIENT: Environmental Services Associates (ESA)
Project Archaeologist for cultural resources studies conducted in compliance with CEQA, as administered by the California Public Utilities Commission (CPUC), of more than 300 miles of proposed routes for the emplacement of fiber optic cable lines along existing streets and railroad rights-of-way within San Francisco, San Mateo, Santa Clara, Alameda, Contra Costa, Marin, Los Angeles, Orange, and San Diego counties, California. Project involvement included background research, field surveys, site recordation, and technical report preparation. Work performed prior to joining EDAW.

Calvary Lutheran Church Data Recovery Project, Solana Beach, CA
Project Supervising Archaeologist/Co-Principal Investigator
CLIENT: Calvary Lutheran Church
Co-Principal Investigator for a data recovery program conducted at prehistoric archaeological site CA-SDI-10,238 (SDM-W-36), important under CEQA, located in the City of Solana Beach, San Diego County, California. Program responsibilities consisted of completion of background research, overall supervision of field personnel, and data analysis and technical report preparation. The program also required interaction with Calvary Lutheran Church personnel, Native American consultants, the City of Solana Beach, and the State Historic Preservation Office. Work performed prior to joining EDAW.

THEODORE COOLEY, RPA

Mexico/United States Colorado River Conveyance Facility, San Diego and Imperial Counties, CA
Principal Investigator
CLIENT: San Diego County Water Authority (SDCWA)
Principal Investigator for archaeological surveys and monitoring of geotechnical drilling/boring sites. The program consisted of evaluations, background research, and field survey of 26 proposed drilling/boring site locations and the subsequent monitoring of five of the drilling/boring operations situated in areas determined as sensitive. The locations were distributed along two proposed pipeline routes between San Vicente Lake and the Yuha Basin in southernmost San Diego and Imperial Counties, California. Project involvement included background research, field surveys, preparation of technical reports, and interaction with SDCWA, BLM, and USDA Forest Service. Work performed prior to joining EDAW.

Dry Creek Native American Gaming Facility, Sonoma County, CA
Project Archaeologist
CLIENT: Environmental Science Associates (ESA)
Project Archaeologist for cultural resources field survey of the location for a proposed gaming facility in the Dry Creek Valley area of Sonoma County, California. Project responsibilities included field surveys and report preparation. Work performed prior to joining EDAW.

Otay Travel Center Project, Otay Mesa, CA
Principal Investigator
CLIENT: Bennett Consolidated
Principal Investigator for a significance testing program of two prehistoric sites, CA-SDI-10,067 and CA-SDI-12,878, located in the Otay Mesa area of southernmost San Diego County, California. Directed all project archaeological activities including data analysis and report preparation. The Project required interaction with subcontractors and County of San Diego planning personnel. Work performed prior to joining EDAW.

City of American Canyon Wastewater Facility & Sewer Line Extension Routes, Napa County, CA
Project Archaeologist
CLIENT: Environmental Science Associates (ESA)
Project Archaeologist for cultural resources field surveys of proposed emplacement of sewer pipelines along future and existing city streets within the City of American Canyon, Napa County, California. Project responsibilities included field surveys, site recordation, and report preparation. Work performed prior to joining EDAW.

Fallbrook Naval Ordinance Center Historic Properties Inventory, Seal Beach, CA
Project Manager/Principal Investigator
CLIENT: U.S. Navy, Southwest Division
Project Manager, Principal Investigator, and overall Field Supervisor for an archaeological resource inventory program in San Diego County, California, that consisted of background research, field surveys of 5,800 acres, and completion of the project data analysis and technical report preparation. The program was conducted for the Naval Weapons Station through Southwest Engineering Facilities Division, in compliance with Section 110 of the NHPA of 1966, as amended. Work performed prior to joining EDAW.

Focused Data Recovery Project, San Juan Capistrano, CA
Supervising Archaeologist/Co-Principal Investigator
CLIENT: Talega Associates
Co-Principal Investigator for a focused data recovery program conducted at prehistoric archaeological site CA-ORA-907, Locus A, important under CEQA, located in the City of San Juan Capistrano, Orange County, California. Program responsibilities consisted of completion of background research, direct supervision of field personnel, data analysis, and technical report

preparation. The program also required interaction with Native American consultants and County of Orange personnel. Work performed prior to joining EDAW.

Naval Air Station Miramar EIS Cultural Resources Studies for the Base Realignment and Closure Project, San Diego, CA
Task Manager/Principal Investigator
CLIENT: U.S. Navy, Southwest Division
For more than 2 years, served as Task Manager and overall Field Supervisor for cultural resources studies with Principal Investigator responsibilities on this major cultural resource program in San Diego County, California. The program consisted of background research for, and field surveys of more than 3,500 acres for numerous proposed facility locations. Project duties consisted of overall direction of fieldwork, and supervision and participation in the project data analysis, technical report preparation, and field construction monitoring for USACE 404 Permit compliance. Work performed prior to joining EDAW.

Marine Corps Camp Pendleton Helicopter Outlying Landing Field Project, San Diego, CA
Project Manager/Principal Investigator
CLIENT: U.S. Navy, Southwest Division
Directed cultural resources studies as Project Manager and Principal Investigator for this three-year EA program, consisting of a Phase I inventory and Phase II evaluation for the construction of a helicopter outlying landing field on Camp Pendleton, California. Four alternative locations were inventoried and three prehistoric sites, located within the preferred alternative, were tested for National Register eligibility. Project duties included overall direction and supervision of the project fieldwork, data analysis, technical report preparation, and interaction with various Base and agency personnel. Work performed prior to joining EDAW.

Emergency Water Storage Project, San Diego, CA
Principal Investigator
CLIENT: San Diego County Water Authority
Principal Investigator for archaeological surveys and site evaluations. This large-scale project lasted for more than two years, and included field surveys of more than 3,500 acres for alternative reservoir sites and appurtenant facilities, and approximately 40 miles of alternative pipeline routes. It included interaction with local Native American groups. Work performed prior to joining EDAW.

Point Loma Submarine Base Data Recovery, San Diego, CA
Project Manager/Co-Principal Investigator
CLIENT: Evaluation Research Company, Inc.
Project Manager and Co-Principal Investigator for a data recovery program conducted at National Register prehistoric archaeological site CA-SDI-10,945, located on the Point Loma Naval Submarine Base, San Diego, California, for the Navy. Program required interaction and coordination with Naval Base personnel, interaction with the State Historic Preservation Office and with the Advisory Council on Historic Preservation. Work performed prior to joining EDAW.

Mission Valley West Light Transit Limited Data Recovery, San Diego, CA
Task Manager/Principal Investigator
CLIENT: Metropolitan Transit District Board
Task Manager and Principal Investigator for a Limited Data Recovery Program conducted at National Register prehistoric archaeological site CA-SDI-11,767, located on the Star Dust Golf Course, San Diego, California. Program required interaction and coordination with Native American Monitors and USACE personnel for 404 Permit requirements. Work performed prior to joining EDAW.

THEODORE COOLEY, RPA

East Mission Gorge Interceptor Pump Station and Force Main Cultural Resources Data Recovery, San Diego, CA
Co-Project Manager/Principal Investigator
CLIENT: PCL Civil Constructors, Inc.
Principal Investigator and Co-Project Manager for a data recovery program conducted at National Register eligible, prehistoric archaeological site CA-SDI-9,243 to be impacted by construction of a reclaimed water force main pipeline located in the City of San Diego. Directed all project archaeological activities including analysis and report preparation. The Project required interaction with City of San Diego Water Utilities personnel and Native American monitors. Work performed prior to joining EDAW.

Otay Ranch Planned Development Archaeological Reconnaissance Survey, Chula Vista, CA
Co-Project Manager/Principal Investigator
CLIENT: City of Chula Vista and County of San Diego
Principal Investigator and Co-Project Manager of an archaeological survey of 6,000 acres of proposed development on three parcel areas of the 23,088-acre Otay Ranch, located in San Diego County, California. The Project required evaluation of all cultural resources on the ranch property. Directed archaeological activities, co-managed the project, supervised analysis and report preparation, and interacted with County of San Diego and City of Chula Vista personnel. Work performed prior to joining EDAW.

Crown Point and Rose Creek Portion of the Mission Bay Sewage Interceptor System Phase V Archaeological Testing Program-Department No. 90-0540, San Diego, CA
Project Manager/Principal Investigator
CLIENT: City of San Diego Water Utilities Department
Principal Investigator and Project Manager for a testing program of two large prehistoric sites, CA-SDI-11,571 and CA-SDI-5,017, during Phase V of the Water Utilities Mission Bay Sewage Interceptor System Project involving the emplacement of pipelines along City streets in the Crown Point and Rose Creek areas, adjacent to Mission Bay. Directed all project archaeological activities, including analysis and report preparation. The Project required interaction with construction subcontractors and City of San Diego Water Utilities personnel. Work performed prior to joining EDAW.

Pipeline Studies, Santa Barbara County, CA
Project Manager
CLIENT: All American Celeron Pipeline Company
Project Manager for more than 3 years on this major cultural resource program that consisted of surveys of alternative pipeline routes, testing of sites to be impacted, final data recovery on 17 prehistoric sites, monitoring of construction activities, and planning and coordination with local Native American groups and Native American monitors, in Santa Barbara County, California. Work performed prior to joining EDAW.

Air Force Housing Archaeological Study, Los Angeles County, CA
Supervising Archaeologist
CLIENT: U.S. Army Corps of Engineers
Project Supervising Archaeologist of a testing program of three sites on the Palos Verdes Peninsula, Los Angeles County, California, for the United States Air Force. Directed field work and participated in analysis and report preparation. Work performed prior to joining EDAW.

Texaco Marine Terminal Construction, Santa Barbara County, CA
Co-Principal Investigator/Supervising Archaeologist
CLIENT: Texaco Trading and Transportation Company
Co-Principal Investigator and Project Supervising Archaeologist for more than 1 year for the Texaco Marine Terminal Construction Project, a cultural resources evaluation and data recovery program involving one historic and four prehistoric sites in Gaviota, Santa Barbara County, California. Project

duties consisted of direction of fieldwork and construction monitoring activities, planning and coordination with local Native American groups and Native American monitors, and supervision and participation in analysis and report preparation. Work performed prior to joining EDAW.

Point Arguello Pipeline Studies, Santa Barbara County, CA
Co-Principal Investigator/Supervising Archaeologist
CLIENT: Chevron, USA
Project Archaeologist with responsibilities as Field Director and Co-Principal Investigator for more than 3 years on this major cultural resource program that consisted of surveys of alternative pipeline routes, testing of sites to be impacted for National Register assessment, final data recovery on 34 National Register quality sites, monitoring of construction activities, and planning and coordination with local Native American groups and Native American monitors, in Santa Barbara County, California. Work performed prior to joining EDAW.

Southwest Power-Link Transmission Line Corridor, Imperial County, CA
Field Director
CLIENT: San Diego Gas & Electric
Field Director for a major, 2-year, archaeological Data Recovery Program that included monitoring of portions of 35 sites along a 27-mile transmission line corridor located in the Picacho Basin and East Mesa areas for Southwest Power-Link, Imperial County, California. Field Director responsibilities included coordination and supervision of three crew chiefs and their field crews, a field laboratory director and laboratory crew, BLM agency personnel, and local Native American groups and Native American monitors. Work performed prior to joining EDAW.

Development Archaeological Studies, Mission Viejo, CA
Project Archaeologist/Field Director
CLIENT: Mission Viejo Land Development Company
Project Archaeologist/Field Director of archaeological surveys of 2,700-acre, 3,000-acre, and 7,000-acre development properties, and of a testing and data recovery program of prehistoric archaeological site CA-ORA-947 to be impacted by planned development, located in Mission Viejo, Orange County, California. Directed the field work and conducted the analysis and report preparation. Work performed prior to joining EDAW.

Archaeological Data Recovery Program, Los Angeles County, CA
Project Archaeologist/Field Director
CLIENT: Cayman Development Company
Project Archaeologist/Field Director of both the test and salvage excavations of prehistoric archaeological sites CA-LAN-844 and CA-LAN-845, located on Palos Verdes Peninsula, Los Angeles County, California. Directed the field work and conducted the analysis and report preparation. Work performed prior to joining EDAW.

Land Development Archaeological Studies, Huntington Beach, CA
Project Archaeologist/Field Director
CLIENT: Signal Landmark Properties, Inc.
Project Archaeologist/Field Director of test, and Co-Field Director of data recovery excavations of archaeological site CA-ORA-183, in the City of Huntington Beach, Orange County, California. Directed field work, conducted analysis and report preparation of the testing phase, and co-directed and participated in analysis and report preparation of the data recovery phase. Work performed prior to joining EDAW.

THEODORE COOLEY, RPA

PUBLICATIONS

Cooley, T., and Laura J. Barrie. 2004. Archaeological Excavation at the Village of Pámu, Ramona Valley, California. *Proceedings of the Society for California Archaeology*, Vol. 17, pp. 43-56.

Cooley, T. 1998. Observations on Settlement and Subsistence During the Late La Jolla Complex-Preceramic Interface as Evidenced at Site CA-SDI-11,767, Lower San Diego River Valley San Diego County, California. *Proceedings of the Society for California Archaeology*, Vol. 11, pp. 1–6.

Cooley, T. 1995. Early Period Results from Data Recovery Conducted on a Portion of Stratified Prehistoric Site, CA-SDI-9,243, San Diego County, California. *Proceedings of the Society for California Archaeology*, Vol. 8, pp. 227–238.

Cooley, T. 1992. Observations on Hydration Measurements of Obsidian Deriving from Buried Deposits from Site CA-SBA-2028, at Gaviota, Santa Barbara County, California. *Coyote Press Archives of California Prehistory*, No. 37, pp. 27–38.

Cooley, T. 1992. Junior author with Jon M. Erlandson, Roy Dugger, and Richard Carrico. Archaeological Investigations at CA-SBA-97: a Multicomponent Coastal Site at Gaviota, California. *Coyote Press Archives of California Prehistory*, No. 37, pp. 49–80.

Cooley, T. 1989. Contributing author. Archaeological Investigations on the Rancho San Clemente, Orange County, California. Principal author Constance Cameron. *Coyote Press Archives of California Prehistory*, No. 27.

Cooley, T. 1987. Junior author with Jon M. Erlandson and Richard Carrico. A Fluted Projectile Point Fragment from the Southern California Coast: Chronology and Context at CA-SBa-1951. *Journal of California and Great Basin Anthropology* Volume 9, Number 1, pp. 120–128.

Cooley, T. 1985. Junior author with Marie Cottrell, Constance Cameron, Vada Drummy-Chapel, and Adella Schroth. Excavations and Investigations at CA-Ora-183, the Newland House Site, Huntington Beach, California. *Pacific Coast Archaeological Society Quarterly* Volume 21, Number 1, January, pp. 1–77.

Cooley, T. 1984. The Biface Reduction Technique Exhibited at a Southern California Quarry Workshop Site: LAn-844. *Pacific Coast Archaeological Society Quarterly* Volume 20, Number 3, July pp. 5–17.

Cooley, T. 1980. Junior author with Marie G. Cottrell and Joyce M. Clevenger. Investigations of CA-SCal-137 Bulrush Canyon, Catalina Island, California. *Pacific Coast Archaeological Society Quarterly* Volume 16, Numbers 1 and 2, January and April, pp. 5–25.

PAPERS AND PRESENTATIONS

Cooley, T. 2008. Dating at the Spindrift Site Relative to Other La Jolla Sites and the Adjacent San Diego Coastal Area. Paper presented at the Society for California Archaeology Meetings, Burbank, California, March.

Cooley, T. 2006. Continuing Discoveries of the San Dieguito and Other Cultural Patterns In and Around the C.W. Harris Site (SDI-149). Paper presented at the Society for California Archaeology Meetings, Ventura, California, March.

Cooley, T., and L. Barrie. 2003. Archaeological Excavation at the Village of Pámu, Ramona Valley, California. Paper presented by the junior author at the Society for California Archaeology Meetings, Sacramento, California, March.

THEODORE COOLEY, RPA

Cooley, T. 1998. Review of the Biface Reduction Technique Exhibited at a Southern California Quarry Site. Paper presented at the Society for California Archaeology Meetings, San Diego, California, March.

Cooley, T. 1997. Observations on Settlement and Subsistence During the La Jolla Complex-Preceramic Interface as Evidenced at Site CA-SDI-11,767, Lower San Diego River Valley, San Diego County, California. Paper presented at the Society for California Archaeology Meetings, Rohnert Park, California, March.

Cooley, T. 1994. Results of a Data Recovery Program Conducted on a Portion of Stratified Prehistoric Site CA-SDI-9,243, San Diego County, California. Paper presented at the Society for California Archaeology Meetings, Ventura, California, March.

Cooley, T. 1991. Investigations at CA-SBa-2028. Paper presented at the Society for California Archaeology Meetings, Sacramento, California, March.

Cooley, T. 1991. Description and Analysis of Biface Artifacts Recently Excavated from the C. W. Harris Site Complex, San Diego County, California. Paper presented at the Society for California Archaeology Meetings, Sacramento, California, March.

Cooley, T. 1990. Preliminary Analysis and Description of Biface Artifacts Recently Excavated from the C. W. Harris Site Complex, San Diego County, California. Paper Presented at the Society for California Archaeology Southern California Data Sharing Meeting, Riverside, California, October.

Cooley, T. 1984. Diagnostic Artifacts and Temporal Considerations at Rancho San Clemente: A Preliminary Appraisal. Paper Presented at the Society for California Archaeology Southern California Data Sharing Meeting, Fullerton, California, October.

Cooley, T. 1984. Thermal Applications and Lithic Tool Manufacture and Use at LAn-844. Paper presented at the Society for California Archaeology Meetings, Asilomar, California, March.

Cooley, T. 1983. The Biface Reduction Technique Exhibited at a Southern California Quarry Site. Paper presented at the Southwestern Anthropological Society Meetings, San Diego, California, March.

Cooley, T. 1983. Project Results of the Picacho Basin Studies. Paper presented at the Society for California Archaeology Meetings, San Diego, California, March.

Declaration of
Cara Corsetti

I, Cara Corsetti, declare as follows:

6. I am presently employed by SWCA, Inc. as Office Principal.

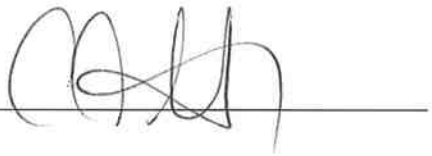
7. A copy of my professional qualifications and experience are attached hereto and incorporated herein by reference.

8. The attached testimony on Paleontological Resources was either prepared by me or under my direction for the Mojave Solar project based on my independent analysis, supplements thereto, data from reliable sources, and my professional experience and knowledge.

9. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed herein.

10. 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: May 14, 2010 Signed: 

At: South Pasadena, California

SWCA
ENVIRONMENTAL CONSULTANTS

CARA CORSETTI, M.S.
Office Principal

Education / Training

- M.S., Geological Sciences, emphasis in Paleobiology, University of California, Santa Barbara, 2007
- B.A., Creative Studies, interdisaplinary degree with an emphasis in Biology, Geology, and Paleontology, University of California, Santa Barbara, 1999
- NHPA Section 106 Training, University of Nevada, Reno, 2002
- CEQA Regulatory Compliance, Association of Environmental Professionals, 2002, 2003

Experience Summary

Cara Corsetti, Office Principal of SWCA Environmental Consultants' Pasadena and Half Moon Bay offices, specializes in the direction and management of multi-disciplinary technical studies and environmental assessments conducted in support of environmental documents, particularly in the disciplines of cultural resources, natural resources, historic preservation, geoarchaeology and paleontology. Her current responsibilities include agency and client coordination and facilitation, program development, proposal writing and project management, budget preparation and oversight, managing and coordinating the tasks of technical and administrative staff, conducting environmental assessments, and the production and editing of technical reports.

With over 18 years of management experience, Ms. Corsetti has been involved in more than 350 projects throughout California, Nevada, Colorado, Wyoming, and Utah and has experience working on a multitude of project types, including oil and gas pipelines, transmission lines, seismic projects, as well as geothermal, natural gas, wind and photovoltaic projects. She has successfully worked with various lead agencies such as the Federal Energy Regulatory Commission (FERC), the Bureau of Land Management (BLM), Caltrans, and the California Energy Commission (CEC).

Ms. Corsetti has been certified through the California Energy Commission (CEC) as a Paleontological Resource Specialist (PRS) on a project-specific basis for multiple projects throughout California during pre-construction and construction phases of various small and large power plants and associated linear facilities. She has worked on 22 power projects under CEC jurisdiction in either the permitting or construction phase. She is a member of the following professional organizations: Society of Vertebrate Paleontology, Society for Sedimentary Geology (SEPM), Geological Society of America, Paleontological Society, and Association for Environmental Professionals.

SWCA Relative Project Experience

Stockton Generation Project; San Joaquin, Stanislaus, and Merced counties, California (2009): Senior Paleontologist for paleontological resources studies in support of the Application for Certification (AFC) for a 530 MW natural gas power plant and associated linear facilities. Served as coauthor and quality control officer for draft paleontological survey report, as well as the AFC section. *Role: Principal Investigator. Client: Power Engineers, Inc.*

Victorville 2 Hybrid Power Project; San Bernardino County, California (2006- present): SWCA is currently providing paleontological resources management services for this project; the scope of work includes (1) performing background research and museum records searches of the project area and vicinity, (2) conducting paleontogical field survey, and (3) preparating a technical report that includes project-specific mitigation measures to be implemented during the ground disturbing associated with the 250-acre plant site, associated utility lines, and approximately 20 miles of transmission line right-of-way. *Role: Project Manager. Client: AECOM.*

Kings River Conservation District Peaking Plant; Fresno County, California (2004-2005): As the project manager and one of the CEC-approved Paleontological Resource Specialists for this project, Ms. Corsetti was responsible for overseeing all paleontological tasks associated with the construction of a small peaking plant located in Fresno County, California. Prior to the commencement of project construction, a paleontological resources survey and assessment was performed of the approximately 18-acre project plant site and associated utility lines. A paleontological monitoring and mitigation program (PRMMP) was designed to identify and salvage scientifically significant paleontological resources and associated data as rapidly as possible in order to prevent construction delays. Additionally, SWCA prepared and implemented the worker environmental awareness training program for paleontological resources as per the project Conditions of Certification. Paleontological monitoring by SWCA's CEC-certified paleontological monitors was performed during the construction of the plant site. A final monitoring report documenting the results of the monitoring program was prepared and submitted to the client. *Role: Paleontological Resource Specialist / Project Manager. Client: Navigant Consulting for the Kings River Conservation District and the California Energy Commission.*

Cosumnes Power Project; Sacramento County, California (2003 – 2005): SWCA assisted Sacramento Municipal Utilities District (SMUD) officials with the implementation of the project's Conditions of Certification, as required by the California Energy Commission (CEC) during a major construction effort for a power plant site, a new gas pipeline, and other facilities. SWCA's team of paleontologists designed and implemented a worker environmental awareness training program for paleontological resources per the project's Conditions of Certification, performed a field survey and conducted soils testing and paleontological sensitivity analysis, and prepared and implemented a Paleontological Resources Monitoring and Mitigation Program for the project. Ms. Corsetti was approved by the CEC as one of the Paleontological Resource Specialists for the project and was responsible for overseeing all paleontological tasks. *Role: Paleontological Resource Specialist. Client: Sacramento Municipal Utilities District.*

Riverside Energy Resource Center; Riverside County, California (2004 - 2005): SWCA was retained by Power Engineers, Inc., to provide support of an application by the Riverside Public Utilities to the California Energy Commission (CEC) for a Small Power Plant Exemption (SPPE) for the Riverside Energy Resource Center (RERC) in the city of Riverside and subsequent paleontological services during the construction of the RERC and associated transmission line. As Paleontology Task Manager, Ms. Corsetti was responsible for overseeing paleontological work, including (1) museum records searches and literature reviews, (2) reconnaissance field surveys, (3) design and preparation of a Paleontological

Monitoring and Mitigation Plan (PRMMP), (4) design and implementation of a worker environmental awareness program, and (5) implementation of monitoring and mitigation services. *Role: Paleontological Resource Specialist/ Paleontology Task Manager. Client: Power Engineers, Inc.*

Declaration of
Gregory S. Darvin

I, Gregory S. Darvin, declare as follows:

1. I am presently employed by Atmospheric Dynamics, Inc. as Senior Meteorologist.

2. A copy of my professional qualifications and experience are attached hereto and incorporated herein by reference.

3. I am adopting the attached testimony on Air Quality and Plume Visibility for the Mojave Solar project based on my independent analysis 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 herein.

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: May 26, 2010 Signed: 

At: Santa Barbara, California

GREGORY S. DARVIN
Senior Project Meteorologist

Summary of Experience

Mr. Darvin has specialized in the meteorological aspects of air quality issues for the last fifteen years. He has extensive experience in air quality modeling, monitoring, permitting, complex terrain model development and implementation, emission inventory and health risk assessments. Mr. Darvin also has extensive experience in air quality operational permits (Title V), especially for the oil and gas industry. His experience spans more than 20 different states and several countries.

Specific project experience includes emissions calculations, modeling of impacts, evaluation of regulatory applicability and compliance, New Source Review (NSR) and Prevention of Significant Deterioration (PSD) permitting, and minor source permitting. He has used and is thoroughly familiar with a number of air quality models, including AERMOD, ISC3, CALPUFF, CALMET, COMPLEX I AND II, IGM, FDM, RTDM, CTSCREEN, CTDMPLUS, UAM, DEGADIS, SPILLS, VISCREEN, PLUVUEII, MESOPUFF, INPUFF, BLP, PAL, CAMEO, CALINE4, OCD5, RAM, TRACE, MM5, SLAB, and the Paris Airshed Model. These models have been used in scientific and development settings as well as in regulatory settings.

Education
MS Atmospheric Science, San Francisco State University, 1993

BA Physical Geography/Meteorology, University of California, Santa Barbara, 1985.

Professional Affiliations
Air and Waste Management Association
American Meteorological Society

Select Project Experience
A representative selection of Mr. **Darvin's projects is included below.**

Prevention of Significant Deterioration - North Island Navel Air Station, San Diego. Task leader for preparing emissions inventory, modeling assessment, and BACT determination for North Island NAS. San Diego APCD required North Island to prepare a PSD application for mobile and stationary sources located throughout the facility. Modeling demonstrated compliance with PSD increments.

Pico Power Project, City of Santa Clara.. Project Manager and lead air quality modeler for permitting a 200 MW power plant in the City of Santa Clara, Ca. Prepared and negotiated air quality permit with BAAQMD and prepared air section(s) of AFC for the California Energy Commission.

Cogeneration Facility Permitting, Fellows Generating Company. Task Leader for air quality section of an Authority For Certification (AFC) in the San Joaquin Valley, Ca. Project required completion of a federal PSD permit application, air quality impact modeling analysis in both near and distant from the source, BACT demonstration, LAER determination, emission reduction credit and offsets, and assessment of Class I area impacts. Project was completed in less than 8 weeks.

Select Project Experience (continued)

Roseville Electric Project, City of Roseville, Ca. Project Manager for air quality analysis related to a proposed new 200 MW natural gas fired power plant. Analysis included evaluation of Class I impacts, visibility impacts, complex terrain, and cooling tower plume modeling.

Russel City Energy Center, Calpine Project Manager for obtaining PSD permit and AFC for a large natural gas fired power plant, located near Hayward, Ca. Project required detailed emission calculations, air quality modeling, combined impact assessments, BACT analysis and demonstration, Title IV compliance, and Title V compliance issues.

Metcalf Energy Center, Calpine. Lead air quality modeler for modeling a large natural gas fired power plant, located near San Jose, Ca. Project included using refined modeling techniques to determine nitrogen deposition impacts, Class I analysis, and downwash analysis.

Otay Mesa Generating, Calpine. Lead Meteorologist for permitting large power plant, located near San Diego, Ca.. Project included Class I impacts, a nitrogen deposition impact assessment, and a downwash analysis in complex terrain. Modeling was used to prepare PSD permit application as well as the AFC application which was submitted to CEC.

Steel Mill Permitting, Birmingham Steel. Project Manager for preparing two PSD permis for two large steel mills in Arizona and Illinois. Project included emissions calculations, air quality modeling, fugitive dust impact modeling, and control technology analysis. Project also required evaluation of the impacts to regional visibility. Not only obtained the permit, but also negotiated favorable permit condition for the facility.

PSD Permitting of Large Gas-Line Compressors, Williams Field Services. Project Manager and Lead Air Quality Scientist for PSD permitting of large gas line compressor station in New Mexico. Project required complex terrain modeling and extensive combined impacts analysis.

Health Risk Assessment, Capital Castings. Project Manager and Lead Engineer for preparation of health risk assessment at two steel mills in Arizona. Project involved calculation of emissions of hazardous air pollutants (both point source and fugitive emissions), dispersion modeling, and evaluation of impacts to human populations from exposure to these pollutants. Sophisticated modeling techniques had to be used to evaluate potential multi-path health risk impacts.

Select Project Experience (continued)

Preparation of a PSD Permit for a large natural gas processing plant, Williams Natural Gas.. Project manager and senior modeler for preparation of a PSD permit in Wyoming. Project included offsets, BACT assessments, Class I impacts and regulatory review. Project was completed in four weeks and was deemed complete by the agency without any comments.

Arctic Ocean Permitting, Arco Alaska. Task Leader and lead modeler for the first OCS permit ever submitted to the USEPA. Permit was for several off-shore oil exploration drilling platforms in the Arctic Ocean off Alaska. Project involved use of OCD to calculate impacts from exploratory drilling rig and support vessels. Impacts at ANWR were also assessed.

Mesoscale Complex Terrain Model Development, Italian Government and Alyeska. Developed a mesoscale complex terrain wind field model to determine impacts of topographically induced winds on a large man-made lake in the Italian Alps. This model has also been used to diagnose trajectories of potential oil spills in Alaskan waters.

Lead Dispersion and Deposition Study, ASARCO, Leadville, Colorado. Lead scientist for assessing potential deposition of lead from smelting operations over a 130 year period. Results of emissions calculations, modeling and deposition were used to develop a soils sampling program and subsequent cleanup criteria.

Mobile Source Emissions Impacts, Various Locations, California. Air Quality Task Leader for large scale transportation projects including the Route 168 extension in Fresno, California; the Highway 4 grade lowering and widening project in Contra Costa County California; the 880/92 interchange in Hayward, California, and the Bay Area Rapid Transit (BART) extension in the Dublin, Pleasanton, and San Leandro areas.

Clean Fuels Refinery Modification, Chevron, Los Angeles, California. Lead air quality modeler for preparation of an Environmental Impact Report (EIR) and New Source Review permit for a large refinery modification in Los Angeles to support the Clean Fuels Program. Project also included toxic emissions calculations and preparation of a Health Risk Assessment.

GEP Stack Height and Downwash Analysis, San Diego Gas & Electric, Chula Vista, California. Performed air quality impact analysis, regulatory applicability review, and GEP stack height analysis and down wash calculations for a proposed utility power augmentation project in Chula Vista, California.

Offsite Consequence Analysis, Unocal, Sacramento, California. Project Manager for an offsite consequence analysis to assess potential impacts of accidental releases of ammonia from a fertilizer plant located in southwest Sacrament. Analysis also required identification of potential release scenarios.

Declaration of
Jessica L. DeBusk

I, Jessica L. DeBusk, declare as follows:

1. I am presently employed by SWCA, Inc. as the Paleontology Lead.

2. A copy of my professional qualifications and experience are attached hereto and incorporated herein by reference.

3. The attached testimony on Paleontological Resources was either prepared by me or under my direction for the Mojave Solar project based on my independent analysis, supplements thereto, data from reliable 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 herein.

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: May 14, 2010 Signed: 

At: South Pasadena, California

SWCA
ENVIRONMENTAL CONSULTANTS

JESSICA L. DEBUSK, B.S.
Paleontology Lead

Education / Training

- B.S., Geology, emphasis in Paleobiology, Mackay School of Mines, University of Nevada, Reno, 2002

Experience Summary

Ms. DeBusk is project manager and paleontology program lead at SWCA's South Pasadena office. She has over seven years of experience in all aspects of paleontology, including conducting paleontological field surveys and assessments; construction-related excavation monitoring; fossil salvaging and matrix sampling; specimen identification; laboratory preparation and analysis of micro- and macrofossils; and preparation of technical documentation and final reports. She has field and laboratory experience in paleobotany, micropaleontology, invertebrate paleontology, and vertebrate paleontology.

As a project manager and paleontologist at SWCA, Ms. DeBusk has extensive experience in conducting paleontological resource management for a variety of projects including transmission lines, oil and gas development, pipelines, power generation, and residential and commercial developments. She has worked on projects throughout the state of California with federal, state, and local agencies such as the Bureau of Land Management, the California Energy Commission (CEC), Sacramento Municipal Utility District, and San Diego Gas and Electric. Ms. DeBusk is a BLM-approved field supervisor on paleontological use permits in the states of California and Nevada.

SWCA Project Experience

Stockton Generation Power Project, Paleontological Resources Survey and Assessment; San Joaquin, Merced, and Stanislaus Counties, California (2009): Directed paleontological field surveys and identified and assessed the paleontological resource potential of the project area. Served as author of the paleontological resources technical report and the paleontological resources section of the application for certification (AFC). *Role: Paleontological Resources Specialist and Field Director. Client: Powers Engineers.*

MOCO 3D Seismic Survey; Kern and San Luis Obispo Counties, California (2009-2010): Managed Class III Cultural Resources Survey in support of 82 square mile oil exploration project. Responsibilities included staffing and managing large field crew and project management. *Client: Oxy USA WTP, LP.*

Palmdale Power Project, Paleontological Resources Survey and Assessment; Palmdale, Los Angeles County, California (2008–2009): Directed field surveys and identified and assessed the paleontological resource potential of the project area. Served as author of the paleontological resources technical report. *Role: Paleontological Resources Specialist and Field Director. Client: ENSR Corporation.*

Ridgecrest, Palen, and Blythe Solar Power Projects, Paleontological Resources Surveys and Assessments; Kern and Riverside Counties, California (2009-2010): Directed field surveys and identified and assessed the paleontological resource potential of the project areas. Served as author of the paleontological resources technical report and paleontology sections of the Applications for Certification (AFC). *Client: AECOM-Environment.*

Mojave Solar Project, Paleontological Resources Survey and Assessment and Geoarchaeological Testing; San Bernardino County, California (2009-2010): Directed paleontological field surveys and identified and assessed the paleontological resource potential of the project area. Served as author of the paleontological resources technical report and the paleontological resources section of the application for certification (AFC). Managed geoarchaeological testing of project site. *Role: Paleontological Resources Specialist and Project Manager. Client: Abengoa Solar Inc.*

Garkane Tropic to Hatch 138 kV Transmission Line Project EIS, Paleontological Resources Survey and Assessment; Garfield and Kane Counties, Utah (2008–2009): Performed paleontological resources assessment of proposed linear transmission line alignment. Authored technical report and EA section. *Role: Paleontological Resources Specialist. Client: JBR Environmental.*

Iron Mountain Substation Off-site Improvement Project, Paleontological Resources Monitoring and Mitigation; Clark County, Nevada (2009): Served as project manager and paleontology field superisor during contruction monitoring services during trenching and excavations related to project development. *BLM-Approved Paleontological Field Agent and Project Manager. Client: Nevada Energy.*

Coyote Springs 138 kV Transmission Line Project, Paleontological Resources Survey and Assessment; Lincoln and Clark Counties, Nevada (2007–2008): Performed paleontological resources field survey and assessment of proposed transmission line alignment. Recorded significant paleontological resource localities and in cooperation with the BLM, delineated avoidance areas. *Role: Paleontological Resources Specialist and Project Manager. Client: Electrical Consultants, Incorporated.*

Kings River Conservation District Community Power Plant, Fresno and Tulare Counties, California (2008): Requested museum records searches and performed a comprehensive literature and geologic map review for the proposed project area and vicinity. Conducted comprehensive field survey and identified and assessed the paleontological resource potential of the project area. Served as author of the paleontological resources technical report. *Role: Paleontological Resources Specialist and Project Manager. Client: Navigant Consulting.*

Beacon Solar Power Project, Paleontological Resources Survey and Assessment; California City, California (2008): Directed field surveys and identified and assessed the paleontological resource potential of the project area. Authored the paleontological resources technical report. *Role: Paleontological Resources Specialist and Field Director. Client: AECOM.*

Black Rock Power Project, Paleontological Resources Survey and Assessment; Imperial County, California (2008-2009): Directed field surveys and identified and assessed the paleontological resource potential of the project area. Authored the paleontological resources technical report. *Role: Paleontological Resources Specialist and Field Director. Client: AECOM.*

Sunrise TAP Transmission Line Project EA, Paleontological Resources Technical Studies; Clark County, Nevada (2007–2008): Directed field surveys and identified and assessed the paleontological

resource potential of the project area. Authored the paleontological resources technical report. *Role: Paleontological Resources Specialist. Client: Powers Engineers and Nevada Power Company.*

Sunrise Powerlink Transmission Line Project EIR / EIS, Paleontological Resources Technical Studies; San Diego and Imperial Counties, California (2006–2008): Identified and assessed the paleontological resource potential of the 200+ mile project alignment and authored the paleontological resources section of the EIR/EIS. *Role: Paleontological Resources Specialist. Client: Aspen Environmental Group.*

Declaration of

Gregory T. Farrand

I, Gregory T. Farrand, declare as follows:

1. I am presently employed by Ninyo & Moore as Principal Geologist.

2. A copy of my professional qualifications and experience are attached hereto and incorporated herein by reference.

3. The attached testimony on Geological Resources was either prepared by me or under my direction for the Mojave Solar project based on my independent analysis, supplements thereto, data from reliable 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 herein.

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: May 24, 2010 Signed: 

At: San Diego, California

GREGORY T. FARRAND, PG, CEG

PRINCIPAL GEOLOGIST

EDUCATION

Masters in City Planning, 1976, San Diego State University

B.S., Geology, 1969, California State University, Northridge

REGISTRATIONS AND CERTIFICATIONS

PG 3645 (California)

CEG 1087 (California)

EXPERIENCE HIGHLIGHTS

Mojave Solar Project

Mission Trails Pipeline Tunnel

Olivenhain Dam

Blythe Energy Center

Yreka-Weed Transmission Line

MMC Energy Escondido Repowering

MMC Chula Vista Energy Center

Pine Tree Wind Project

BC Renewables Energy Cable

PROFESSIONAL AFFILIATIONS

American Public Works Association

American Society of Civil Engineers

American Water Works Association

Association of Engineering Geologists

San Diego Association of Geologists

Society of American Value Engineers

Mr. Farrand's professional experience includes geologic and geotechnical investigations for treatment plants, reservoirs, dams, tunnels, pipelines, highways, bridges, power plants, quarries, groundwater resources, and environmental impact reports. Mr. Farrand has authored scientific papers on fault and landslide hazards, and coastal bluff stability in southern California and Baja California. He has performed extensive field mapping, analyses of borings and trenches, seismic refraction surveys, remote sensing surveys, and environmental studies. His responsibilities consist of technical direction to the staff of geologists and field personnel, and in-house Quality Assurance/Quality Control review of investigations and analyses on geologic, hydrogeologic, and geotechnical projects.

REPRESENTATIVE PROJECT EXPERIENCE

Pine Tree Wind Project, Tehachapi Mountains, Kern County, California: Principal-in-Charge during a preliminary geotechnical evaluation for the environmental impact report (EIR) and preliminary design of the Pine Tree Wind Project. The joint Los Angeles Department of Water and Power (LADPW), Zilkha Renewable Energy and General Electric Wind Energy project consists of 20-square-miles of land located in the vicinity of Pine Tree Canyon, Jawbone Canyon and Little Jawbone Canyon in the Tehachapi Mountains. The project includes 80 to 120 1.5-megawatt turbine generators, over 50 miles of access roads, substation and an 11-mile long electrical transmission line with lattice towers. Mr. Farrand reviewed background data; provided oversight of the geologic reconnaissance by an Engineering Geologist; and prepared a Geotechnical Reconnaissance Report with illustrations presenting our findings, conclusions and preliminary recommendations for inclusion as a technical section of the Environmental Impact Report. Issues include nearby active faulting, strong ground motions, regional seismicity, landslides, unstable slopes, erosible soils, foundations and mineral resources. The active Garlock Fault, Sierra Nevada Frontal Fault System and Owens Valley Fault are located near the project site.

Mojave Solar Project, San Bernardino County, California: Principal-in-Charge for geotechnical consulting services during the permitting, environmental impact documentation and design phase of the Mojave Solar Project. Performed a geotechnical evaluation for the solar power plant and associated improvements. The main site consists of three sections of land (3-square miles) located along the south edge of Harper Lake in the Mojave Desert near Barstow. The project involves installing solar arrays, cooling towers, turbines, boilers, administration and control buildings, utilities and ancillary facilities on the site. Services included a geologic reconnaissance, geotechnical subsurface evaluation with test pits and borings, a fault trench investigation of an active fault identified by the California Geological Survey as a Earthquake Fault Hazard Zone (AP Fault Zone) on portions of the site, laboratory testing and analysis. A geotechnical evaluation report was prepared.

REPRESENTATIVE PROJECT EXPERIENCE (continued)

Blythe Energy Center, Riverside County, California: Principal-in-Charge of a geotechnical subsurface evaluation for a 550-megawatt combustion turbine power plant, with evaporative cooling towers, switching yard and concrete-line evaporation pond. The project includes a 9-mile long natural gas pipeline extending from the power plant to its tie-in with the El Paso Natural Gas Pipeline in Ehrenberg, Arizona. The gas pipeline will cross beneath the Colorado River, Goodman Slough, levees and railroad tracks by horizontal directional drilling (HDD) methods. The geotechnical engineering report for the power plant included information on soil and geologic conditions, active faulting, seismic design criteria, liquefaction potential, and water table depth. Recommendations for mitigation of adverse geologic conditions, earthwork and grading, foundations, lateral earth pressures, paving, and design of three water supply wells at the plant were included in the report. The report for the gas pipeline addressed geologic and seismic hazards and included recommendations regarding excavatability, trench wall stability, suitability of materials for backfill, dewatering, shoring, modulus of subgrade reaction (E'), pipeline bedding, and soil corrosivity. For the HDD crossings, the report addressed the feasibility of alternative boring technologies, cover depths for scour, operating pressures, and drilling fluids based on geotechnical conditions. Services included response to California Energy Commission questions.

Wadham Biomass Facility, Williams, Colusa County, California: Principal-in-Charge of geotechnical consulting United American Energy's (UAE) Wadham Biomass Facility, the world's largest rice waste-to-energy plant. The plant recycles approximately 200,000 tons per year of rice waste (hulls and chaff) in order to generate up to 29.5 megawatts of energy. Power is sold under contract to the Pacific Gas & Electric Company and Rice hull silica is Wadham's primary by-product. Ninyo & Moore's role involved evaluating the cause(s) for leakage of over 1 million gallons of water to the ground surface from the plant. Services included the review of background data on the existing facilities (pipelines, storage tanks, utilities, silos, generators, etc.); review of hydrostatic pressure test data; review of data from prior geotechnical and hydrogeologic studies; borings; ground water monitoring wells, water level measurements, water quality analyses; laboratory tests; performance of a geotechnical reconnaissance to observe the site conditions and facilities; and preparation of a geotechnical report with our findings, conclusions and recommendations.

Kern Canyon Hydroelectric Generating Facility, Kern County, California: Project Manager to provide geotechnical consulting services as part of an Initial Study/EIR for the divestiture of Pacific Gas & Electric's (PG&E) Kern Canyon Hydroelectric Generating Facility on the Kern River in the Sequoia National Forest approximately 15 miles below Lake Isabella, Kern County, California. The project was a part of an EIR for the divestiture of PG&E's other hydroelectric power generation assets in California. The Kern Canyon site included a 11.5 MW powerhouse, switchyard, penstock consisting of 520-foot long riveted steel pipe, concrete diversion dam with 3-acre reservoir, tunnel intake, and 8,363-foot long Kern CanyonTunnel. Our services included the review of the Proponent's Environmental Assessment (PEA) and PG&E's Application 99-09-053, a geologic field reconnaissance; a review of stereoscopic and oblique aerial photographs; a review of geologic, seismic, geotechnical, environmental, and water quality reports; analysis of the data; and the preparation of a draft technical memorandum report presenting our findings and conclusions. The draft report addressed issues such as ground surface fault rupture, seismic ground shaking, seismically induced ground failure, liquefaction, seiche, ground subsidence, landslides, slope stability, thermal springs, compressible and expansive soils.

Declaration of
William Graham

I, William Graham, declare as follows:

1. I am presently employed by AECOM as Principal.

2. A copy of my professional qualifications and experience are attached hereto and incorporated herein by reference.

3. The attached testimony on Land Use and Socioeconomics was either prepared by me or under my direction for the Mojave Solar project based on my independent analysis, supplements thereto, data from reliable 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 herein.

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: May 27, 2010 Signed: 

At: San Diego, California

William Graham, MCP
Principal

Education
MCP, Urban and Regional Planning, San Diego State University, 1992
BA, Phi Beta Kappa, Cultural Anthropology, San Diego State University, 1980

Professional Affiliations
Member, American Planning Association (APA)
Member, Association of Environmental Professionals (AEP)

Mr. Graham has more than 25 years of experience in the environmental and urban planning field. His professional experience ranges from municipal planning and permit review, to management of large-scale environmental studies, to expert witness testimony concerning the application of federal environmental regulations. He has a broad geographic base of experience. This has led to a thorough understanding of the application of National Environmental Policy Act (NEPA) in a wide variety of contexts. He has also gained a familiarity with the environmental regulations of various states.

Mr. Graham has extensive experience in the conduct of environmental documentation processes for large-scale developments. These have included public infrastructure facilities ranging from large above-ground reservoirs to highway projects, and private developments ranging from major casinos to planned residential communities. Gained in this experience is a profound understanding of the applicability of the entire gamut of state and federal environmental regulation, and insight into strategies to assure regulatory compliance while achieving project objectives.

Mr. Graham's extensive record of managing NEPA documentation projects has allowed him to gain a detailed knowledge of the other, resource-specific aspects of federal environmental regulation. He is knowledgeable in the consultations with the SHPO under the provisions of Section 106 of the NHPA. He is experienced in the application of the provisions of the Endangered Species Act, and was the manager for a project which was one of the first to be permitted under Section 10 of the Act. Many of his projects have required permitting under the Clean Water Act, and he is experienced in evaluating projects for Clean Air Act compliance.

Mr. Graham has prepared environmental documentation for review by a wide variety of federal lead agencies. These include the FERC, FAA, FCC, ACOE, USFS, USFWS, U.S. Navy, Federal Transit Authority, BLM, the Bureau of Indian Affairs, and the National Indian Gaming Commission. He is familiar with the NEPA implementation procedures of each of these entities. He has also submitted environmental documentation to many state regulatory agencies. As most of his career has been spent in California, he is very familiar with the preparation of environmental documentation under the provisions of the California Environmental Quality Act (CEQA).

Mr. Graham has always played an active role in professional organizations. He has served on the Chapter Board of Directors of both APA and AEP and is a former President of AEP. He has delivered papers at several state AEP conferences and national APA conventions.

Project Experience

Energy Projects

FPL Energy, LLC, Beacon Solar Energy Development, California City, CA
Provided oversight for all biological permitting efforts (including, wildlife biology and botany) and oversight of archaeological and architectural surveys and technical reports. We worked with FPL Energy to develop an Application for Certification (AFC) for the California Energy Commission to permit the development of a 250 MW solar thermal power plant in the Mojave Desert of California. This project proposes to use a well-established parabolic trough solar thermal technology to produce electrical power using a steam turbine generator. The generator receives heated transfer fluid from solar thermal equipment composed of arrays of parabolic mirrors. Because of the large acreage required for this project (over 2,000 acres), potential impacts and mitigation for biological resources are major issues. AECOM has provided overall biological services, cultural resources, land use planning, and socioeconomics analysis to develop the environmental sections of the AFC for the client.

Mojave Solar Project, San Bernardino County, CA
Oversaw the environmental studies supporting preparation of an Application for Certification (AFC) for the California Energy Commission. The project proposed to develop a 500 MW solar thermal power plant on over 4,000 acres in the Mojave Desert located in the vicinity of Harper Lake, San Bernardino County, California. The solar project is proposed to comprise 2,200 acres of parabolic trough arrays, with the rest of the site reserved for future plant expansion upon finalization of power purchase agreements. Environmental technical studies include biological services (permitting, habitat conservation plan, wildlife biology and botany surveys, and multiple mitigation monitoring plans), cultural resources (archaeological and architectural surveys and associated technical reports), land use, and socioeconomic analysis. Major project species concerns include the desert tortoise (Mojave population), Mohave ground squirrel, and western burrowing owl. The corresponding sections of the Application for Certification (AFC) for the California Energy Commission will also be prepared.

Solar Millennium Energy Projects – California Desert
Overseeing the environmental studies supporting preparation of Applications for Certification (AFC) for the California Energy Commission. Solar Millennium proposes to develop three commercial solar thermal electric power generating projects located in the desert areas of California. Totaling 2,000 MW, the projects would utilize solar parabolic trough technology to generate electricity. Environmental technical studies include biological services (permitting, habitat conservation plan, wildlife biology and botany surveys, and multiple mitigation monitoring plans), cultural resources (archaeological and architectural surveys and associated technical reports), land use, and socioeconomic analysis. Major project species concerns include the desert tortoise (Mojave population), Mohave ground squirrel, and western burrowing owl. The corresponding sections of the Application for Certifications (AFC) for the California Energy Commission have been prepared.

San Diego Gas & Electric (SDG&E) Facilities - Cleveland National Forest EA, San Diego County, CA
Cleveland National Forest (CNF) desires to consolidate the different easements and access roads used by SDG&E into a single use permit application. Under direction of Project Manager Mr. Graham, we are preparing an Environmental Assessment, as well as supporting technical documentation, to support this application. As the quality of existing locational data is variable, our staff are performing GPS surveys of SDG&E facilities within the CNF for transfer to GIS-generated maps. Cultural resource and biological surveys are being performed. We are also managing a consultation with the US Fish and Wildlife Service under Section 7 of the Endangered Species Act concerning the

potential effects of SDG&E's operational and maintenance activities within the CNF upon federal listed species.

Intergen 230kV Transmission Line EA, California to Mexico
Currently serving as Project Manager for the preparation of an EA for a 230kV overhead electrical power transmission line and will compose the U.S.-routed portion of an electrical transmission line interconnecting the proposed Energia De Baja California Power Project in Mexico with an existing 230kV Substation in Imperial Valley, California, owned by the SDG&E. The transmission line will be routed east of, and parallel to, the existing 230kV transmission line that connects the La Rosita Substation to the aforementioned Imperial Valley substation. The EA will be submitted jointly to the BLM and the Department of Energy. A Presidential Permit will be required from the Department of Energy in order to cross the border.

Intergen DeAnza Pipeline EIR, Ehrenberg, AZ to Calexico, CA
Managed preparation of environmental studies prepared in support of a licensing application submitted to the FERC. The license would apply to the construction and operation of a 20-inch natural gas pipeline. The pipeline route crosses the Colorado River, open desert areas under the jurisdiction of the BLM, irrigation facilities, and agricultural areas in the Imperial Valley. Our staff conducted all necessary biological and archaeological technical surveys. An analysis of pipeline routing relative to the BLM's land management objectives under the California Desert Conservation Area Plan was conducted.

Moapa Power Plant EIS, Clark and Lincoln Counties, NV
Managed preparation of environmental technical studies in support of an EIS for a proposed new 760 mw, natural gas-fired electrical generation plant on the Moapa Indian Reservation in southern Nevada. The EIS also addresses power transmission lines on the Reservation and on adjacent land under the jurisdiction of the BLM. The Lead Agency for the EIS is the BIA, with the BLM serving as a Cooperating Agency. Our staff performed cultural resource and biological surveys, the latter including directed surveys for desert tortoise. Limited testing of cultural resources in order to determine site significance was performed. Technical reports were prepared for both issues. A visual impact analysis of the proposed plant and transmission lines was prepared in conformance with BLM Visual Resource Management methodologies.

SDG&E Valley-Rainbow 500 kV Transmission Line Proponent's PEA, CA
Managed preparation of technical studies prepared in support of a PEA for a proposal by SDG&E to construct a 500 kV transmission line connecting Southern California Edison's Valley substation with a proposed new SDG&E substation in Rainbow, California. A total of 67 miles of potential transmission route linkages were analyzed. Links were eliminated or modified based on an analysis. These linkages were reduced to seven primary routing alternatives, ranging between 28 and 37 miles each, that were carried forward into the PEA. Our staff was responsible for the biological, cultural resource, and socioeconomic components of the analysis. Extensive use of GIS-based mapping layers derived from the Western Riverside County Multiple Species Habitat Conservation Plan were utilized in the biological analysis of routing alternatives. Our staff was also responsible for consultation with Native American tribes.

Park Projects

County of Riverside Laborde Canyon State Vehicle Recreation Area, Riverside County, CA
As Project Principal, currently overseeing the work of staff and various subconsultants in the planning and preparation of a General Plan and EIR for a new State Vehicle Recreation Area (SVRA) in the Badlands area of Riverside County, California. When approved by the state Off-Highway Vehicle Commission, the project will be the first SVRA to be developed in California in more than 20 years. The project encompasses a site measuring 1,360 acres in size, and will feature a variety of facilities for off-highway vehicle use, including motocross tracks, single-track trails, and hill-climbs. The use of the site is assumed in the Western Riverside County Multi-Species Habitat Conservation Plan. More than 6,000 acres of mitigation land will be purchased and protected as conserved habitat as part of project implementation.

California Department of Parks and Recreation Doheny State Beach, Dana Point, CA
As Project Principal, Mr. Graham is directing staff in the preparation of the Doheny State Beach General Plan and EIR. The scope of services for the General Plan is to update the park's Purpose, Vision, and Goals based on an evaluation of user needs, physical and environmental constraints, and community compatibility. Major issues that have been identified for evaluation are the need for improvement to park facilities, expanded interpretive program, protection of

the marine environment, external open space linkages, and traffic circulation to, and within, the park. Public meetings have been held to solicit input and to select a Preferred Alternative and other alternatives for concurrent evaluation in the EIR. The joint document will include all mandatory requirements of CEQA will detail actions to be taken to respond to major issues identified for park operations and resource protection.

Land Development Projects

Bureau of Land Management (BLM) East San Diego County Resource Management Plan and Environmental Impact Statement, San Diego, CA
Currently managing preparation of a Resource Management Plan (RMP) and EIS for 98,902 acres of BLM land in the southern California desert. The RMP must provide for a variety of recreational uses within the planning area. It must protect designated Critical Habitat for the endangered peninsular bighorn sheep, while at the same time allowing continued use of long-standing grazing allotments where feasible. An extensive public outreach and scoping process is underway. The draft RMP will require consultation with the USFWS under Section 7 of the Endangered Species Act.

City of Maryland Heights Creve Coeur Area Land Use Plan, Maryland Heights, MO
Managed preparation of a 6,000-acre Specific Plan. The plan will guide future land and infrastructure development within the portion of the city that is within the 100-year floodplain of the Missouri River currently devoted almost exclusively to agriculture. Phased infrastructure improvements include seven miles of 500-year levee, an internal drainage system designed to detain the runoff from the 75-square mile area of the St. Louis suburbs which empties into the project area, and two expressways. Some 2,000 acres within the project will be retained in agricultural use or will consist of conserved or restored wetlands as mitigation for future development. This would allow 4.8 million square feet of additional office space over a 25-year period. An additional 7.5 million square feet of various industrial, commercial, and entertainment uses would also be called for in the plan.

Imperial County General Plan EIR, Imperial County, CA
As part of the EIR for the Imperial County General Plan, prepared the land use impact analysis. The principal issue in this analysis was the potential land use effects of the plan's designation of several new commercial and industrial development areas outside of the county's already developed urban areas. Concerns were raised regarding the potential decline of these older cores if new development was channeled to newly designated sites.

County of Riverside Stephens Kangaroo Rat Habitat Conservation Plan EIS, Riverside County, CA
As Project Manager, supervised preparation of a Habitat Conservation Plan and EIS submitted by the County of Riverside, California, under Section 10(a) of the Endangered Species Act. Approval of the plan allowed land development to proceed outside habitat reserves essential for the species' survival. The Plan resulted in the creation of ten habitat reserves, based initially upon roughly twelve-thousand acres of public land owned or managed by the BLM, the Metropolitan Water District, the County, and the University of California.

County of San Diego Upper San Diego River Improvement Project EIR, Lakeside, CA
As Project Manager, supervised the environmental review, and permitting for this 596-acre river reclamation project. The project area is host to sensitive riparian resources, including several endangered songbird species. The plan established a total of 362 acres of future light industrial and commercial development; water quality objectives and wetlands permit conditions were satisfied via the use of restored riparian habitat.

Native American Projects

Agua Caliente Band of Cahuilla Indians New Casino, Palm Desert, CA
Served as project manager for an EA of the proposed new casino on the Agua Caliente Band of Cahuilla Indians Reservation. The proposed new casino will be located on a 36-acre parcel. An environmental impact analysis was conducted to address land use, traffic circulation, noise, air quality, drainage/water quality, visual aesthetics, public services/utilities, public safety, cultural resources, biological resources, geology/soils, and socioeconomics. Based on the analysis, an EA has been prepared and conforms to the specifications of the Tribal Environmental Policy Act.

Eastern Band of Cherokee Indians Harrah's Casino Expansion, Cherokee, NC
Served as project manager to provide environmental services for the construction of the Harrah's Cherokee Hotel and Conference Center. The hotel is adjacent to the existing

Harrah's casino on the Eastern Band of Cherokee Reservation. Environmental issues addressed include land use, traffic circulation, noise, air quality, hydrology, water quality, visual aesthetics, public services, public safety, cultural resources, biological resources, geology/soils, socioeconomics, and hazardous materials. For each issue, relevant baseline data is being collected. The collection and analysis of data related to each of the identified environmental issues is being documented into technical studies in preparation for the EA.

Rincon San Luiseno Band of Mission Indians Casino EA, Valley Center, CA
Managed environmental consulting services for the proposed Harrah's casino on the Rincon Indian Reservation. An EA was conducted to address land use, traffic circulation, noise, air quality, hydrology, water quality, visual aesthetics, public services, public safety, cultural resources, biological resources, geology/soils, and socioeconomics. Directed surveys were conducted for listed species. Upon completion of the analysis, an EA was prepared to cover the proposed gaming facility development. The EA conformed with the specifications of NEPA 40 CFR 1508.9 and the Tribal Environmental Policy Act.

Barona Band of Mission Indians Casino Off-Reservation Environmental Impact Analysis, San Diego County, CA
Managed environmental impact documentation for the proposed expansion of the casino resort on the Barona Indian Reservation. The documentation of this analysis will fulfill the requirements of Sec. 10.8.1 of the Tribal-State Gaming Compact and the Barona Band of Mission Indians environmental protection ordinance. Staff prepared an environmental checklist form, conducted environmental impact analysis of water, traffic circulation, noise and air quality issues. Mitigation measures were formulated and an environmental document prepared summarizing the analysis.

Lakes Kean-Argovitz Resorts Jamul Fee-to-Trust Acquisition Constraints Report, Jamul, CA
Managed consulting services in support of the Jamul Band of Mission Indian's efforts to acquire additional 85-acres of land. Assisted the Band and Lakes Kean-Argovitz Resorts in future decisions pertaining to the properties and concerning interactions with local, state, and federal regulatory agencies. These interactions will be triggered by efforts to have the subject acreage taken into trust status by the U.S. for the Jamul Band.

Eastern Band of Cherokee Indians Casino EA, Cherokee, NC
Managed all environmental analysis and permitting for the 175,000-square foot gaming facility on the Cherokee Reservation in western North Carolina. Phase II archaeological testing determined that the proposed building location was underlain by a prehistoric habitation site eligible for listing on the NRHP. Consultation with the Tribe and the North Carolina State Historic Preservation Officer led to development of a memorandum regarding the protection of the site and the relocation of the gaming facility on the site. The project's effects upon regional traffic circulation was an important issue. Level-of-Service analyses were conducted at roadway segments and intersections in the project vicinity. Intersection and lane improvements were incorporated into the project. A Nationwide 26 Permit from the ACOE to allow fill of jurisdictional wetlands. Hydrological analysis was submitted to FEMA to demonstrate no rise in the floodwaters of Soco Creek, a perennial stream bordering the site.

Capital Gaming International Cow Creek Gaming Facility Expansion EA, Canyonville, OR
Managed preparation of an EA for the Cow Creek Band of Umpqua Tribe of Indians examining a 23,722-square foot expansion to the existing Cow Creek Gaming Facility. Project consisted of expanded gaming floor space, a new restaurant, a 156-room hotel, a convention facility, and a new wastewater treatment plant. Facility parking was expanded to 1,377 spaces. Principal environmental issues were the potential effects upon freeway ramps connecting the facility with Interstate 5, and the potential new demands placed upon community services and infrastructure.

Harrah's Entertainment Prairie Band of Potawatomi Indians Gaming Facility EA, Marietta, KS
As Project Manager, supervised preparation of an EA for the Prairie Band of Potawatomi Indians, in association with Harrah's Entertainment, Inc., for a 63,000 square foot casino located 17 miles north of Topeka, Kansas. The project involved construction of a 1.5-mile roadway connecting the project site with US 75. Technical studies prepared included a cultural resource survey, a wetlands delineation, and a biological survey. Mr. Graham supervised preparation and submittal of a 404 Permit application required by the ACOE for the relocation of approximately 900 feet of intermittent stream channel and associated wetland impacts.

Capital Gaming International Narragansett Indian Gaming Facility EA, Charlestown, RI
The Narragansett Indian Gaming Facility is a proposal by the Narragansett Tribe, in association with Capital Gaming International, to develop a gaming facility on Tract 6 of Tribal lands. The initial development project would consist of a 112,440 square-foot structure, including a 66,500 square-foot gaming floor. The development would feature a terraced parking lot with spaces for 1,500 cars. As Project Manager, Mr. Graham oversaw preparation of a series of technical studies for the project, and managed a large team of local subconsultants. A salient issue was the project's potential effects on the roadway network in southern Rhode Island. Additional important issues were the need to treat wastewater on-site and to discharge the treated effluent into an aquifer feeding Indian Cedar Swamp, a Wildlife Management Area.

Squaxin Island Tribe Gaming Facility EA, Kamilche, WA
Environmental staff managed by Mr. Graham, as well as several locally based subconsultants under his direction, conducted the environmental analysis required to prepare an EA for the Squaxin Island Tribe's 35,000 square foot gaming facility. The gaming operation and related facilities are located on a 20-acre tribal trust site south of Shelton, Washington. Potential land use conflicts with Mason County land use designations for the site were studied. As the site is located at an interchange of Highway 101 and SR-108, the project's traffic circulation impacts were assessed. Of particular concern was the potential conflict between casino patrons accessing the facility and heavy use of the state route by logging trucks. Skookum and Little Creeks, which cross the site, are very productive salmon streams; potential project effects to water quality were a prime tribal and regulatory concern. Several options for wastewater treatment and disposal were examined.

Agua Caliente Band of Cahuilla Indians Gaming Facility EA/ND, Palm Springs, CA
Mr. Graham was the Project Manager for the EA/EIR prepared for a proposal by the Agua Caliente Band of Cahuilla Indians, in association with Caesars World Resorts, Inc., to build a gaming facility on tribal trust land of the Agua Caliente Indian Reservation. The 8-acre gaming facility site is located in the central district of the City of Palm Springs. The ultimate 80,000 square-foot gaming facility will feature approximately 40,000 square-feet of gaming area and retail, dining, entertainment, and casino support uses. A series of phased improvements, several involving the active participation of the City are proposed as part of the eventual gaming facility development. These consist of the abandonment of street segments for pedestrian and vehicular access, parking, and other uses; demolition of outdated buildings and parking lots. Phased development of these outlying properties with accessory uses would then occur on a site encompassing approximately 20 acres. The environmental impact analysis conducted under Mr. Graham's direction covered the full range of potential issues. The analysis was incorporated into the EA reviewed and processed by the National Indian Gaming Commission. Prominent issues included traffic circulation, air quality, noise, cultural resources, and visual assessment.

Tonto Apache Tribe Mazatzal Casino EA, Payson, AZ
The Tonto Apache Tribe, in conjunction with Capital Gaming International, is currently operating a 35,000 square foot casino outside of Payson, Arizona adjacent to SR-87. Mr. Graham managed preparation of an EA that examined the project's potential effects on municipal functions such as fire and medical responses and the provision of water. A key issue was the identification of required traffic improvements at the intersection of the Reservation's access road with SR-87. As the Reservation is surrounded by Tonto National Forest, the relationship of the project the USDA Forest Service management objectives and identified visual resources required assessment.

Muckleshoot Tribe Casino and Off-Track Betting Complex, Auburn, WA
Environmental staff and locally based subconsultants, under the direction of Mr. Graham, prepared an EA for the Muckleshoot Casino and Off-Track Betting Complex. The 63,900 square foot project is located on a 25-acre parcel on the Muckleshoot Reservation within the corporate boundaries of the City of Auburn, Washington. Extensive traffic analyses were prepared concerning intersections and roadway segments in the project vicinity. A Municipal Services Agreement was negotiated between the City of Auburn and the Tribe. It arranged for the payment of certain service and hookup fees by the Tribe and the Tribe's participation in a City-wide Traffic Signal Interconnect Project.

Water and Wastewater Projects

San Diego County Water Authority (SDCWA) Regional Colorado River Conveyance Feasibility Study, San Diego, CA
Served as Project Manager for this binational study evaluated the feasibility of conveying Colorado River water directly to the Tijuana-San Diego region. Alternative aqueduct alignments, segments of which were on either side and crossed the border, were evaluated for feasibility of construction and supply reliability. An environmental screening analysis was conducted for the various alignments and associated facility improvements. The environmental analysis included evaluation under both the National Environmental Policy Act (NEPA) and Mexico's *Ley General del Equilibrium Ecológico y la Protección al Ambiente* (LGEEPA). This included binational coordination with the Mexican environmental consultant. Additional areas of review included the North American Free Trade Agreement, International Boundary and Water Commission regulations, and BECC certification requirements.

City of Virginia Beach Southern Canals EA and Permitting, Virginia Beach, VA
Managed preparation of an EA and permit applications for this project involving maintenance of several drainage canals located in the southeastern portion of the City which is typically flat and at low elevation. The USDA originally constructed the canals in the 1950s. The growth of vegetation, collection of debris, and accumulation of sediment through lack of maintenance has decreased the capacity of these drainageways to accommodate storm events and resulted in flooding of upland properties. Desired maintenance activities included dredging to establish original dimensions and removal of vegetation and debris. The Norfolk District of the ACOE required submittal of an individual permit and was the Lead Agency for the accompanying EA.

San Diego County Water Reclamation Master Plan, San Diego County, CA
Managed preparation of an EIR concerning the environmental effects of the upgrade of all County-operated wastewater facilities to a treatment standard allowing human contact with effluent. The project results in a supply of reclaimed water for use at twenty-eight designated water reuse areas in the unincorporated portion of the County. The public health effects of the reclaimed water use were assessed. Biological and cultural resource surveys of all facilities were performed.

Sweetwater Authority Reservoir Urban Runoff Diversion System EIR, San Diego County, CA
Managed preparation of an EIR for a system of structures installed to divert urban runoff, particularly the "first-flush" following periods of extended drought, thereby protecting this 12,650 acre-foot reservoir. The effects upon endangered species and wetlands were analyzed, and necessary permits obtained from regulatory agencies.

SDCWA Pipeline 4B, San Diego and Riverside Counties, CA
Managed the preparation of an EA, associated environmental technical studies and surveys, and permitting for the San Diego County Water Authority's Pipeline 4B, a 96-inch diameter pipeline extending approximately 90 miles. Pipeline 4B is the largest of three parallel raw water pipelines together comprising the Second San Diego Aqueduct, which transports a blend of Colorado River and California Aqueduct water to the storage and distribution facilities of the San Diego County Water Authority.

Olivenhain Municipal Water District Water Storage Project EA, San Diego County, CA
Managed preparation of EA for construction of a 310-foot high, 2,400-foot long dam, creating a 24,000 acre-foot reservoir. Technical studies performed for biological resources, cultural resources, visual quality and air quality. Consultation with the USFWS required under Section 7 of the Endangered Species Act to identify mitigation for project impacts to the California gnatcatcher and to coastal sage scrub habitat.

Ramona Municipal Water District Sewer Master Plan EIR, Ramona, CA
Managed preparation of an EIR for the plan. The Master Plan identified treatment facilities, pipelines, and disposal areas that will be needed to serve build-out conditions within the water district. Growth inducement, land use, and hydrology/water quality were the key issues reviewed.

Transportation Projects

San Joaquin Council of Governments State Route 4 Cross-town Extension, Stockton, CA
As Project Principal, oversaw preparation of the Preliminary Environmental Assessment Report (PEAR) for this $250-million freeway extension. The project involved development of two alternatives for a 4-mile extension of SR-4 to Charter Way. The project will also improve the access to the Port of Stockton and in turn remove trucks from crossing through an

adjacent neighborhood. A Draft Relocation Impact Study was prepared to evaluate the impact for the removal of 35 homes. The PEAR identified Environmental Justice as a key issue in the future environmental documentation as a result of the project's potential division of a Traditionally Disadvantaged Population.

San Diego Association of Governments (SANDAG) Mid-City Rapid Bus Project, San Diego, CA
SANDAG proposed implementation of the Mid-City Rapid Bus Project to replace an existing bus route and add a new 10-mile limited-stop route between downtown and San Diego State University (SDSU). Improvements to support the rapid bus route are focused within segments of the Park Boulevard and El Cajon Boulevard corridors and include transit priority measures and new enhanced rapid bus stations at 10 major intersections. Project Principal for the project which includes deployment of visually distinctive buses, improvements for pedestrian safety, and several street system modifications to improve local traffic flow. We will prepare a Mitigated Negative Declaration for the project.

County of Los Angeles, Department of Public Works Old Road – Lake Hughes Road to Hillcrest Parkway EA/EIR Los Angeles County
Principal-in-charge of our preparation of an EA/EIR in support of the widening and realignment of Old Road in northern Los Angeles County. Interstate 5 (I-5) is adjacent and parallel to the project limits and is the major transportation corridor link between northern and southern California. Old Road serves as an alternate route for local commuters and provides a viable option for travelers and regional commerce during closures/emergencies on I-5.

County of San Francisco Transportation Authority Yerba Buena Island Ramps EIR/EIS, San Francisco, CA
Principal-in-charge of a proposed project that would replace the existing westbound on-ramp and the westbound off-ramp located on the eastern side of Yerba Buena Island with a new westbound on-ramp and a new westbound off-ramp connecting to the new San Francisco Bay Bridge, which is currently under construction. We are preparing an EIR/EIS along with the entire suite of supporting technical studies. Due to National Register-listed historic resources on the island, the Section 106 and Section 4(f) issues associated with the project are critical. The project is being reviewed by District 4 of the Department as a Local Assistance project sponsored by the San Francisco County Transportation Commission (SFCTC).

LA County Department of Public Works SR 90 Extension/Admiralty Way EIR/EIS, Marina del Rey, CA
Managed preparation of a an EIR/EIS for a one-mile extension of SR 90 and the widening of a 4-mile segment of Admiralty Way under contract to the LA County Department of Public Works. Project is a Local Assistance project with Caltrans District 7. Major issues include right-of-way acquisition, resulting in a need for Relocation Study and a Section 4(f) Evaluation, noise impacts on sensitive receptors, building evaluations, and community opposition to increased traffic on connecting surface streets.

City of Santa Clarita Cross Valley Connector EA/EIR, Santa Clarita, CA
Managing staff and subconsultant services to the City of Santa Clarita for the Cross Valley Connector project, a 2.1-mile new arterial roadway that includes a bridge across the Santa Clara River. The project is a Local Assistance project in Caltrans District 7. We have prepared a series of Caltrans-format technical studies, including an HPSR for cultural resources and an NESR for biological resources. The latter reported on surveys for the listed California gnatcatcher and arroyo toad. An EA/EIR is being prepared for the project.

Dokken Engineering for the City of Solana Beach I-5/Lomas Santa Fe Interchange BA and MND, Solana Beach, CA
Managed preparation of a BA necessitated by a determination that project grading would disturb approximately 0.4 acre of disturbed coastal sage scrub habitat within Unit 3 of the designated Critical Habitat for the California gnatcatcher. Our staff prepared the BA in accordance with the Caltrans format. The mitigation measures outlined include the off-site replacement of the disturbed habitat at a 2:1 ratio and the revegetation of all disturbed areas within the project area with DCSS vegetation. During preparation of the BA, it became apparent that the previously circulated MND for the project, prepared by a different consultant, was obsolete. Our staff revised the MND and coordinated its noticing and circulation in cooperation with Caltrans and City of Solana Beach staff. We drafted a new Finding of No Significant Impact (FONSI), and participated in the hearing process.

Dokken Engineering for the City of Encinitas I-5 Manchester Avenue Interchange, San Diego County, CA
Managing environmental consulting services for the Interstate 5/Manchester Avenue interchange. The project is being funded through SANDAG as a Caltrans Local Assistance Program project. Initial tasks consist of

preparation of a Project Study Report and a determination regarding eventual documentation requirements pursuant to the NEPA/CEQA. It is anticipated that the potential environmental effects are such that an EIS/EIR will be required.

City of Palm Springs Indian Canyon Drive and Bridge Widening, Palm Springs, CA
Managing the preparation of natural resource, cultural resource, air quality, and noise technical reports. Directed surveys for sensitive species, including Coachella Valley milk vetch, desert tortoise, and Coachella Valley ground squirrel. Includes preparation of Initial Site Assessment and Preliminary Environmental Assessment for Caltrans Local Assistance project. Preparation of Initial Study/Environmental Assessment followed by anticipated preparation of Negative Declaration/Finding of No Significant Impact.

County of Riverside Laborde Canyon State Vehicle Recreation Area, Riverside County, CA
As Project Principal, currently overseeing the work of staff and various subconsultants in the planning and preparation of a General Plan and EIR for a new State Vehicle Recreation Area (SVRA) in the Badlands area of Riverside County, California. When approved by the state Off-Highway Vehicle Commission, the project will be the first SVRA to be developed in California in more than 20 years. The project encompasses a site measuring 1,360 acres in size, and will feature a variety of facilities for off-highway vehicle use, including motocross tracks, single-track trails, and hill-climbs. The use of the site is assumed in the Western Riverside County Multi-Species Habitat Conservation Plan. More than 6,000 acres of mitigation land will be purchased and protected as conserved habitat as part of project implementation.

City of Del Mar North Torrey Pines Bridge EA/ND, Del Mar, CA
Mr. Graham is currently managing our provision of environmental consulting services for the seismic retrofit of the North Torrey Pines Bridge. The project involves coordinating with Caltrans District 11 offices, and reviewing existing environmental and historic resource reports prepared by the City of San Diego and Caltrans. The NCTD right-of-way crossing beneath the bridge is a major issue in project development. We are preparing a Historic Property Survey Report (HPSR) for submittal to Caltrans, the Federal Highway Administration (FHWA), and the State Historic Preservation Officer (SHPO). Other tasks included advising the City of Del Mar on their compliance with the CEQA and the NEPA, and attending Del Mar City Council and Historic Site Board meetings.

Clark County Regional Transportation Commission South Resort Corridor Intermodal Transit Station, Las Vegas, NV
As Project Manager, prepared an EA, in accordance with Federal Transit Administration NEPA regulations for a proposed intermodal transit station at the southern end of the South Resort Corridor in Las Vegas, Nevada. The facility will initially serve as a bus transfer facility, but will also serve as a major transfer station along the Fixed Guideway planned for development along "the Strip" in downtown Las Vegas. In the long term, the facility is also positioned to serve as a station for the High Speed Rail line planned to serve the Los Angeles-Las Vegas corridor.

City of San Diego Calle Cristobal Assessment District EIR, San Diego, CA
Served as the City of San Diego Planning Department Project Manager for the EIR prepared concerning the assessment district formed to finance and construct the four-mile segment of Calle Cristobal. The roadway linked the Planned Urbanizing community of Mira Mesa with Sorrento Valley and Interstate 5. The EIR involved the compilation of the many roadway-related mitigation measures previously mandated in EIRs prepared for the various single- and multi-family residential developments fronting the planned corridor.

County of San Diego Highway 395 Bridge Replacement EA, San Diego County, CA
As Project Manager, prepared an EA for the replacement of the Highway 395 bridge across the San Luis Rey River. The old bridge was undermined by winter storm floodwaters. The project required an individual permit under section 404 of the Clean Water Act. Revegetation and intrusive plant species eradication was required. Mitigation for bat populations roosting on the underside of the bridge was also required.

City of Escondido Bear Valley Parkway EIR, Escondido, CA
As Project Manager, prepared EIR for the widening of a four-mile segment of a north-south arterial road. Principal issues were the noise, air quality, and visual impacts on adjacent residential areas resulting from increased traffic volumes and speeds. A bridge replacement on Del Dios Creek required an Individual Permit from the ACOE and a Section 7

Consultation with the USFWS as a result of the presence of a breeding pair of endangered least Bell's vireo.

City of San Diego Fairmount Avenue/Montezuma Avenue Interchange EA, San Diego, CA
As Project Manager, prepared FHWA-format EA for this interchange on a federal highway corridor. Environmental issues analyzed included impacts to wetlands and other biological resources, noise, air quality, and visual aesthetics. Surveys for endangered California gnatcatcher breeding territories were conducted. A Section 4(f) analysis was prepared as a result of the acquisition of City-owned open space for needed right-of-way.

North County Transit Development District Oceanside-San Diego Commuter Rail EIR Technical Studies, San Diego County, CA
As Project Manager, coordinated the preparation of technical studies examining the environmental impacts associated with the construction and operation of the various stations along "The Coaster" commuter rail route. Studies were prepared for each impact category identified through the Initial Study. These individual studies were then formatted into an EIR prepared by North County Transit Development Board staff. Prepared the responses to all agency and public comments received during the review period. The project required an extensive scoping and hearing process. Issues of most concern to community groups included traffic circulation, parking, noise, and visual aesthetics.

Metropolitan Transit Development Board Washington Street Light Rail Transit Station Negative Declaration, San Diego, CA
As Project Manager, prepared a Negative Declaration concerning the redevelopment of the Mission Brewery. Included in the environmental analysis was development of an LRT station platform on the west side of the building as part of the Old Town LRT line development.

Metropolitan Transit Development Board Bayside Light Rail Transit Line, San Diego, CA
Served as Project Manager for environmental review and Coastal Development Permit processing for the Metropolitan Transit Development Board's Bayside Light Rail Transit alignment, stations and corridor landscaping. The project required environmental review by the City of San Diego and permit approval by the CCC. Consultation with the State Historic Preservation Officer under Section 106 of the Historic Preservation Act was required due to the displacement of the historic Frost Hardwood Lumber complex.

County of Pima River Road Realignment EA, Tucson, AZ
Managed the preparation of an FHWA-format EA the widening and realignment of a 12-mile segment River Road for the Pima County Department of Public Works. Key issues were roadway noise, air quality, visual impacts on sensitive hillsides, and the socioeconomic effects of business relocations.

County of James City Alternate SR-5 EA, James City County, VA
Managed preparation of an EA for a 3.5-mile, two-lane roadway linking residential areas west of Williamsburg, Virginia, within the planned SR-199 corridor. Wetland mapping within the corridor was confirmed. Extensive visual impact analyses were required as a result of the route's designation as a Virginia Scenic Byway. Drainage crossings and bridges were permitted under the provisions of Nationwide Permits 14 and 26. Staff performed a survey for the small-whorled pogonia, a federally listed threatened species. The project will result in permanent impacts to 2.18 acres of forested wetlands. Mitigation was accomplished via the transfer of 92 acres of open space to the Williamsburg Land Conservancy.

Puerto Rico Ports Authority Luiz Muñoz Marin International Airport Runway 26 Extension EA, San Juan, Puerto Rico
Managed preparation of an EA for the construction of a 1,000 foot extension to the main runway at the Luiz Muñoz Marin International Airport. The extension will occur largely on fill placed in the La Torrecilla Lagoon east of the airport. The lagoon is bordered by mangrove swamps. The project will require an individual permit issued by the ACOE under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. The lagoon is also within the boundaries of the Los Piñones Forest Preserve; the project required a determination under Section 4(f) of the U.S. Department of Transportation Act of 1966. One alternative considered shifted aircraft operations to the west; the FAA's Integrated Noise Model was utilized to determine this alternative's effect upon sensitive noise receptors in the Isla Verde resort area. In addition to coordination with federal agencies, the project required consultation with several agencies of the Commonwealth of Puerto Rico.

Virginia Department of Transportation Rugby Road Categorical Exclusion, Charlottesville, VA
Managed the preparation of a Categorical Exclusion for the Virginia Department of Transportation concerning the widening of a .8-mile segment of Rugby Road. The subject road segment extends westward from the University of Virginia campus and passes through the Rugby Road Historic District, which is listed on the NRHP. A consultation with the Virginia Department of Historic Places was necessary under Section 106 of the NHPA. Of concern was the project's potential effects upon the historic streetscape.

Capital Area Airport Authority Richmond International Airport Extension of Runway 16/34 EA, Richmond, VA
As Land Use Planner, prepared Land Use Impacts and Land Use/Noise Compatibility Analysis for this EA dealing with a runway extension and other improvements at Richmond International. Principal environmental issues addressed in the document included noise from increased air operations, land use, impacts to wetlands, and potential effects upon cultural resources. Managed consultation with SHPO, mandated by Section 106 of the NHPA. This consultation was necessary due to Confederate entrenchments dating to the 1862 Peninsular campaign being present within the project area.

Pactel Cellular Communications Sites EA, NV and CA
Contracted by Pactel Cellular to obtain the necessary approvals from the BLM and the County of San Bernardino, for the construction of thirteen wireless communication antenna sites along the Interstate 15 corridor between Los Angeles and Las Vegas. The sites, all consisting of monopole- or lattice tower-mounted dish antenna and accessory structures, were situated on private land under County jurisdiction or federal land under BLM jurisdiction. As Project Manager, an EA was prepared that analyzed potential impacts upon the endangered desert tortoise, visual impact analyses conducted in conformance with Department of Interior Visual Resource Inventory and Evaluation procedures, and analysis of consistency with County land use plans and the BLM Land Management Use Categories contained in the California Desert Plan.

Confidential Project
Managed preparation of EIR for a new 102,000 square-foot student center and a 43,000 square-foot bookstore in the central portion of the campus. Major issues analyzed consisted of seismic risk factors, architectural compatibility, traffic and parking, and solar access.

Declaration of
Christopher B. Hansmeyer

I, Christopher B. Hansmeyer, declare as follows:

1. I am presently employed by Abengoa Solar Inc. as General Counsel.

2. A copy of my professional qualifications and experience are attached hereto and incorporated herein by reference.

3. The attached testimony on Soil and Water Resources, including water rights, water supply, and supply alternatives, was either prepared by me or under my direction for the Mojave Solar project based on my independent analysis, supplements thereto, data from reliable 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 herein.

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: May 28, 2010 Signed: 

At: Berkeley, California

Christoper B. Hansmeyer

San Francisco, California • (415)680-4405 • christopher.hansmeyer@solar.abengoa.com

EDUCATION

UNIVERSITY OF CALIFORNIA, BOALT HALL SCHOOL OF LAW, Berkeley, California **J.D. 1999**

- Specialization in Land Use, Environmental and Natural Resources Law.

HUMBOLDT STATE UNIVERSITY, Arcata, California **B.S. 1996**

- Bachelor of Sciences in Natural Resources Planning and Interpretation, *Summa Cum Laude* (Highest Honors).

EXPERIENCE

Abengoa Solar Inc., General Counsel, San Francisco, California **2007-Present**

- General Counsel for USA operations of an International Solar Energy Developer. Responsible for establishment of internal legal department, hiring of attorneys, and implementation of company wide practices and procedures. Serve as Secretary to the Board of Directors and responsible for formation, corporate compliance, and records for all USA activities. Advise Senior Management on all issues associated with business development issues in the USA and abroad.
- Prepare and negotiate all contracts, including, but not limited to, Power Purchase Agreements, Real Estate Purchase Agreements, Joint Venture/Partnership Agreements, Intellectual Property Agreements, Consulting Agreements, and Confidentiality/Non-Disclosure Agreements. Ensure compliance with local, state, federal and international law.
- Identify, engage, and manage external Legal Service Agreements for matters including, but not limited to, Energy, Land Use, Permitting, Tax, Financing, Real Estate, Labor, Intellectual Property, Corporate, and Litigation/Dispute Resolution.

SOLE PRACTITIONER, San Diego, California **2003-2007**

- Assisted clients regarding a wide variety of real estate, energy, land use, and corporate issues. Including drafting and negotiating contracts for leasing and real property acquisitions, employment and consulting agreements, preparation of private financing documents, corporate formation and governance. Representation included appearing on behalf of clients before local and state agencies, and related litigation support.
- Specialized in water rights issues. Performed extensive due diligence into the validity and transferability of various forms of water rights. Assisted clients in the identification of water supplies for residential, commercial, and industrial applications. Represented clients before various governmental agencies, including the California Department of Water Resources, California Energy Commission, local agencies and water districts.
- Served as outside legal counsel to a variety of corporate clients. Representation included: corporate formation and financing documents, identification of and establishment of contractual agreements for the supply of major components and manufacturing services, coordinating the international production and importation of goods, trade show contracts, trademarks, advertising and media contracts, employee and consulting agreements, and establishment of and monitoring compliance with environmental, fair trade, and labor policies.

ALLEN MATKINS LLP, Associate Attorney, San Diego and San Francisco, California **1998-2003**

- Assisted clients in a broad range of water, energy and land use matters, including government entitlements, zoning compliance, redevelopment issues, and administrative proceedings before local governing entities. Assisted clients with office, industrial and retail leasing and property acquisitions and dispositions. Advised clients regarding compliance with the local, state and federal regulations, in particular, real estate development, water rights and environmental regulations.
- Drafted and negotiated a wide variety of commercial contracts, including, but not limited to, licensing agreements, confidentiality agreements, letters of intent, memorandums of understanding, and partnership agreements.
- Prepared legal memoranda and drafted pleadings and argument sections of briefs filed in state and federal court. Coordinated with and appeared on behalf of clients before local and state administrative agencies.

SHUTE MIHALY and WEINBERGER, Law Clerk, San Francisco, California **1998**

- Performed extensive legal work on environmental and land use issues.

CALIFORNIA ATTORNEY GENERAL'S OFFICE, Law Clerk, San Francisco, California **1997**

- Performed extensive legal work on environmental and state agency issues relating to state agency actions.

Declaration of
Alice E. Karl, Ph.D.

I, Alice Karl, declare as follows:

1. I am presently self-employed.

2. A copy of my professional qualifications and experience are attached hereto and incorporated herein by reference.

3. I helped prepare the attached testimony on Biological Resources for the Mojave Solar project based on my independent analysis, supplements thereto, data from reliable 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 herein.

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: May 19, 2010 Signed: 

At: Davis, CA

ALICE E. KARL, Ph.D.

ALICE E. KARL & ASSOCIATES, INC.
P.O. Box 74006
Davis, California 95617
Phone: (530) 666-9567 (office) (530) 304-4121 (cell) FAX: (612) 465-4822 E-mail: heliophile@mindspring.com

Alice has been an environmental consultant since 1978 and is the principal for the firm Alice E. Karl & Associates, a certified woman-owned business. She has an extensive knowledge of the arid southwest, having worked continually in the southwestern deserts of the United States and Mexico for over 30 years. She has also completed biological surveys in the coastal ranges of California and the Central and San Joaquin valleys. She is a highly experienced botanist, herpetologist, small-mammalogist, and a recognized desert tortoise authority. She holds permits that permit her to conduct all activities on desert tortoises (e.g., handle tortoises, apply transmitters, collect blood for health analyses) and conduct independent Mohave Ground Squirrel trapping. She also holds a California scientific collecting permit.

Alice conducts field surveys on special-status species, assists with project permitting, conducts research and monitors construction. She regularly organizes and leads large crews to conduct the necessary biological resource surveys for projects, but also is contracted as a reviewer for other firms' biological surveys and reports. Agency coordination and permitting is a critical component of her projects and she works with agency biologists and project proponents in an efficient and scientifically credible manner to develop conservation-oriented, practical and feasible project design and mitigation measures. Research has included long-term and geographically extensive projects on (a) desert tortoise reproduction, translocation, population viability, habitat relationships; (b) rare plants; (c) vertebrate community relationships; and (d) sampling methods.

In addition to being an accomplished field biologist, crew chief, and project manager, Alice has worked with agency biologists to develop protocols for desert tortoise surveys, translocation, handling, and other procedures. She has developed a sampling technique for estimating tortoise densities over large areas, which is currently being tested for large military expansion projects. She has also contributed to several area-wide plans (West Mojave Plan, Northern and Eastern Colorado Desert Plan, Clark County HCP).

MAJOR PROJECT CATEGORIES

- Solar energy development, hybrid and gas-fired power plants, hydropower projects
- Transmission lines and pipelines
- Wind projects
- Waste facilities
- Military expansion
- Mining

MAJOR TASK CATEGORIES

- Special-status species surveys
- Mitigation plan development
- Permitting (ESA, CESA, CEQA, HCPs, BAs, 2081, 1603, 404, SMARA)
- Agency coordination and workshops
- Designated Biologist/Authorized Biologist
- Research
- Construction Monitoring

SPECIAL-STATUS PLANTS and REVEGETATION

- Principal botanist for numerous surveys of special-status plants in the Mojave and Colorado deserts (California and Nevada), the Tehachapi Mountains and the Central and San Joaquin valleys
- Extensive knowledge of Mojave and Colorado Desert flora and habitats
- Revegetation
- Wetlands delineation

DESERT TORTOISE

- Recognized desert tortoise authority, with over 32 years experience studying desert tortoises in California, Nevada, Utah, and western Arizona; habitat specialist
- 2 advanced degrees involving desert tortoises
- Holds own handling and research permits from the USFWS and the California Department of Fish and Game
- Designed and implemented one of the largest and longest desert tortoise research projects to date - approximately 130 tortoises were telemetered for 10 years to study reproduction, growth, home range, burrow use, dispersal within the context of forage production, size and gender
- Instructor for Desert Tortoise Council Technical Workshops and telemetry use; train construction employee groups and tortoise monitors for construction projects
- Over 25 Bureau of Land Management (BLM)-type trend plots or other mark-recapture plots for population studies and >3000 transects to assess relative densities
- Impacts assessment, mitigation development - numerous projects
- Development of TRED density sampling model
- Construction monitoring and development of monitoring protocol
- Contributor to development of methodologies for USFWS survey and handling protocols
- A primary reviewer of USFWS original listing package for desert tortoises
- Contributor to Clark County Habitat Conservation Plan, West Mojave Plan, and Northern and Eastern Colorado Coordinated Management Plan

OTHER WILDLIFE

- Extensive knowledge of southwestern reptile and amphibian fauna
- Extensive small-mammal (rodents) trapping studies in California, Nevada and Arizona, including Mohave ground squirrel and other special-status rodents.
- Survey, research, and permitting experience with the following listed species: Valley elderberry longhorn beetle, Shasta salamander (permitted), Tehachapi slender salamander, San Joaquin kit fox
- Burrowing owl surveys and mitigation
- Numerous bird surveys in desert habitat.
- Mojave ground squirrel - permitted to conduct trapping

PERMITS HELD

- Federal 10(a)(1)(A) for Desert Tortoise (permit in Alice Karl's name) (TE 746058-11)
- State MOU for Desert Tortoise
- California Scientific Collection Permit (SC001368)
- Mohave Ground Squirrel trapping (Authorized field Investigator on W. Vanherweg permit)

EDUCATION

Ph.D., Ecology - University of California, Davis. January 1998. Dissertation: Reproductive strategies, growth patterns, and survivorship of a long-lived herbivore inhabiting a temporally variable environment.

M.S., Biology - California State University, Northridge. 1982. Thesis: The distribution, relative densities, and habitat associations of the desert tortoise, *Gopherus agassizii*, in Nevada.

Declaration of
Victor A. Kelson

I, Victor A. Kelson, declare as follows:

10. I am presently employed by Layne Christensen Company as Chief Modeler.

11. A copy of my professional qualifications and experience are attached hereto and incorporated herein by reference.

12. I helped prepare the attached testimony on Soil and Water Resources for the Mojave Solar project based on my independent analysis, supplements thereto, data from reliable sources, and my professional experience and knowledge.

13. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed herein.

14. 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: May 27, 2010 Signed:

At: Bloomington, IN

Vic Kelson

SUMMARY OF QUALIFICATIONS

Groundwater Flow Modeling

Model Code Development

Groundwater / Surface Water Interaction

Contaminant Transport Modeling

Databases and GIS

Regulatory Agency Collaboration

Water Supply Protection and Planning

Dr. Victor Kelson, Chief Modeler, is a certified groundwater professional and one of the leading developers of hydrological modeling tools and codes in the United States. He has written groundwater modeling code for the USEPA, tools for pre and postprocessing South Florida Water Management District's regional simulation model (RSM) and he has developed other tools that are now embedded in the commercial Groundwater Management System (GMS) developed by Environmental Modeling Systems, Incorporated. Dr. Kelson, along with his collegue Dr. Jack Wittman, is a co-inventor of a new technique for modeling the effects of collector wells on groundwater flow (patent pending).

Dr. Kelson earned his B.S. in Chemical and Petroleum-Refining Engineering from Colorado School of Mines and went to work as a process engineer at a fertilizer manufacturing plant in the Midwest. While he was a research scientist and graduate student the School of Public and Environmental Affairs, Vic applied his skill as software developer to the problems of groundwater hydrology. Vic was the primary software designer and engineer during the development of the U.S. EPA's wellhead protection code WhAEM for Windows.

Prior to becoming a Chief Modeler at WHPA, Vic worked for two years as a Senior Engineer in the Hydrologic Systems Modeling Division at the South Florida Water Management District. While in Florida, Vic was primarily responsible for groundwater model code development including methods for integrating the results of surface water and groundwater flow models. At WHPA, Vic is responsible for managing the development of modeling and data management tools for application to water resources planning. Over the past decade Dr. Kelson has been involved in some of the largest hydrologic analysis arguments in the country, including the restoration of the Everglades ecosystem, the Crandon Mine (in Wisconsin). Dr. Kelson is an engineer with deep experience in industry, chemical manufacturing and environmental systems analysis who is now applying these skills to environmental restoration.

EDUCATION

1998 Ph.D. Environmental Science, Indiana University, Bloomington, Indiana
1981 B.S. Chemical and Petroleum-Refining Engineering, Colorado School of Mines

PROFESSIONAL HISTORY

1999 – present	Chief Modeler, WHPA, Inc., Bloomington, IN
1998 – 1999	Senior Hydrologist, South Florida Water Mgt. Dist., WPB, FL
1991 – 1998	Research Assistant, SPEA, Indiana University, Bloomington, IN
1982 – 1991	Chemical Engineer, Hercules Chemical, Terre Haute, IN

SELECTED PUBLICATIONS

Bakker, M., V.A. Kelson, and K. Luther. "Multilayer analytic element modeling of radial collector wells."*Ground Water*. 43(6) p926-934. 2005.

Kelson, V.A., R.J. Hunt and H.M. Haitjema. "Improving a regional model usning reduced complexity and parameter estimation."*Ground Water*. 40(2) p132-143. 2002.

Hunt, R. J., M. P. Anderson and V. A. Kelson. "Improving a Numerical Groundwater Model using an Analytic Element Screening Model". Ground Water. 36(6). 1998.

Haitjema, H. M. and V. A. Kelson. "Using the stream function for flow governed by Poisson's equation". *Journal of Hydrology*. 187(1996) 367-386. 1996.

Kelson, V. A., H. M. Haitjema and S. R. Kraemer. "GAEP: A geographical preprocessor for groundwater flow modeling". *Hydrological Science and Technology*. Volume 8, number 1-4, 74-83. 1993.

Sharif-zadeh, M. and V. A. Kelson. "Managerial Styles in a Technical Environment: A Comparison". *Supervisory Management*. 1983.

COMPUTER CODES

bModAEM, a model of three-dimensional flow near surface waters, including horizontal wells and collector wells. WHPA Inc. (proprietary), 2002.

ModAEM preprocessing tools for regional wellhead protection modeling. WHPA Inc. (proprietary), 2001.

WhAEM for Windows, a new public-domain wellhead protection model code for U.S. EPA (beta version released), 1998.

MODAEM, a modular, massively-parallel analytic element groundwater flow model, 1997. Available under the GNU GPL license.

PATENT

U.S. Patent application no 11/045,759. Bessel Analytic Element System and Method for Collector Well Placement. Patent pending.

CURRENT PROFESSIONAL ASSOCIATION MEMBERSHIPS

Indiana Water Resources Association, President Elect, 2001
American Water Works Association
National Ground Water Association Member
American Geophysical Union Member

CERTIFICATIONS

National Ground Water Association, Association of Ground Water Scientists and Engineers, Certified Ground Water Professional

PROFESSIONAL EXPERIENCE (general descriptions of experience)

Lead Sulfide Mine Permit Review, Crandon, Wisconsin – Vic Kelson did groundwater modeling work in support of the Wisconsin DNR permit review for a lead sulfide mine in Crandon, WI. That work examined the performance of the petitioner's regional groundwater flow model, in particular the appropriateness of the boundary conditions in the model. The model results were included in the USGS and DNR review, and was presented to the Wisconsin AWWA, and was the subject of a peer-reviewed paper in Ground Water (Kelson, V.A., R.J. Hunt and H.M. Haitjema. "Improving a regional model using reduced complexity and parameter estimation."Ground Water. 40(2) p132-143. 2002). In the paper, we demonstrate how inverse models can be used to identify the parameters and processes that most affect model predictions, which can be a critical factor in model reviews.

Inverse modeling and calibration of the South Florida Regional Simulation Model (RSM) – Developed necessary tools and strategies for calibration, and assisted in the analysis of calibration for the new regional-scale integrated surface water / groundwater model SFRSM. SFRSM is the "next generation" District-wide model, intended for planning and decision making for water supply and ecosystem restoration applications. This work was performed in conjunction with the staff of the Office of Modeling, South Florida Water Management District, West Palm Beach, FL.

Modeling of water-quality issues for a collector well in Terre Haute, IN. Implemented a groundwater model of a collector well at an industrial facility in Terre Haute, IN. The objective was to devise operational or design strategies that would increase the relative contribution of induced recharge into the well from the Wabash River, and the resulting improvement in performance of the plant's reverse-osmosis water

treatment facility. The modeling was performed using WHPA's version of the TimML 3-D analytic element model, including the model of flow to a collector well.

Analytic element modeling of levee seepage in South Florida – Developed a customized cross-sectional model preprocessor and postprocessor for the WHPA-customized version of the analytic element model code ModAEM. The model was applied to the problem of computing flows beneath levees in South Florida to determine seepage coefficients for the South Florida Regional Simulation Model (SFRSM). The modeling effort included use of inverse model code PEST, for the purpose of determining confidence intervalse for the seepage coefficients. This work was performed under contract with the South Florida Water Management District, West Palm Beach, FL.

Development of analytic element tools for modeling three-dimensional flow near collector wells – Worked with Mark Bakker (University of Georgia) to develop TimML, an analytic element groundwater flow model code using "Bessel" elements to simulate 3-D flow, including flow near horizontal wells, surface waters, and horizontal collector wells. WHPA has a patent pending for the model of flow near horizontal wells and collector wells.

ModAEM 1.8 Analytic Element Groundwater Flow Model – The USACE-sponsored Groundwater Management System (GMS) now includes advanced preprocessing and postprocessing facilities for the analytic element model ModAEM (Kelson, 1998). ModAEM includes steady sea-water interface flow and streamflow routing facilities.

Postprocessing training for the South Florida Regional Simulation Model (RSM) – Taught a week-long training course for staff at the South Florida Water Management District. The course described the postprocessing software framework WHPA has developed for the new regional-scale integrated surface water / groundwater model SFRSM. SFRSM is the "next generation" District-wide model, intended for planning and decision making for water supply and ecosystem restoration applications. February, 2006.

Development of a Fortran-95 version of a recharge estimation code – Developed a Fortran-95 code that implements the recharge estimation methodology described by Dripps (2003). This code is a soil-water balance estimator that includes precipitation, runoff, evapotranspiration, and soil-moisture modeling at a regional scale. This work was performed under a contract with the U.S. Geological Survey, Middleton, WI. 2005-2006.

Declaration of
David T. Larsen

I, David T. Larsen, declare as follows:

1. I am presently employed by Navigant Consulting, Inc. as Director.

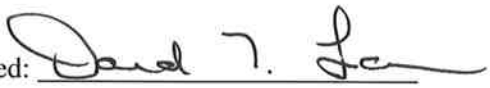
2. A copy of my professional qualifications and experience are attached hereto and incorporated herein by reference.

3. The attached testimony on Transmission Line Safety and Nuisance and Transmission System Engineering was either prepared by me or under my direction for the Mojave Solar project based on my independent analysis, supplements thereto, data from reliable 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 herein.

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: May 27, 2010 Signed: 

At: Rancho Cordova, California

NAVIGANT CONSULTING

David T. Larsen

David T. Larsen
Director

Navigant Consulting, Inc.
3100 Zinfandel Drive, Suite 600
Tel: 916-631-3247
Fax 916-852-1073

dlarsen@navigantconsulting.com

Professional History

- Navigant Consulting, Inc. (1986 - Present) Director
- Arizona Electric Power Cooperative, Inc. (1975 - 1986) Supervisor of System Planning

Education

- B.S., Electrical Engineering, South Dakota State University, Brookings, 1970

Professional Associations

- Institute of Electrical and Electronics Engineers
- National Honorary Electrical Engineering Society

Mr. Larsen is a Director with Navigant Consulting, Inc. (NCI) and has over 35 years of experience in transmission and resource planning and the development and negotiation of power contracts. At NCI, he oversees the evaluation and planning of transmission projects and provides technical support in the evaluation and negotiation of power contracts and the performance of power marketing analyses. Mr. Larsen has performed or supervised interconnection and system impact assessments for both renewable and conventional generating facilities in the western United States. He has also participated in the planning of several major electric transmission projects. He has represented one of NCI's major transmission owner clients on the Western Electricity Coordinating Council's Planning Coordination Committee.

Prior to joining NCI, Mr. Larsen was employed by the Arizona Electric Power Cooperative and was actively involved in resource and transmission planning in the Desert Southwest. Mr. Larsen was one of the original members of the Southwest Area Transmission Planning Committee, which was responsible for the performance of coordinated powerflow and transient stability evaluations of the interconnected system (500-kV, 345-kV, and 230-kV) in the Desert Southwest and served as chairman of the Committee.

Professional Experience

» **Third Party System Impact Studies (California).** As a result of the CAISO's Generator Interconnection Process Reform (GIPR) activities, several proposed generating projects had been placed in the "transition cluster" and, as a result, work had ceased on the impacts studies being performed for these projects. In order for a project to proceed through the California Energy Commission's (CEC) Application for Certification (AFC) process a system impact study for the project must be completed. The CEC had stated that it would accept a "third party" impact study and, as a result, NCI was asked to perform system impact studies (SIS) for three projects. These studies identified the transmission system impacts caused solely by the addition of the proposed project, identified the system reinforcements necessary to mitigate the adverse impacts of the proposed project under various system conditions, and provided preliminary cost estimates for the above system reinforcements.

» **Mohave Solar Project (California).** An NCI client is developing a 250 MW solar project near Harper Lake, California and has entered into a contract under which they would build, own, and operate the project and Pacific Gas & Electric (PG&E) would purchase the project's electrical output. Since early 2008 NCI has provided transmission interconnection related services to the client relative to the project which could be interconnected with the systems of either Southern California Edison (SCE) or the Los Angeles Department of Water and Power (LADWP). These services have included: (i) reviewing and providing comments on the System Impact Study prepared by the LADWP; (ii) reviewing and providing comments on the System Impact Study, the Technical Assessment, the Facilities Study, and Optional Study reports prepared by SCE and the California ISO; (iii) participating in meetings with the various parties at which the results of the above studies were discussed; (iv) performing independent technical studies to assess how the system impacts due to the project might change if certain "senior queued" projects were not developed; and (v) participating in discussions with SCE and the CAISO related to the Large Generator Interconnection Agreement (LGIA) for the project.

» **Solana Generating Station Solar Project (Arizona).** An NCI client is developing the 270 MW Solana Generating Station Solar Project near Gila Bend, Arizona and has entered into a contract under which it would build, own, and operate the Project and Arizona Public Service (APS) would purchase the Project's electrical output. Since early 2008 NCI has provided transmission interconnection related services to the client relative to the Solana Project. These services have included: (i) performing a preliminary system impact study which was filed as part of the CEC application with the ACC; (ii) assisting in the development of the Project interconnection application with APS and participating in the scoping meeting with APS : (iii) reviewing and providing comments on the Interconnection Feasibility Study, the System Impact Study, and the Facilities Study reports prepared by APS; and (iv) participating in meetings with APS at which the results of the above studies were discussed.

» **Lathrop Wells Solar Project (Southern Nevada).** An NCI client is proposing the development of a the Lathrop Wells Solar Project which would include a 270 MW (gross) CSP unit and up to 10 MW of PV generation which would be interconnected with the Valley Electric Association

(VEA) system in the Project area. To date NCI has assisted the client with the development of the interconnection applications for both the 280 MW CSP unit and the 10 MW PV unit and has participated in the scoping meeting with VEA for both applications. Future activities will include reviewing and providing comments on the Interconnection Feasibility Study, the System Impact Study, and the Facilities Study reports prepared by VEA and participating in meetings with VEA at which the results of the above studies were discussed.

» **Proposed Solar Project (Southwest Texas).** An NCI client had identified a site for a potential solar generating station (the "Project") in southwest Texas and requested that NCI undertake studies to identify how much additional generation could be interconnected with the 138-kV facilities in the area. In doing so NCI performed powerflow studies on ERCOT 2011 peak and off-peak powerflow cases to assess system impacts for both Category A and Category B conditions for cases in which varying amounts of Project generation was interconnected with the existing transmission facilities and the wind generation in west Texas was set a 20% of installed capacity (for on-peak load conditions) and at 80% of installed capacity (for off-peak load conditions).

» **TANC Transmission Project (Northern California).** NCI Staff worked with the member utilities of the Transmission Agency of Northern California (TANC) in the development of a proposed Transmission Project which would: (i) enhance the reliability of the transmission system in Northern California; (ii) increase the ability to transfer power between utilities; (iii) increase the operational reliability of the SMUD and TID Balancing Authorities; and (iv) provide increased access to potential renewable resources. Activities included: (i) conducting and managing the technical studies performed to assess the benefits/impacts of the various components of the Project; (ii) coordinating these activities with the pertinent TANC Members; and (iii) completing the WECC sub-regional planning process for the Project.

» **ERCOT Southeast Loop Project (Texas).** The sponsor of this proposed transmission Project retained Navigant Consulting, Inc. (NCI) to assess the benefits, such as additional import capability in to the Houston area, which the proposed Project would provide to the transmission system in eastern Texas. The proposed Project would consist of a new approximately double-circuit 345-kV line from northeastern Texas to the Houston area. In assessing the benefits of the Project, NCI performed both powerflow and transient stability studies of the ERCOT transmission system. These studies indicated that: (1) the addition of the Project would increase the maximum allowable imports into the Houston Area by approximately 1,300 MW; (2) new generating facilities could be interconnected with the Project and increase the Houston Area imports by an additional 500-600 MW; and (3) the addition of the Project would provide improve transient stability and system reliability.

» **Panhandle Loop Project (Northwest Texas).** At the request of the sponsors of the proposed Project, NCI performed preliminary powerflow studies to provide information for the Project plan-of-service and to assess potential impacts on the ERCOT grid due to the addition of the Project. These studies considered three different ERCOT system load conditions with as much as approximately 8,700 MW of generation being transferred from west to east over the ERCOT 345-kV grid. This generation included approximately 3,700 MW of existing and announced wind

generation interconnected with the western portion of the ERCOT system and 5,000 MW of Project-related wind and thermal generation. These studies indicated that the above amounts of generation could be transferred over the ERCOT grid with minimal impacts to the grid during Category A and B conditions if: (1) the proposed Project transmission facilities were developed; (2) certain 345-kV additions as discussed in the ERCOT report entitled ***Analysis of Transmission Alternatives for Competitive Renewable Energy Zones in Texas*** (December 2006) were made to the grid; and (3) the necessary reactive support equipment was installed on the grid.

» **Impact of Unit Retirements on Import Capability and RMR Requirements (California).** Performed a preliminary assessment of the potential impacts which the retirement of certain power plants identified by the California Energy Commission as being at high and medium risk of retirement would have on the Southern California Import Transmission (SCIT) nomogram and on local area transmission reliability. The SCIT nomogram analysis focused on impacts if the high probability units in Southern California were retired while the local area reliability analysis investigated the impacts of retirement of both the high and medium probability units on the transmission systems serving local area load pockets. Both sets of studies assessed such impacts for 2005, 2006, 2007, and 2008 summer peak conditions.

» **Magnolia Power Project (Southern California).** Managed and was actively involved in the powerflow, transient stability, post-transient, and short circuit studies performed by NCI on behalf of the Project participants to assess impacts on the City of Burbank 69-kV system, to which the project will be connected, and on the 500-kV and 230-kV grid in the Los Angeles Basin. Also coordinated Project-related technical studies with the Los Angeles Department of Water and Power (LADWP) and with Southern California Edison (SCE). Developed documents for use in the Application for Certification (AFC) submitted to the California Energy Commission and provided technical support to the Project manager in various discussions with LADWP and SCE regarding the replacement of circuit breakers on the LADWP and SCE systems. In addition, performed studies assessing incremental losses on the Burbank system for various load levels and dispatch levels for the MPP and the existing Burbank generation and assessing system impacts if the normally open ties between Burbank and the City of Glendale were closed.

» **Malburg Power Project (Southern California).** Managed and was actively involved in the powerflow and short circuit studies performed by NCI on behalf of the City of Vernon to assess impacts on the City's 66-kV system, to which the project will be connected, and on the 500-kV and 230-kV grid in the Los Angeles Basin. Also coordinated Project-related technical studies with the Los Angeles Department of Water and Power (LADWP) and with Southern California Edison (SCE). Developed documents for use in the AFC submitted to the California Energy Commission and provided technical support to the Project manager in various discussions with LADWP and SCE regarding the replacement of circuit breakers on the LADWP and SCE systems.

Declaration of
Philip Leitner

I, Philip Leitner, declare as follows:

1. I am presently a Sole Proprietor doing business as an independent biological consultant.

2. A copy of my professional qualifications and experience are attached hereto and incorporated herein by reference.

3. I helped prepare the attached testimony on special-status wildlife (Mohave ground squirrel) for the Mojave Solar project based on my independent analysis, supplements thereto, data from reliable 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 herein.

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: May 27, 2010 Signed: Philip Leitner

At: Orinda, California

PHILIP LEITNER

2 Parkway Court
Orinda, CA 94563
(925) 253-8400
E-mail: pleitner@pacbell.net

Consultant in Wildlife Biology

Professional Interests

- Ecology and environmental physiology of birds and mammals
- Field surveys of terrestrial biological resources
- Environmental impact assessment under CEQA and NEPA
- Mitigation planning to meet requirements of CEQA and NEPA
- Biological studies of threatened and endangered wildlife

Education

B.S.	Zoology	1958	Saint Mary's College of California
M.A.	Zoology	1960	University of California, Los Angeles
Ph.D.	Zoology	1961	University of California, Los Angeles

Professional Experience: Teaching and Academic Administration

1962-present Professor of Biology, Saint Mary's College of California.

1969-1985 Chairperson, Biology Department, Saint Mary's College of California.

1985-1992 Dean, School of Science, Saint Mary's College of California.

1992-1994 Assistant to Academic Vice President, Saint Mary's College of California.

2002-present Adjunct Professor, California State University, Stanislaus

Professional Experience: Environmental Consulting

2007-08 Subcontractor to Tetra Tech, Inc. Prepared report on current status of the Mohave ground squirrel for Edwards Air Force Base. Assembled and analyzed database of all available records for the period 1998-2007.

2007 Project Director for Endangered Species Recovery Program, California State University, Stanislaus. Conducted field surveys to document the status of the Mohave ground squirrel at Red Rock Canyon State Park.

2006-07	Project Director for Endangered Species Recovery Program, California State University, Stanislaus. Directed intensive surveys for the Mohave ground squirrel on the Western Expansion Area of Fort Irwin.
2003	Subcontractor to TYBRIN Corporation. Carried out field surveys for Mohave ground squirrel on Edwards Air Force Base, California.
2002-2005	Contractor to Desert Tortoise Preserve Committee. Conducted field research to determine distribution, abundance, and habitat requirements of state-listed Mohave ground squirrel at several sites in Kern and San Bernardino counties.
2002-2004	Subcontractor to Anteon Corporation. Responsible for field surveys of the El Mirage Off-Highway Vehicle Open Area to determine the status of Mohave ground squirrel. Studies conducted on behalf of US Department of Interior Bureau of Land Management.
2001-present	Project Director, Mohave Ground Squirrel Research and Monitoring Program. Managing multi-year research effort for Endangered Species Recovery Program, California State University, Stanislaus. Studies designed to support comprehensive conservation strategy for this state-listed species.
2001 & 2006	Contractor to Coso Operating Company, LLC. Responsible for monitoring study of Mohave ground squirrel populations in satisfaction of California Energy Commission mitigation requirements.
2001	Conducted protocol surveys for state-listed Mohave ground squirrel on behalf of Endangered Species Recovery Program for proposed Caltrans construction project along 10 miles of U.S. Highway 395 in Inyo County.
2001	Subcontractor to Environmental Science Associates. Carried out habitat assessment for Mohave ground squirrel on 1200-acre proposed expansion area for Lancaster Waste Water Treatment Plant, Los Angeles County.
2001	Subcontractor to Environmental Science Associates. Participated in protocol-level salt marsh harvest mouse survey along proposed transportation corridor at Oakland International Airport, Alameda County.
2000-2001	Subcontractor to Jones & Stokes Associates in evaluating the suitability of mitigation sites for the San Francisco International Airport Airfield Reconfiguration Project. Analyzed potential sites throughout the San Francisco Bay Area for salt marsh harvest mouse and other special status mammals.

2000-2001	Contractor to Conservation Partners, Inc. Responsible for field reconnaissance and evaluation of habitat potential for special status wildlife species on 29 public land parcels in Sonoma, Lake, and Mendocino counties. Work conducted in support of Bureau of Land Management Cache Creek Land Exchange, Phase III.
2000	Subcontractor to LSA Associates. Carried out protocol trapping surveys for Mohave ground squirrel in connection with proposed Caltrans highway improvement project on State Route 138 in San Bernardino County.
2000	Subcontractor to Monk & Associates. Conducted extensive trapping and translocation of endangered salt marsh harvest mice on Caltrans construction site at Sonoma Creek Bridge, Sonoma County.
2000	Contractor to Wildlife Research Associates. Conducted surveys for bat colonies in 650 abandoned housing units at Hamilton Field, Marin County.
1999	Subcontractor to Environmental Science Associates. Carried out habitat assessment for San Joaquin kit fox on proposed State Route 4 Bypass route, Contra Costa County.
1998-2001	Contractor to Desert Tortoise Preserve Committee with funding from California Energy Commission. Conducted field research to determine distribution, abundance, and habitat requirements of state-listed Mohave ground squirrel in Inyo, Kern, and San Bernardino counties.
1998	Subcontractor responsible for Mohave ground squirrel field surveys along proposed route of 32-mile natural gas pipeline to supply High Desert Power Plant in San Bernardino County.
1997-1999	Subcontractor to Environmental Science Associates. Carried out live-trapping study of the endangered salt marsh harvest mouse in restored tidal marsh environment at San Leandro Shoreline, Alameda County.
1997	Consultant to CalEnergy Exploration Company. Prepared technical report on wildlife resources of proposed Telephone Flat Geothermal Project area, Siskiyou and Modoc counties. Analyzed existing data sources and conducted reconnaissance-level field surveys to produce a report used in preparation of the project EIS/EIR.
1996-1998	Subcontractor to MHA Environmental Consulting. Prepared wildlife resource sections of EIS/EIR for proposed Fourmile Hill Geothermal Project, Siskiyou and Modoc counties. Conducted analysis of impacts to sensitive wildlife resources and designed appropriate mitigation measures.

1988-1996 Chief Scientist for Coso Grazing Exclosure Monitoring Program, Inyo County. Designed and conducted long-term ecological study to assess the effects of a 43,500-acre livestock grazing exclosure on populations of the threatened Mohave ground squirrel.

Permits

California Department of Fish and Game

Memorandum of Understanding regarding studies of the Mohave Ground Squirrel (*Spermophilus mohavensis*). Effective Mar. 31, 2000; formally amended on Mar. 11, 2005 and extended to Oct. 31, 2012.

Recent Papers and Reports

Leitner, Philip. 2008. Current status of the Mohave ground squirrel. Transactions of the Western Section of The Wildlife Society 44:11-29.

Leitner, Philip. 2008. Mohave ground squirrel surveys at Red Rock Canyon State Park, California. Prepared for California Department of Parks and Recreation, Tehachapi District, Lancaster, CA. Endangered Species Recovery Program, California State University, Stanislaus, Fresno, CA. 26 pp. + appendices.

Leitner, Philip. 2008. Exploratory trapping surveys for the Mohave ground squirrel in three regions of the western Mojave Desert 2002. Prepared for California Department of Fish and Game, Habitat Conservation Planning Branch, Sacramento, CA and Eastern Sierra and Inland Deserts Region, Ontario, CA. Endangered Species Recovery Program, California State University, Stanislaus, Fresno, CA.

Leitner, Philip. 2008. Mohave ground squirrel trapping surveys in the Spangler Hills OHV Open Area and the Western Rand Mountains ACEC. Prepared for California Department of Fish and Game, Habitat Conservation Planning Branch, Sacramento, CA and Eastern Sierra and Inland Deserts Region, Ontario, CA. Endangered Species Recovery Program, California State University, Stanislaus, Fresno, CA. 20 pp.

Leitner, Philip. 2008. Monitoring Mohave ground squirrel populations in the Coso region, 2002-2005. Prepared for California Department of Fish and Game, Habitat Conservation Planning Branch, Sacramento, CA and Eastern Sierra and Inland Deserts Region, Ontario, CA. Endangered Species Recovery Program, California State University, Stanislaus, Fresno, CA. 20 pp + appendices.

Leitner, Philip. 2007. Mohave ground squirrel survey, El Mirage Off-Highway Vehicle Open Area, 2002 and 2004. Prepared for USDI Bureau of Land Management, California Desert District, Moreno Valley, CA. 17 pp.

Leitner, Philip. 2007. Mohave ground squirrel surveys at the Western Expansion Area of the National Training Center and Fort Irwin, California. Prepared for ITS Corporation,

San Bernardino, CA. Endangered Species Recovery Program, California State University, Stanislaus, Fresno, CA. 26 pp. + appendices.

Leitner, Philip. 2006. Mohave ground squirrel monitoring, Coso geothermal power generation facility, 2006. Prepared for Coso Operating Company, LLC, Inyokern, CA. 11 pp. + appendix.

Harris, John H. and Philip Leitner. 2005. Long distance movements of juvenile Mohave ground squirrels, *Spermophilus mohavensis*. Southwestern Naturalist, 50:188-196.

Leitner, Philip. 2005. Mohave ground squirrel trapping survey in the region between U.S. Highway 395 and the Mojave River, San Bernardino County, 2004. Prepared for Desert Tortoise Preserve Committee, Inc., Riverside, CA. 16 pp.

Leitner, Philip. 2005. Trapping survey for the Mohave ground squirrel in the DTNA Eastern Expansion Area, 2003. Prepared for Desert Tortoise Preserve Committee, Inc., Riverside, CA. 19 pp.

Harris, John H. and Philip Leitner. 2004. Home-range size and use of space by adult Mohave ground squirrels, *Spermophilus mohavensis*. Journal of Mammalogy, 85:517-523.

Leitner, Philip. 2003. Inventory for presence of Mohave ground squirrels at Edwards AFB, California. Prepared for TYBRIN Corporation, Fort Walton Beach, FL. 13 pp. plus appendices.

Leitner, Philip. 2001. California Energy Commission and Desert Tortoise Preserve Committee Mohave ground squirrel study. Final report 1998-2000. Prepared for Desert Tortoise Preserve Committee, Inc., Riverside, CA. 33 pp. + appendix.

Leitner, Philip. 2001. Report on Mohave ground squirrel monitoring, Coso geothermal power generation facility, 2001. Prepared for Coso Operating Company, LLC, Inyokern, CA. 16 pp. + appendix.

Leitner, Philip and Barbara Malloch Leitner. 1998. Coso Grazing Exclosure Monitoring Study. Mohave ground squirrel study, Coso Known Geothermal Resource Area, major findings, 1988-1996. Final Report. Prepared for CalEnergy Company, Inc., Ridgecrest, CA. 42 pp. plus appendix.

Leitner, Philip. 1998. San Leandro Shoreline Marshlands Enhancement Project. Salt marsh harvest mouse trapping, August 20-September 8, 1998. Prepared for Environmental Science Associates, Inc., San Francisco, CA. 15 pp. plus appendix.

Leitner, Philip and Barbara Malloch Leitner. 1997. Biological resources of the Telephone Flat Geothermal Project study area. Prepared for CalEnergy Exploration Company, Omaha, NE. 59 pp. plus maps and appendixes.

Professional Presentations

Bell, Kayce C., Philip Leitner, and Marjorie D. Matocq. Population structure and genetic diversity of the Mohave ground squirrel, *Spermophilus mohavensis*. Presented at the Annual Meeting of the American Society of Mammalogists, Springfield, MO, June 15-19, 2005.

Bell, Kayce C., Philip Leitner, and Marjorie D. Matocq. Phylogeographic analysis of the Mohave ground squirrel (*Spermophilus mohavensis*). Presented at the Annual Meeting of the American Society of Mammalogists, Arcata, CA, June 12-16, 2004.

Leitner, Philip and John R. Gustafson. Current status of the Mohave ground squirrel (*Spermophilus mohavensis*). Presented at the 2001 Annual Conference of The Wildlife Society Western Section, Sacramento, California, Feb. 22-24, 2001.

Harris, John H. and Philip Leitner. Movements and home range of adult Mohave ground squirrels (*Spermophilus mohavensis*). Presented at the Annual Meeting of the American Society of Mammalogists, Seattle, WA, June 20-24, 1999.

Harris, John H., Philip Leitner, and Alison Tschohl. Juvenile dispersal in Mohave ground squirrels. Presented at the 1998 Annual Conference of The Wildlife Society Western Section, Sacramento, California, Feb. 11-14, 1998.

Leitner, Philip and Barbara Malloch Leitner. Extinction and persistence of local populations of the Mohave ground squirrel during severe drought. Presented at the Second Annual Conference of The Wildlife Society, Portland, Oregon, Sept. 12-17, 1995.

Leitner, Philip. Rainfall and reproduction in the Mohave ground squirrel. Presented at the 1995 Annual Conference of The Wildlife Society Western Section, Rohnert Park, California, Feb. 1-4, 1995.

Professional Societies

American Association for the Advancement of Science
American Society of Mammalogists
Ecological Society of America
Society for Conservation Biology
The Wildlife Society

Declaration of
Bob Mantey

I, Bob Mantey, declare as follows:

6. I am presently employed by Alliance Acoustical Consulting, Inc. as a Principal Consultant.

7. A copy of my professional qualifications and experience are attached hereto and incorporated herein by reference.

8. I prepared the attached testimony on Noise for the Mojave Solar project based on my independent analysis, supplements thereto, data from reliable sources, and my professional experience and knowledge.

9. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed herein.

10. 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: May 27, 2010 Signed: 

At: Irvine, CA

BOB MANTEY – PRINCIPAL CONSULTANT
Alliance Acoustical Consulting, Inc.

PROFESSIONAL HISTORY:

- Principal Consultant, **Alliance Acoustical Consulting, Inc.**, Irvine, Calif., 2000 to present
- Section Manager - Noise, Vibration & Acoustics Group, **PCR Services Corporation**, Irvine, California, 1997 - 2000
- Lead Engineer/Senior Engineer, **Fluor Daniel, Inc.**, Irvine, California, 1990 - 1997
- Lead Engineer/Senior Engineer, **Douglas Aircraft Co.**, Long Beach, California, 1988 - 1990
- Research Specialist/Member of the Technical Staff, **Wyle Research Group, Wyle Laboratories**, El Segundo, California, 1981 - 1988
- Acoustical Engineer/Consultant, **Bolt Beranek and Newman, Inc.**, Canoga Park, California, 1979 - 1981
- B.S., Engineering, **Harvey Mudd College**, Claremont, California, 1979

Certifications & Training:

- Member, Institute of Noise Control Engineering (INCE)
- FTA Certification - Transit Noise and Vibration Impact Assessment
- TNM 2.5 Training & Certification via HMMH.
- Engineer-In-Training Certificate, EIT, State of California
- Attended several instrumentation and data acquisition seminars given by Brüel and Kjær

Expertise:

BOB MANTEY has more than 30 years of managerial and technical experience in the field of applied engineering acoustics and industrial noise control. His expertise includes environmental/community noise modeling, predictive noise analyses, noise impact assessment & documentation, as well as machinery noise analysis, mitigation, and control. He is experienced in acoustical analysis, modeling, and investigation techniques using both proprietary and commercially-available computer packages. He is also well-versed in field data acquisition/ measurement techniques and noise data processing methodologies. He has consulting experience in residential sound insulation design optimization analyses, aircraft over-flight noise level measurements, and emergency warning system design. Mr. Mantey has training in ISO 9000 implementation, Kepner-Tregoe decision-making and technical contract management. He has foreign assignment experience in Taiwan, Saudi Arabia, Thailand, and Mexico.

Experience:

PROJECT MANAGEMENT / GROUP MANAGEMENT: Since its inception in late 2000, Mr. Mantey has been a managing technical principal of an acoustical engineering consulting firm that he co-founded. This consulting firm provides services to both private and government entities in environmental noise assessment, industrial noise control, transportation noise analyses, vibration evaluation, and acoustical project planning. Prior to establishing AAC, Bob was responsible for group management and administrative oversight of several noise control engineering and acoustical specialists at two firms over a span of 10 years. Over the last 20 years, he has been a Project Manager on many industrial noise control, environmental noise survey, and noise impact assessment jobs that have addressed the noise issues at power plants, refineries, commercial facilities, mixed-use developments, and residential properties.

Alliance Acoustical Consulting, Inc.
bmantey@allianceacoustics.com
800/664-7318 Voice
800/664-7340 Fax

BOB MANTEY – PRINCIPAL CONSULTANT

POWER PLANT PERMITTING AND DESIGN SUPPORT: As a subset of CEQA assessment documentation Bob has reviewed, contributed to, analyzed, and/or written noise sections for many power plant permit applications to the California Energy Commission (CEC). As part of the CEC permitting process, technical noise studies, modeling analyses, Application for Certification (AFC) section generation, response to comments, and/or assistance in public hearings have been performed for the following California power projects: Orange Grove, Hydrogen Energy-California (HECA), Mojave Solar, Orange Grove, South Bay, Morro Bay, Avenal, Colusa, Tesla, Moss Landing, Rio Linda/Elverta, Mountainview, High Desert, Riverside Canal, and Crockett. Mr. Mantey has also prepared technical noise studies on power plants in 15 other states and in a half-dozen countries for such developers as SDG&E, Duke Energy, LS Power, Abengoa Solar, Wellhead Electric, Reliant Energy, ConEd, Entergy, AES, FPL, TIE, Panda Power, PSE&G, TransAlta, Iberdrola, and EMI.

INDUSTRIAL NOISE CONTROL: Bob has performed environmental noise analysis, predictive design modeling, and worker (OSHA) exposure assessments for hundreds of electrical power generation stations, refinery/hydrocarbon-processing plants, and commercial/industrial facilities. Emphasis was placed on noise control of all types of rotating machinery, cooling equipment, process piping, venting sources, and material handling systems. Project involvement often entails 'cradle-to-grave' services from regulatory review, to ambient baseline surveys, to permitting and impact assessment, to noise control engineering (throughout the design process), to start-up troubleshooting, to verification measurements following commissioning. Noise reduction/mitigation projects typically have entailed source assessments, mitigation methodology examinations, vendor screenings, benefit estimations, and costing investigations to establish a cost-effective and practical noise reduction approach, while minimizing facility down-time. Bob supported the design team regarding noise intrusion at two overseas U.S. embassies, while maintaining security and functionality aspects.

NOISE MEASUREMENTS / MONITORING: Bob has done community/environmental noise data acquisition on industrial facilities, transportation sources, and entertainment venues and he has conducted field studies of machinery noise emissions at several power plants and refineries; both domestic and foreign. Measurements have included frequency-band, time-averaged, and statistical sound level data acquisition/processing techniques. Also, he has performed on-site noise mitigation trouble-shooting at operating facilities, including food-grade facilities, off-shore oil drilling platforms, a CO_2 recovery plant, large refineries, and several power plants.

TRANSPORTATION: Bob has performed railway noise and vibration measurements on active freight and commuter rails lines; including the proposed Gold Line commuter rail line in the City of South Pasadena. He has managed two separate rounds of traffic noise analyses and mitigation assessments – the latter using TNM 2.5 – at several housing developments on a busy arterial in the City of La Quinta. Earlier, Bob performed a noise impact study on a proposed medical campus in Carlsbad, Calif. Bob has also conducted public information presentations and city staff overview briefings for a roadway re-alignment project in the City of Orange. Previously, he carried out field measurements of aircraft fly-over noise for residential sound insulation projects around several major airports, including LAX and John Wayne (SNA). On the analytical side, he helped develop, run, and update computer optimization studies for retrofit sound insulation upgrades for several residential pilot programs at major southern California airports. He helped write a performance specification for an expanded and updated community noise monitoring system at LAX.

Alliance Acoustical Consulting, Inc.
bmantey@allianceacoustics.com
800/664-7318 Voice
800/664-7340 Fax

BOB MANTEY – PRINCIPAL CONSULTANT

ENVIRONMENTAL NOISE ASSESSMENT AND EIR DOCUMENTATION: Bob wrote or assisted in the preparation of the noise section and/or noise technical appendix for several California development projects requiring CEQA-based EIR documentation. These projects included the Hollywood & Highland Entertainment Center (the permanent home of the Oscars®), the Warner Center Specific Plan Supplemental EIR, WDI's Grand Central Creative Campus (GC3) studios in the Glendale Redevelopment Center, WDI's Third Gate in the Disneyland Resort Complex, and the LA Equestrian Center. He also performed technical review and helped generate formal responses to comments on the proposed Universal City Specific Plan EIR (for Universal Studios' proposed theme park, retail, and hotel expansion). Bob also generated NEPA documentation for potential noise impacts from a proposed solar power plant in Arizona as well as for a Veterans Administration Hospital facility expansion/upgrade project. All of these environmental assessment projects entailed significant noise-related issues and/or potential impacts to surrounding land uses, adjacent residential area, and/or nearby school facilities.

ARCHITECTURAL ACOUSTICS: Bob has modeled and analyzed potential impacts from exterior mechanical equipment onto interior spaces at several commercial facilities, including residential developments, hotel facilities, hospitals, and office spaces. Bob also supported the architectural acoustics design efforts for operating spaces inside the Emergency Operations (911) Centers for both the City of Long Beach and the City of Los Angeles. Bob has performed field measurements of sound and impact vibration transmission through party wall and floor assemblies in high-end hotel developments and condominium facilities. Previously, he applied theoretical research studies to the practical estimation/assessment of sentence intelligibility parameters inside industrial work areas. He also evaluated telecommunications effectiveness and alerting capabilities on interior environments in several nuclear power facilities.

LEGAL SUPPORT: Bob has supported legal firms in the environmental application process for several power plant projects, including testifying (sworn-in hearings) before the California Energy Commission on one of the most complicated and involved projects to go before the CEC. In support of a legal firm representing a homeowners' group, Mr. Mantey conducted outdoor noise level measurements in a dispute over potentially intrusive commercial operations. He has also contributed to the litigation support of ***LAUSD vs. City of Los Angeles,*** concerning noise impacts in a degraded classroom noise environment for the City of Los Angeles' Warner Center Specific Plan.

ACOUSTICS RESEARCH: Bob was the Task Manager on a noise research project for Riverside County aimed at studying the noise emissions, measurement methodologies, and long-range propagation of noise from electricity generation wind turbines. He presented a technical paper at a Wind Turbine Technology Symposium.

Alliance Acoustical Consulting, Inc.
bmantey@allianceacoustics.com

800/664-7318 Voice
800/664-7340 Fax

Declaration of
M.K. Meiser

I, Maria K. Meiser, declare as follows:

1. I am presently employed by AECOM as Architectural Historian.

2. A copy of my professional qualifications and experience are attached hereto and incorporated herein by reference.

3. The attached testimony on Cultural Resources for the Mojave Solar project based on my independent analysis, supplements thereto, data from reliable 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 herein.

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: May 28, 2010 Signed: 

At: San Diego, CA

TRINA MEISER
Architectural Historian

SUMMARY
Historic preservation specialist and architectural historian

EDUCATION
MA, Historic Preservation Planning, Cornell University, 2003
BA, History, Kenyon College, 1998

AFFILIATIONS
National Trust for Historic Preservation
Society of Architectural Historians
California Preservation Foundation

Trina Meiser is a historic preservation specialist and an architectural historian with 6 years of experience in surveying, documenting, evaluating, and planning for historic structures, districts, sites, and cultural resources. Her background is based on a solid knowledge of architectural history, architectural styles and terminology, building materials conservation, and historic preservation theory. She has led seminars on architectural styles and the history of historic preservation, charrettes for the design treatments of historic districts, as well as workshops in materials conservation. She has completed cultural resource technical reports, National Register of Historic Places nominations, historic structures reports, and Federal Rehabilitation Tax Credit applications. She has consulted on a variety of historic structure rehabilitation plans with clients, architects, engineers, and agency representatives for regulatory review. Her experience in historic preservation planning provides a strong understanding of federal, state, and local historic preservation laws. She has a thorough knowledge of the *Secretary of the Interior's Standards for the Treatment of Historic Properties* and their functions in historic preservation planning.

Ms. Meiser's areas of interest include urban and landscape preservation planning and design, building restoration, archaeology, international heritage sites, and historic district and neighborhood revitalization projects. She is a member of the Society of Architectural Historians, the California Preservation Foundation, the National Trust for Historic Preservation, and several regional historical societies and preservation organizations.

HISTORIC PRESERVATION PROJECTS

National Register Eligibility Assessment for Naval Base Ventura County, Port Hueneme, California
Architectural Historian
CLIENT: U.S. Navy, Southwest Division
Recorded and evaluated 18 buildings at the Naval Construction Training Center at Port Hueneme for eligibility to the National Register. Conducted research on the Disaster Recovery Training School for incorporation into the historical context. Completed DPR forms and incorporated findings in a Historic Resources Evaluation Report.

Ramona Air Center Environmental Impact Report, Ramona, California
Architectural Historian
CLIENT: TCR Properties
Conducted a survey and historical research of structures more than 50 years old to evaluate and document historic resources. Results were recorded on DPR forms and summarized for inclusion in the project Environmental Impact Report.

Exposition Light Rail Transit Phase 2, Los Angeles County, California
Architectural Historian
CLIENT: Exposition Light Rail Authority/AECOM Transportation
Conducted fieldwork to record and evaluate historic resources along the Exposition Corridor ROW. Completed a Historical Resources Evaluation Report for the evaluation of historical resources for eligibility to the National Register of Historic Places and the California Register of Historical Resources. Provided cultural resources portion of Environmental Impact Statement, including mitigation measures for the treatment of evaluated historical resources.

SR-76 Mission to I-15 Historical Resources Evaluation Report, San Diego, California
Architectural Historian
CLIENT: San Diego Association of Governments/Caltrans
Conducted fieldwork to record and evaluate ranching buildings and residences. Completed a Historical Resources Evaluation Report per Caltrans standards for the evaluation of historical resources for eligibility to the National Register of Historic Places and the California Register of Historical Resources.

Main Street Bridge Replacement Project, Temecula, California
Architectural Historian
CLIENT: City of Temecula
Conducted a survey and historical research of historic resources in Old Town Temecula adjacent to the Main Street Bridge. Results were recorded on DPR forms and in a Historical Resources Survey Report per Caltrans guidelines.

301 University Avenue Historical Evaluation and Technical Report, San Diego, California
Architectural Historian
CLIENT: Allen, Matkins, Leck, Gamble, Mallory & Matsis, LLP
Evaluated the condition and integrity of the former supermarket building dating from 1942. Prepared Historic Resources Evaluation Report and survey forms. Summarized findings for inclusion in the 301 University Uptown Environmental Impact Report.

SFVAMC Environmental Assessment of Seismic Upgrades, San Francisco, California
Architectural Historian
CLIENT: Department of Veterans Affairs
Consulted with architects and designers for the rehabilitation and seismic retrofit of the 1930s-era Art Deco San Francisco Veterans Affairs Medical Center buildings. Reviewed plans and rehabilitation standards to evaluate design of new additions and alterations. Engaged in consultation with the State Historic Preservation Office.

North Torrey Pines Bridge "Sorrento Overpass" Restoration, Del Mar, California
Historic Preservation Specialist
CLIENT: City of Del Mar
Consulted with engineers for the restoration of the 1933 North Torrey Pines Bridge to resolve significant impacts to the National Register-eligible resource. Assessed the deterioration of the bridge and established the historic character-defining features to be preserved. Evaluated restoration plans to suggest mitigation measures for its treatment in compliance with the Secretary of Interior Standards for Restoration.

Jefferson National Expansion Memorial, St. Louis, Missouri
Architectural Historian
CLIENT: National Park Service
Contributed to the cultural resources section of the GMP/EIS. Provided historical context for the Native American occupation, the French colonial establishment, and the 19th century development of the built environment in St. Louis, Missouri.

Fort Totten Conservation Work Weekend, New York, New York
Historic Preservation Specialist
CLIENT: New York City Department of Parks and Recreation
Organized a historic preservation event to perform restoration work on Officers' Quarters at retired military site along New York's East River. Oversaw the conservation of historic exterior woodwork elements. This conservation project was completed prior to joining EDAW.

Hurricane Katrina Recovery, Disaster 1604-DR-MS, Biloxi, Mississippi
Architectural Historian
CLIENT: Federal Emergency Management Agency, Region VI
Recorded the condition and integrity of multiple properties affected by Hurricane Katrina and performed photo documentation. Determined if structures were eligible for National Register designation. Results were summarized in a report and through a series of maps generated in GIS. This conservation work was performed prior to joining EDAW.

Hurricane Katrina Recovery, Disaster 1604-DR-MS, Biloxi, Mississippi
Historic Preservation Specialist
CLIENT: Federal Emergency Management Agency, Region VI
Completed Section 106 review and coordinated with the State Historic Preservation Office to ensure that all projects funded by FEMA complied with federal regulations and the National Historic Preservation Act. Evaluated restoration projects for National Register eligibility in compliance with Secretary of Interior's Standards for Restoration and Rehabilitation under Programmatic Agreement. This historic preservation work was performed prior to joining EDAW.

Ithaca Downtown Commercial Historic District National Register Eligibility Nomination, Ithaca, New York
Historic Preservation Planner
CLIENT: City of Ithaca
Completed research and documentation of downtown commercial buildings dating from the 1830s to the 1930s. Document included architectural descriptions of each building. Successful nomination to the National Register. This historic preservation planning project was completed prior to joining EDAW.

University Avenue Historic District National Register Eligibility Assessment, Ithaca, New York
Historic Preservation Planner
CLIENT: City of Ithaca
Completed documentation included in the survey and nomination of this residential historic district with resources dating from the 1860s to the 1950s. This historic preservation planning project was completed prior to joining EDAW.

Historic Ithaca's State Theatre Restoration Project, Ithaca, New York
Historic Preservation Specialist
CLIENT: Historic Ithaca, Inc.
Evaluated restoration designs for compatibility with the historic character of the resource and for compatibility with the *Secretary of the Interior's Standards for Rehabilitation*. Performed conservation of textiles, decorative fixtures, plaster, and windows. Managed construction projects relating to aesthetic and ADA accessibility modifications. This restoration work was completed prior to joining EDAW.

The Clinton House, Ithaca, New York
Historic Preservation Planner/Specialist
CLIENT: Historic Ithaca, Inc.
Evaluated designs for compatibility with the historic character of the resource and for compatibility with the *Secretary of the Interior's Standards for Rehabilitation*. Compiled and prepared Part 1 of the Federal Rehabilitation Tax Credit Application. Oversaw construction management for aesthetic modifications to historic elements. This planning and conservation project was completed prior to joining EDAW.

TRINA MEISER

The Delaware, Lackawanna and Western Train Station National Register Eligibility Nomination, Ithaca, New York
Historic Preservation Specialist
CLIENT: City of Ithaca
Composed historic context statement and architectural description for historic train station. Photodocumented building and submitted the application to the State Office of Historic Preservation. This historic preservation planning project was completed prior to joining EDAW.

Athens Exchange Hotel Stagecoach Livery Historic Structures Report, Athens, Pennsylvania
Preservation Planner
CLIENT: Town of Athens, Pennsylvania
Conducted comprehensive assessment of exterior and interior spaces of 1860s livery structure. Identified character-defining features and compiled historic context statement. Photodocumented building and developed recommendations for treatment and maintenance of deteriorated historic features. This conservation project was completed prior to joining EDAW.

Declaration of
Brad S. Merrell

I, Brad S. Merrell, declare as follows:

1. I am presently employed by Merrell-Johnson Engineering, Inc. as the Principal Engineer.

2. A copy of my professional qualifications and experience are attached hereto and incorporated herein by reference.

3. The attached testimony on Hazardous Materials, Soil and Water Resources, and Waste Management was either prepared by me or under my direction for the Mojave Solar project based on my independent analysis, supplements thereto, data from reliable 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 herein.

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: May 27, 2010 Signed: 

At: Victorville, CA

Brad S. Merrell, P.E.
Principal Engineer, RCE 49423

Brad Merrell brings a variety of experience to his role as principal engineer and corporate president of Merrell-Johnson Engineering, Inc. He has 24 years of hands-on experience in the construction industry. He has spent two decades in engineering design. His professional experience has ranged from private development to municipal government with a good portion of recent work in industrial/utility contracts.

- **Abengoa Solar Inc., Mojave Solar Project.** Principal Engineer to provide civil engineering and surveying services for a 250 megawatt solar electric generating facility proposed on 1,765 acres of privately owned-land in unincorporated San Bernardino County, California approximately nine miles northwest of Hinkley, CA. Work included site layout, grading, hydrology and storm water management, storm water pollution plan preparation, erosion control, waste management, street improvements, utility improvement design, geotechnical hazards, soils, mapping support, boundary and title work information for the proposed Mojave Solar Project in Lockhart, California.

- **Abengoa Solar Inc., Lathrop Wells Solar Project – Amargosa Valley, Nevada.** Principal Engineer involved with Abengoa Solar Inc. in the initial site design and permitting phase for their Lathrop Wells Solar Project. This plant is a 500 megawatt solar electric generating facility proposed on approximately 5,120 acres of public land in the Amargosa Valley in unincorporated Nye County, Nevada. Work includes submittal of Plan of Development to Bureau of Land Management also Utility Environmental Protection Act permit application to Bureau of Land Management and to the Nevada Public Utilities Commission including grading and drainage plans, off-site and on-site hydrology studies, site layout preparation, and mapping support.

- **SolFocus MW Solar Array Power Plant, Victor Valley Community College** Principal Engineer currently under contract with SolFocus to provide engineering work on the installation of an operational 1MWdc solar plant consisting of one hundred twenty-two (122) SolFocus SF1100S concentrating photovoltaic arrays, at the Victor Valley College campus. These services include site due diligence, geotechnical, land and engineering permitting. Detailed geotechnical analysis, identify city permitting requirement for scope of work for entire project. Civil design package to include a foundation plan and foundation design drawings, as built marked-up drawings showing all final locations, modifications, and design or specification changes.

- **Victor Valley Community College District, Eastside Public Safety Training Center.** Principal Engineer currently under contract with Highland Partnership to provide surveying and engineering services for the new Eastside Public Safety Training Center located on Johnson & Navajo Rd in Apple Valley, CA. Work includes the design and installation of new utilities including coordination with all existing utility and city agencies serving the site, the design and construction of parking spaces, approximately 21,855 assignable square feet of buildings and footings for training props. Design of grading, storm water collection and

retention system, erosion control, street, water and sewer improvement plans. Prepare, submit and implement a Storm Water Pollution Prevention Plan.

- **Clark Capitol Reality/Clark Construction**. Design-Build Project, Principal Engineer for the design and construction of base housing for Fort Irwin National Training Center. Work included: all off-site and on-site improvements, Streets, Grading, Water, Sewer, Dry Utilities, for housing and community centers in multiple communities at Fort Irwin.

- **Apple-Bear Partners.** Project Manager/Principal Designer for Apple Valley Towne Center. Commercial shopping center with major tenants being Lowe's, Stater Brothers, and Walgreens. Duties included: Parcel map, public hearings, water and sewer extensions, grading and site improvements, off-site road and utilities. Traffic signal and striping improvements

- **City of Victorville.** Nisqualli Road improvements, Phase I. Principal Engineer for the widening of Nisqualli Road from Hesperia Road to Seventh Street. Working as a joint venture with So and Associates, Inc, and VVCE, Inc. Under contract with the City of Victorville. Duties included the design of the roadway, Hydrology and Hydraulic analysis for storm drain improvements. Individual grading plans for construction easements and property owner negotiations.

- **Town of Apple Valley.** Principal Engineer for the design of major storm drain improvements for the outflow of local tributary flows from the Market Place at Jess Ranch into the Mojave River. Duties included the permitting of the work though San Bernardino Flood Control and assisted in the environmental permits with Fish and Game and various agencies.

- **City of Hesperia**. Principal Engineer for the Design of approximately 50,000 LF of waterline improvements for the City. Work included Utility research, field surveys and improvement plans and documents for the FY 2007-2008 City wide water pipeline replacement project.

- **City of Barstow** Principal Engineer for the reconstruction major roadways for the Engineering Department. Road work included East and West Main Street, and Lenwood road Reconstruction. Principal Engineer for the Rimrock and Montara trunk line sewer study. Work included the flow monitoring of existing sewers, capacity calculations and master plan recommendations for improvements needed for ongoing and future developments along the tributary area.

- **Service Rock Products, Inc**. Principal Engineer for the design of various projects for corporate expansions. Work included: New batch plant, Fort Irwin Road including highway modifications for truck movements and site improvements. Plant expansion for the Victorville batch plant and preliminary engineering for a BNSF rail spur.

- **Cemex, Inc. (formerly Southdown, Inc.)** Design work for Cemex, Inc. Duties include preliminary/final design and construction support for various projects:

  - Design and Construction support for Locomotive Repair Facility at Victorville River Plant. New railroad spur and elevated track sections for rolling repair of

locomotives.

- Design of retaining wall for new coal pile. Stacker/Reclaimer Rail footing design at Black Mountain Quarry Plant, Apple Valley, CA.
- Design of hoist rails for several facility crane structures at Black Mountain Quarry Plant.
- Design for modification of #2 Conveyor for new Dust Hood for Environmental mitigation at Black Mountain Quarry Plant.
- Design of Rail Car Shaker support frame at Black Mountain Quarry Plant.
- Emergency repair/engineering for Primary Crusher Canopy support column.
- Design of safety high line cable for Kiln #2 Fall Protection.

- **San Bernardino County Special Districts, Lenwood Sewer Project.** Principal Engineer for the design of the Lenwood Sewer Project for the County of San Bernardino Special Districts. Design included 56,000 ft. of gravity sewer for the connection of High Desert Estates and the Lenwood area to the City of Barstow's sewer system.

- **Newmark International, Inc.** Principal Engineer for design and construction support for new Mojave River pole manufacturing plant in Lenwood/Barstow, CA. 90,000 sq. ft. steel structure with batch plant and silo on 40 acre site. Provided structural, civil and architectural plans along with contract specifications for entire project.

- **High Desert Juvenile Detention Center.** Principal Engineer for the site adaptation of a new Juvenile Detention Center on Dale Evans Parkway in Apple Valley, CA. Work included site presentations, site layout, design of grading, water system, hydrology, sewer and street improvements, storm drain and off-site water options. Worked as sub-consultant to Patrick Sullivan & Associates.

- **Community Development Director, City of Barstow, Calif.** Management and oversight of Planning, Building and Engineering departments. Oversight of water reclamation plant improvement (Headworks) and reconstruction of Lenwood Road/ Interstate 15 interchange. April 1997 through September 1998.

- **Assistant City Engineer, City of Las Vegas, Nevada.** Responsible for management of Construction Services, Capital and Land Development Off-Site Improvements of the City Engineer Division. January 1996 through April 1997.

California, Registered Civil Engineer, 49423, June 1992
Arizona, Registered Civil Engineer, 29429, 1995
Nevada, Registered Civil Engineer, 11634, 1995
Nuclear Safety and Testing Certification, 18508, April 1991
ICBO Certified Special Inspector Structural Masonry, 0881764-84
ICBO Certified Special Inspector Reinforced Concrete, 0881764-49
ACI Concrete Field Testing Technician Grade I, April 1991, ID# 944911
California, Land Surveyor-in-training No. 004266, September 1991
California, General Building Contractor, B-448292, November 1983
California, General Building Contractor, A-448292, 1991

B.S., Civil Engineering

California State Polytechnic University, Pomona, March 1989
National Civil Engineers Honor Society, Chi Epsilon.
American Society of Civil Engineers
American Concrete Institute
Construction Specifications Institute

Declaration of
Lyndon Quon

I, Lyndon Quon, declare as follows:

1. I am presently employed by AECOM as Senior Biologist.

2. A copy of my professional qualifications and experience are attached hereto and incorporated herein by reference.

3. The attached testimony on Biological Resources was either prepared by me or under my direction for the Mojave Solar project based on my independent analysis, supplements thereto, data from reliable 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 herein.

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: May 19, 2010 Signed: Lyndon Quon

At: San Diego, California

LYNDON QUON
Senior Wildlife Biologist

SUMMARY
Ecological risk assessor

Experienced with GPS and GIS

Expert in sensitive and endangered species and desert habitats

EDUCATION
BA, Ecology, University of California, San Diego, 1989

OTHER TRAINING
Mohave Ground Squirrel CHIEF Training, California Department of Fish and Game, 1992

Desert Tortoise Survey and Handling Techniques Workshop, Desert Tortoise Council, 1991 and 1999

Southern California Rodent Biology and Management Workshop, California Department of Fish and Game, 1993

OSHA Hazardous Material Operations and Emergency Response Training and Supervisory Training, 1994

Environmental Compliance Assessment System Training, U.S. Army National Guard, 1994

California Fairy Shrimp Identification Course, 2000

Biological Assessment Workshop, U.S. Fish and Wildlife Service, 2001

Lyndon Quon has 21 years of experience conducting environmental impact and species diversity studies. Mr. Quon is experienced in conducting biological studies for military and industrial projects, as well as with utilizing GPS and GIS to map sensitive species. His other responsibilities have included project management, managing databases, overseeing quality assurance and quality control for data collection procedures, conducting field surveys and habitat analyses, and writing sections of EIRs and other environmental technical reports.

Mr. Quon is qualified to perform surveys for a variety of federally and/or state threatened or endangered species, including arroyo toad, Mojave desert tortoise, and least Bell's vireo. He has received special training in survey and handling techniques for the federally threatened Mojave desert tortoise and has been trained to identify mitigation requirements of impacts to the Mohave ground squirrel.

PROJECT EXPERIENCE

Abengoa Mojave Solar Project
Lead Project Biologist/Project Manager
CLIENT: Abengoa Solar, Inc./Mojave Solar, LLC
Project biologist overseeing the completion of biological surveys of an approximately 4,400-acre study area, associated with a proposed 1,765-acre parabolic trough, solar-thermal plant located in the vicinity of Harper Lake, San Bernardino County, California. Lead author preparing the biological resources sections of the California Energy Commission Application for Certification. Project manager overseeing the preparation of various permit applications, including a Habitat Conservation Plan, a Fish and Game Code 2081 Incidental Take Permit Application, and multiple mitigation monitoring plans. Major project species concerns include the desert tortoise (Mojave population), Mohave ground squirrel, and western burrowing owl.

Beacon Solar Energy Project
Lead Project Biologist/Project Manager
CLIENT: FPLE/NextEra Energy
Project biologist overseeing the completion of biological surveys of an approximately 2,200-acre study area, associated with a proposed 1,280-acre parabolic trough, solar-thermal plant located north of California City, California. Lead author of the biological resources sections of the California Energy Commission Application for Certification. Project manager overseeing the permitting consultation services and preparation of various permit applications, including a Low Effect Habitat Conservation Plan, a Fish and Game Code 2081 Incidental Take Permit Application, and multiple mitigation monitoring plans. Major project species concerns include the desert tortoise (Mojave population), Mohave ground squirrel, and western burrowing owl.

Salton Sea Unit 6 Geothermal Power Generation Plant Burrowing Owl Mitigation, Monitoring, and Reporting Plan Project
Lead Project Biologist/Project Manager
CLIENT: Imperial Irrigation District
Currently overseeing the preparation of a Mitigation, Monitoring, and Reporting Plan (MMRP) addressing the western burrowing owl for potential impacts associated with the District's Salton Sea Unit 6 Geothermal Power Generation Plant in Imperial County, California. Once completed, the MMRP will be submitted for review by the California Energy Commission.

LYNDON QUON

Pine Tree Wind Development Project, Tehachapi, Kern County, CA
Wildlife Biologist
CLIENT: Zhilka
Assisted in conducting focused surveys for the Mojave desert tortoise, following a modified protocol, approved by the local BLM office. Also assisted in reviewing sections of the environmental documentation for the project.

Chiriaco Summit Electrical Transmission Line Project, Riverside and Imperial Counties, CA
Lead Project Biologist/Project Manager
CLIENT: Imperial Irrigation District
Conducted biological resource investigations along the proposed 8.5-mile-long electrical transmission line corridor and implemented the biological monitoring during project construction. Biological surveys included accounts of the biological resources (such as the desert tortoise) within the proposed construction areas.

Transmission Line Pole Replacement Projects, Imperial County, CA
Wildlife Biologist
CLIENT: Imperial Irrigation District
Served as wildlife biologist for biological resource investigations along two existing transmission lines where 300 existing poles (a total of 184 miles) were to be replaced. Biological surveys included pole-specific accounts of the biological resources (such as the flat-tailed horned lizard, burrowing owl, and desert tortoise) within the proposed construction areas.

Meadow Valley Wash Slope Stabilization, Caliente Subdivision
Lincoln and Clark County, NV
Field Biologist
CLIENT: Union Pacific Railroad Company
Providing the Union Pacific Railroad Company with a range of environmental services, in support of the ongoing slope stabilization and infrastructure protection activities in Meadow Valley Wash, Clover Creek, and other tributaries, in Lincoln and Clark counties, Nevada. Environmental services provided include focused surveys for the federally listed threatened Mojave desert tortoise, biological monitoring for the desert tortoise and the federally listed endangered southwestern willow flycatcher, the preparation of multiple Biological Assessments in support of federal Endangered Species Act, Section 7 consultations with the USFWS, and assistance in the preparation of multiple Environmental Assessments for activities proposed on lands under BLM administration.

Desert Tortoise Monitoring for Glamis Derailment,
Glamis, CA
Field Biologist
CLIENT: Union Pacific Railroad Company
Provided the Union Pacific Railroad Company with emergency environmental services, from February through September 2007. Services provided included surveys and biological monitoring for the federally listed threatened Mojave desert tortoise, and coordination with local regulatory personnel from the USFWS and BLM. At the conclusion of the field activities, EDAW prepared a biological monitoring report and submitted the document to the El Centro office of the BLM.

Declaration of
Frederick H. Redell, PE

I, Frederick H. Redell, PE, declare as follows:

1. I am presently employed by Abengoa Solar Inc. as Engineering Manager.

2. A copy of my professional qualifications and experience are attached hereto and incorporated herein by reference.

3. I prepared the attached testimony on Project Description and Facility Design, Power Plant Efficiency, Power Plant Reliability, Worker Safety, Air Quality and Public Health – HTF Recovery System, Soil and Water Resources – Plant Water Demand Calculations, Visual Resources – Solar Collector Array Impacts, and Alternatives for the Mojave Solar project based on my independent analysis, supplements thereto, data from reliable 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 herein.

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: June 1, 2010 Signed: 

At: Lakewood, CO

FREDERICK H. REDELL, PE
Abengoa Solar Inc.
11500 W. 13th Ave
Lakewood, CO 80215
(303) 928-8500

CURRENT POSITION:

Engineering Manager ABENGOA SOLAR INC., Lakewood, CO

PRIOR PROFESSIONAL EXPERIENCE:

Owner/Principal REDELL ENGINERING, INC., Santa Ana, CA 2007-2009

Redell Engineering, Inc. provided consulting services that focus on energy related projects in commercial, aerospace and defense industries.

Mojave Solar Project – 250 MW solar thermal energy facility permitting – project management and engineering coordination.

Beacon Solar Energy Project – 250 MW solar thermal energy facility permitting – authored project description and alternatives analyses section for Application for Certification.

Earth Orbiting Calibration Devices – Design and analysis of low-cost calibration objects for thermal, optical, and radio frequency sensors.

Solar Concentrator for Space Propulsion – Conceptual design and numerical modeling of novel deployable solar concentrator structure.

Deployable Wing Design for UAVs – Design, fabricate, and test deployable wing.

Internal Research and Development – Design and analyze micro-scale flapping wing concepts.

Internal Research and Development – Numerical modeling of stochastic data streams.

Vice President, Engineering INLAND ENERGY, INC., Newport Beach, CA 2006 - 2007

Primarily responsible for the technical and design performance aspects of power plant development efforts. Working closely with contractors, acted as the technical-to-environmental interface, coordinated all permitting efforts (technical and environmental requirements, budget and schedule) for CEC licensing of this 563 MW facility, as well as air quality and biological resources-related permits. Coordinated the design efforts for a power plant combining a gas-fired combined cycle power plant integrated with 50 MW of solar thermal; this involved design coordination across multiple disciplines and involving multiple subcontractors and specialists. Authored the detailed Project Description included in the AFC, and prepared the quantitative project data needed as inputs for the environmental evaluation in all disciplines. Was responsible for managing a project budget of approximately $5,500,000.

Project Engineer/Program Manager L'GARDE, INC., Tustin, CA 2002 - 2006

Researched innovative techniques to improve the power-to-weight ratio for photovoltaic space-power systems. Developed a space-based long-lived solar concentrator technology by investigating novel methods to deploy and shape large aperture solar concentrators with inflation and subsequently rigidize the reflector allowing large apertures to be utilized for deep space applications. Additional work includes mechanical design, thermal and structural analysis utilizing classical and numerical methods, and material testing. Typical annual budget managed was $1,200,000.

Senior Mechanical Engineer KULICKE & SOFFA INDUSTRIES, San Jose, CA 2001 - 2002

Managed capital equipment expansion that included specifying equipment requirements, negotiating terms, overseeing installation, and prepping equipment for process qualification using Microsoft Project. Designed, tested and implemented equipment modifications for pilot manufacturing line. Developed innovative ideas to increase product yield and reduce cycle time.

Global Product Support Engineer NOVELLUS SYSTEMS, INC., San Jose, CA 2000 - 2001

Managed and implemented engineering improvement projects to meet customer requirements.

Graduate Student Researcher UNIVERSITY OF CALIFORNIA, SAN DIEGO 1999 - 2000

Research included investigation of ethanol combustion and product generation. Used experimental techniques to determine chemical species concentrations and flow characteristics in a flame flow field and theoretical techniques included developing fundamental equations for fluid flow and species generation and applying

numerical methods to predict concentrations and compare results to experimental findings. Performed calculations using Fluent CFD and Flamemaster numerical codes.

Mechanical Engineer SARGENT & LUNDY, LLC, Chicago, IL 1998 - 1999

Collaborated with a team of engineers to provide clients solutions to design problems including power plant upgrades and accident analysis. Created heat balances to create design criteria and size equipment using GateCycle. Performed and reviewed design calculations for power plant modifications and accident evaluations. Used numerical methods to solve three-dimensional time varying thermo-fluid science models.

Lead Operating Engineer CHICAGO AREA HOSPITALS, Chicago, IL 1995 - 1998

Operated and maintained high and low pressure boilers, chillers, building automation systems, and hospital support equipment. Initiated preventative and corrective maintenance programs on mechanical and electrical systems to increase reliability of safety and life-support systems.

Nuclear Power Plant Supervisor/Lead Lab Technician U.S. NAVY, SUBMARINES 1989 - 1995

Oversaw chemistry/radiochemistry monitoring on boiler and reactor plant water to predict trends. Supervised and trained the team accountable for the daily steam and power plant operations. Lectured on plant theory and operation, chemistry/radiological controls, and preventative maintenance to junior personnel. Operated and maintained all mechanical aspects of the power plant including steam turbines, reduction gears, distilling units, pumps and chiller units. Performed complex repairs to reactor plant equipment including pneumatics and hydraulics.

RECENT PUBLICATIONS:

Redell, F., Kleber, J., et. al., Inflatable-Rigidizable Solar Concentrators for Space Power Applications, 6th AIAA Gossamer Space Forum, Austin, Texas, April 18, 2005.

Redell, F., Kleber, J., et. al., Testing of an Inflation-Deployed Sub-Tg Rigidized Support Structure for a Planar Membrane Waveguide Antenna, 6th AIAA Gossamer Space Forum, Austin, Texas, April 18, 2005.

Lichodziejewski, D., and Redell, F., Power-Scaleable Inflation-Deployed Solar Arrays, 5th Gossamer Space Forum, Palm Springs, CA, April 18, 2004

Palisoc, A., Redell, F., and Andersen, G., Deployment and Structural Support of Space Membrane Optics System Using Rigidizable Conical Booms, Earth and Space, Houston, Texas, 2004.

Hopkins, D., Cravey, R., et.al, Comparison of Measured and Modeled Performance of a Tensioned Membrane Waveguide Array Antenna, Antennas and Propagation Society International Symposium, June 20, 2004.

EDUCATION:

Master of Science in Mechanical Engineering - University of California, San Diego
Center for Energy Research - Graduate Student Researcher

Bachelor of Science in Mechanical Engineering - University of Illinois, Chicago
Graduated with Highest Honors

U.S. Navy Nuclear Power Training Program - June 1989

HONORS, ACHIEVEMENTS, MEMBERSHIPS AND CERTIFICATIONS:

Registered Professional Engineer (CA M33758), Mechanical, California
Awarded Navy Achievement Medal twice, also awarded the Expeditionary Medal twice
Member American Society of Mechanical Engineers
Member American Institute of Aeronautics and Astronautics
Member Tau Beta Pi, Illinois Zeta Chapter

Declaration of
Jack Wittman

I, Jack Wittman, declare as follows:

1. I am presently employed by Layne Christensen Company as National Director of GeoSciences.

2. A copy of my professional qualifications and experience are attached hereto and incorporated herein by reference.

3. The attached testimony on Groundwater Resources was either prepared by me or under my direction was either prepared by me or under my direction for the Mojave Solar project based on my independent analysis, supplements thereto, data from reliable sources, and my professional experience and knowledge.

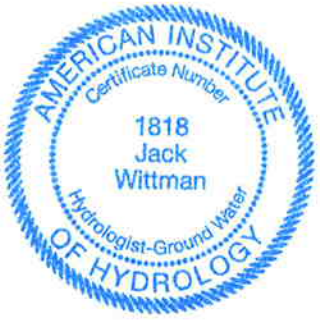
4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed herein.

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: May 25, 2010 Signed: _____

At: Bloomington, Indiana



Jack Wittman

SUMMARY OF QUALIFICATIONS

Groundwater Flow Modeling

Watershed Modeling

Groundwater / Surface Water Interaction

Contaminant Transport Modeling

Groundwater Quality

Aquifer Yield Investigation

Water Supply Protection and Planning

Dr. Jack Wittman is a nationally recognized groundwater scientist and watershed hydrologist. For the past 25 years, Dr. Wittman has been applying hydrologic data and models to scientific and public policy problems. Wittman's research has focused on using hydrologic models to protect community drinking water supplies.

Over the past decade Dr. Wittman has published many research reports, technical guidance documents and journal articles. Dr. Wittman has advised Federal, State, Tribal, and local governments, as well as the largest water utilities in the world. He has been asked to consult with utility regulators and managers to explain risks of contamination.

Over the past 20 years Dr. Wittman has built a consulting firm and managed interdisciplinary and often remote teams of technical specialists on projects as diverse as reviewing plans nuclear waste isolation to regional water supply development.

Dr. Wittman developed new methods to evaluate riverbank filtration using analytic elements and is one of the co-inventors of a proprietary code used to model groundwater flow near and within collector wells. Dr. Wittman developed new insights into contaminant risk by using numerical experiments (one, two, and three-dimensional flow and transport models) to test the sensitivity of a solute pulse release to variation in release characteristics. These new tools and metrics have been used to define the risk of contamination based on the chemical and toxicological characteristics of the contaminant.

Jack is registered as a Certified Ground Water Professional (CGWP) by the National Groundwater Association (NGWA) and has been appointed by the Indiana governor to the State Water Shortage Task Force and he is currently a member of the NGWA's certification committee. Jack is on the ASTM Committee D18 on Soil and Rock, the AWWA Research Foundation technical review committee, and is a member of the American Water Works Association's Water Utility Council. Dr. Wittman has helped hundreds of community water supply systems evaluate and protect their source of supply.

EDUCATION

2000 Ph.D. Environmental Science, SPEA-Indiana University, Bloomington, IN
1987 M.S. Watershed Science, Utah State University, Logan, UT
1978 B.S. Environmental Studies, Utah State University, Logan, UT

PROFESSIONAL HISTORY

2008 –present	Layne GeoSciences Director, Layne Christensen Co., Bloomington, IN
2006–present	Adjunct Professor, IUPUI, Department of Geology
1995 – 2008	President, Wittman Hydro Planning Associates, Bloomington, IN
1995 – 1998	Senior Research Scientist, Center for Urban Policy, Indianapolis, IN
1990 – 1995	Research Hydrologist, Indiana University, Bloomington, IN
1988 – 1990	Consulting Hydrologist, Yakima, WA
1986 – 1988	Tech. Program Mgr., Yakama Indian Nation, Toppenish, WA
1985 – 1986	Associate Director, High Level Nuclear Waste Office, Salt Lake City, UT
1984 – 1985	Mine Reclamation Hydrologist, Div Oil Gas and Mining, Salt Lake City, UT

SELECTED PUBLICATIONS

Articles

Wilsnack, M., V. Kelson, and J. Wittman. 2005. An Application of the Analytic Element Method in Modeling Florida Everglades Hydrology. Journal of American Water Resources Association, Volume 41, No.1, pp. 67 – 76, Feb. 2005.

Lindsey, G., J. Wittman, and M. Rummel. Using indices in environmental planning: Evaluating policies for wellfield protection. Journal of Environmental Planning and Management, 40(6) 685-703, 1997.

Wittman, J., Haitjema, H.M. and L. Studebaker. Recycling input data during analytic element modeling near Indianapolis, Indiana. Journal of the American Water Resources Association. 33(1) 47-54, 1997.

Technical Reports

"A Tool for Assessing Contamination Risk in Wellhead Protection Areas". J. Wittman and B. Hensel. EPRI, Palo Alto, CA: 2000. EPRI Report 1000790.

"Contaminant source inventory of the Indianapolis Water Company wellhead protection areas". J. Wittman and J. Rubleske. Final report to the Indianapolis Water Company. 1998.

"Alluvial Aquifer Response to a Flood Pulse; Using Transient Boundary Conditions in a Local Screening Model". J. Wittman, J. Mundell, and J. Berndt. Contract Report to ATC, Inc. 1995.

"Capture Zone Delineation for the White River, Webb, and Sugar Creek Wellfields". J. Wittman, WHPA, Inc. Final report to the Indiana American Water Company.

"Evaluation of Risks of Potential Contaminants in Well Field Protection Areas". J. Wittman and J. Mundell. Report for Marion County Wellfield Technical Committee,

Center for Urban Policy and the Envir. Report #97-E02. 1997.

"Capture Zone Delineation for the Municipal Well Fields, Columbus, Indiana". H.M. Haitjema, V. Kelson and J. Wittman for SIECO, Inc., Columbus IN, October 21, 1996.

"WhAEM: Program Documentation for the Wellhead Analytic Element Model". H.M. Haitjema, J. Wittman, V. Kelson, N. Bauch. U.S. EPA document EPA/600/R-94/210. 1994.

Presentations

"Modeling Recharge in a Fractured Bedrock Aquifer to Evaluate the Potential Effects of Climate Change on Groundwater Availability: new techniques" J. Wittman. Invited speaker at European Geosciences Union General Assembly 2010, Vienna, Austria. May, 2010.

"Conjunctive Use of Surface and Groundwater: Scientific, Management, and Regulatory Issues" J. Wittman. Invited panelist at 2010 UF Water Institute Symposium: Sustainable Water Resources, Gainesville, Florida. February, 2010.

"Water Supply in Central Indiana" J. Wittman. Invited speaker at the Central Indiana's Mayor Forum, Indianapolis, Indiana. April, 2009.

"Is the State of Illinois Prepared for Water Shortages?" J. Wittman. White paper presentation at Beyond Showerheads and Sprinklers: Water Governance Solutions for Illinois Conference, Chicago, Illinois. May, 2008.

"Kane County Water Supply Study Planning Strategy" J. Wittman. Invited speaker at Implementing a Sustainable Water Supply for Kane County's Future, Geneva, Illinois. September, 2007.

"Characterizing stream/aquifer interaction: the role of measurement, observation, and modeling" J. Wittman, V, Kelson, and D. Dahlstrom. Invited speaker at the 2006 NGWA Groundwater Summitt, San Antonio, Texas. April, 2006.

"Advanced models of stream/aquifer interaction" J. Wittman. Invited speaker at the Emerging Issues in Source Water Management and Strategies for Addressing New Drinking Water Regulations Conference, April, 2006.

"Design and Evaluation of High Capacity Ground Water Supplies Considering the Potential for Riverbank Infiltration" P. Johnson, J. Wittman. Midwest Focus Conference AWWA, Chicago, Illinois. April, 2002.

"The Problem of Groundwater Contamination in Indiana" J. Wittman. Invited speaker at the Indiana Realtors Association Meeting. September, 1998.

"Well Field Protection in Indiana" J. Wittman. Invited speaker at the annual meeting of the Indiana Association of Planners. September, 1998.

"Use of Geologic Mapping in Groundwater Flow Modeling". J. Wittman. Invited panel member at the Great Lakes Geologic Mapping Forum. Indianapolis, IN. March 1997.

"Uncertainty in Capture Zone Delineation". Presentation to members of the Indianapolis City-County Council. December 1996.

"Hydrogeology of the Fall Creek Aquifer". Field trip / presentation for the Indiana Academy of Science Spring Meeting. April 1995.

Design and evaluation of high capacity ground water supplies: Considering the potential for riverbank filtration" P. Johnson and J. Wittman. Presented at the NGWA Midwest Focus Conference Chicago, IL, April, 2002.

"Management and Analysis of Ground-Water Elevation and Water Quality Data in the Electric Power Industry" K. Ladwig, B. Hensel, J. Wittman, and V. Kelson. Presented at the NGWA Association of Ground Water Scientists and Engineers Annual Meeting. December 2001.

"A New Tool for Organizing and Managing Hydrogeologic Data," J. Wittman and V. Kelson. Presented at the MODFLOW 2001 conference. September 2001.

"Potential Effects of Climate Change on Groundwater Availability," J Wittman and H.M. Haitjema. Presented at the American Water Resources Association Specialty Conference on Potential Consequences of Climate Variability and Change to Water Resources of the United States. Atlanta, Ga. ISBN 1-882132-45-9. May 1999.

"Evaluating the Risks of Potential Contaminants in Well Field Protection". J. Wittman. Presented at the 2nd Symposium on the Hydrogeology of Washington State. Olympia, WA. August 1997.

"Comprehensive Well Field Modeling for Marion County, Indiana" J. Wittman, H.M Haitjema, and G. Lindsey. Presented at the International Conference on Analytically Based Method of Groundwater modeling. Nunspeet, The Netherlands. April 1997.

"Evaluating the Risks of Chemical Compounds". J. Wittman. Presented at the Indiana Water Resources Association Fall Metting and Symposium, Lafayette, IN. December 1996."Towards a State-Wide Groundwater Modeling Plan". J. Wittman. Presented at the Indiana Water Resources Association Symposium. Spring Mill State Park, Mitchell, IN. June 1994.

"Climate Change Impacts on Groundwater Availability: An Application of Supra-Regional Groundwater Flow Modeling". J. Wittman and H.M. Haitjema. Presented at the International Association of Hydrological Sciences Fall Meeting, Orlando, FL. 1993.

"Capture Zone Modeling near Columbus, Indiana". J Wittman and H.M. Haitjema. Presented at the Indiana Water Resources Association Symposium. Indianapolis, IN. June 1992.

Current Professional Association Memberships

Indiana Water Resources Association, President Elect, 2001

American Water Works Association, Member, Indiana Section

Indiana Rural Water Association Member

ASTM Member, Section D18 (Soil & Rock) Subcommittee Member

National Ground Water Association Member, Certification Committee

American Geophysical Union Member

Certifications

National Ground Water Association, Association of Ground Water Scientists and Engineers, Certified Ground Water Professional (#3015475)

PROFESSIONAL EXPERIENCE (general descriptions of experience)
Evaluation of the Impact of Discrete Openings on Groundwater Flow in Till Aquifers, Center for Earth and Environmental Sciences, Indianapolis, Indiana. This project had the objective of determining the potential effect of discrete openings in semi-layered till aquifers on groundwater flow and transport. It is not clear which conceptual model is appropriate for these unconsolidated glacial aquifer systems. The fact that there is limited data available to describe the extent of aquifer zones within till prompted the use of stochastic modeling techniques. This work showed that openings are important to predicting contaminant transport in aquifers. The conceptual model used in the predictions alters the residence time distribution but not the water budget. The implications of flow through these discrete pathways on residence times and contaminant transport are extreme. This project identified the scale at which local openings alter flow paths that can be responsible for contaminant plume dispersion.

Supra-Regional Groundwater Modeling to Assess the Impacts of Climate Change on Regional Bedrock Aquifers in the Midwest. This work was funded by the U.S. Department of Energy's National Institute for the Global Environmental Change, Bloomington, Indiana. Used analytic element groundwater modeling technique, coupled with a set of one and two-dimensional numerical models, to investigate how long-term reductions in regional recharge could affect stream flow and groundwater availability in the regional Silurian-Devonian limestone bedrock aquifer in Indiana and Ohio and the overlying unconsolidated aquifers.

Developed Residence Time Map for Wellhead Protection Areas, Community Water Supply Well Field, Columbus, Indiana. Developed an alternate approach to delineating wellhead protection areas that used 3-dimensional groundwater particle tracking to delineate the time-of-travel contributing recharge chronograph that mapped the predicted time for water to move from the water table to a very high capacity well field. The wellhead protection effort included an analysis of the potential risks posed by two neighboring contaminated sites. The results showed that some of the water on the opposite bank of the River was likely contributing to one of the wells in the well field. This information was used to develop a more effective groundwater quality sampling strategy and the modeling was used as support for the first wellhead protection plans developed in the state.

Users Manual for USEPA's new wellhead protection code, W*h*AEM, the Wellhead

Analytic Element Model. (EPA/600/R-94/210). Managed the research and development project for a multiple university research team. Wrote all of the users guides and documentation for the W*h*AEM model. The new capture zone delineation code was co-developed by a group at the University of Minnesota while the mapping and preprocessor tools were developed at Indiana University. This new code was developed to improve upon more simple methods that were being used by applying analytic element models (these use distributed singularities) to define boundary conditions for flow in an aquifer and to a well. This was one component of the USEPA's support for sophisticated, yet practical tools for identifying the appropriate protection areas around wells. Our team was primarily responsible for developing the preprocessor code, linking to the results that were produced by the solution engine developed at the University of Minnesota, and developing tutorials and documentation for the user community.

Develop Tool for Assessing Groundwater Contamination Risks, Electric Power Research Insititute (EPRI), Palo Alto, California. This research used unsaturated and saturated flow and transport models to determine how the risks of water supply contamination are dependent on the geology of the site, the properties of the chemical, and characteristics of the release. Used numerical experiments (one, two, and three-dimensional flow and transport models) to test the sensitivity of a solute pulse release to variation in release characteristics. This work has applications to a variety of problems including corrective action planning and analysis, source water protection and wellhead protection. This work was funded by EPRI and a consortium of power companies, local businesses, state agencies, and a city planning department. In addition to the EPRI report publication (EPRI Report 1000790), Dr. Wittman was one of the co-authors of an award-winning paper that describes that application of this work to community planning in the Journal of Environmental Planning and Management.

Greenway Impacts - Consequences of Increasing River Stage on Groundwater Levels Along the White River, Indianapolis, Indiana. Principle hydrologist on a project to determine the consequences of a redevelopment proposal that would raise the height of two dams in the central reach of the White River in Indianapolis on groundwater levels in the alluvial aquifer. The analysis used a technique analogous to telescopic mesh refinement to locally refine a regional 2-D analytic element model with a more detailed, 3-D multiple aquifer MODFLOW model. This approach was designed to capture the three-dimensional effects of mapped clay layers as well as the large municipal well fields of the city. The report included consideration of the effects of flood flows through this reach on transient groundwater levels.

Developed New Tool for Managing Statewide Hydrogeologic Data - *EnviroViewer*, Bloomington, Indiana. Designed a new tool to manage and view public data as a part of data democratization project. Timed to coincide with the state wellhead protection program, this tool is a simple mapping tool that allows the user to zoom-in on any area of the state, locate home-owner wells, high capacity wells, and regulated facilities. Data viewer includes cross-section tools, tabular exports, spatial referencing and other organizational and modeling support.

Assessment of the Impact of Irrigated Agriculture on Shallow Aquifer Groundwater Quality, Toppenish Creek Basin, Washington. Designed and subsequently obtained funding for a comprehensive basin-wide groundwater quality investigation to determine the risks of contamination to the alluvial, lahar, and basalt aquifers in the Yakima Fold Belt. Developed sampling plan, collected over 500 samples from home-owner wells, considered the effects of crop type, irrigation depth, soil type and well depth on the measured water quality at any location. The investigation determined that Nitrate concentrations were indicators of particular crop types. This was more pronounced when these crops were grown on particular soil types. Irrigation and agricultural practices were causing a deterioration of local groundwater and stream water quality.

Appendix A

DECLARATION OF
TIMOTHY R ZACK

I, TIMOTHY R ZACK, declare as follows:

1. I am presently the sole proprietor of 3DScape, and am currently the principal design visualization specialist.

2. A copy of my professional qualifications and experience are attached hereto and incorporated herein by reference.

3. I helped prepare the attached testimony on Visual Resources for the Mojave Solar Project based upon my independent analysis, supplements thereto, data from reliable 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 herein.

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: 05/18/10 Signed: 

At: Laguna Niguel, California

3DSCAPE

Timothy R Zack
Principal Design Visualization Specialist

Education

Bachelor's of Architecture - California Polytechnic University, Pomona
3D Studio Max, Photo Shop, AutoCAD, Micro-Station, Adobe Premiere

Relevant Experience

Timothy R Zack has 20 years of experience designing and producing high quality visualization solutions for the architectural and engineering communities. In addition to working closely with numerous visual analysts, he has extensive experience supporting:

- Applications For Certification, (AFC); Visual Resources
- Environmental Impact Reports, (EIR); Visual Resources
- Environmental Impact Statements, (EIS); Visual Resources

He has also served a host of regulatory agencies including, but not limited to: Federal Energy Regulatory Commission (FERC); USDA Forest Service; USDI Bureau of Land Management; California Public Utilities Commission (CPUC); and California Energy Commission (CEC).

Representative Projects

- Abengoa Mojave Solar Power Plant Project AFC #09-AFC-5. Visual resource assessment and computerized visual simulations for new solar farm on 1,765 acres. San Bernardino Co, CA.
- Genesis Solar Energy Project AFC #09-AFC-8. Visual resource assessment and computerized visual simulations for new solar farm on 1,800 acres. Riverside County, CA.
- Alta Oak Creek Wind Energy Project EIR. Visual resource assessment and computerized visual simulations for 350 new wind turbine generators. Kern County, CA.
- Tehachapi Renewable Transmission Project, Segments 4-11 EIR/EIS. (TRTP 4-11) Visual resource assessment and computerized visual simulations. Tehachapi Wind Resource Area to Mira Loma Substation. Kern, Los Angeles, and San Bernardino Counties, CA.
- Antelope Transmission Project, Segments 2 & 3 EIR (TRTP 2-3). Visual resource assessment and computerized visual simulations. Kern and Los Angeles Counties, CA.

- Antelope-Pardee 500kV Transmission Project EIR/EIS (TRTP 1). Visual resource assessment and computerized visual simulations. Lancaster to Santa Clarita, LA County, CA.
- Riverway Substation Project visual resource assessment and computerized visual simulations for a Mitigated Negative Declaration. Visalia, Tulare County, CA.
- Lompoc Wind Energy Project EIR. Visual resource assessment and computerized visual simulations for 90 new wind turbine generators. Santa Barbara County, CA.
- Dillon Wind Energy Project EIR. Visual resource assessment and computerized visual simulations for 45 new wind turbine generators. Palm Springs and Riverside County, CA.
- Liberty XXIII Renewable Energy Power Plant EIR. Visual resource assessment and computerized visual simulations for new bio-fuel power plant. City of Banning, CA.
- Lake Elsinore Advanced Pump Storage Transmission Project EIR (LEAPS). Visual resource assessment and computerized visual simulations. Orange County, CA.
- Amendment to CEC License for Blythe Energy Transmission Line Project. Land use study, visual resource assessment, visual simulations. Blythe to Julian Hinds, CA.
- South Bay Energy EIR. Computerized visual simulations and visual resource assessment for new combined cycle energy facility in South Bay. Chula Vista, San Diego, CA.
- Morro Bay EIR. Computerized visual simulations and visual resource assessment and for new 2x600MW combined cycle energy facility in Morro Bay. Morro Bay, CA.
- Avenal EIR. Computerized visual simulations and visual resource assessment and for new combined cycle energy facility. Avenal, CA.
- Walnut Energy Park. Computerized visual simulations and visual resource assessment for new combined cycle energy facility. Walnut, CA.
- Denali GTB: New, world scale gas treatment facility located in the Arctic, Fluor Corp and Denali Pipeline.

Declaration of
[full name, as on resume]

I, [Joshua Isaac Zinn], declare as follows:

1. I am presently employed by [AECOM] as [Ecologist and Regulatory Specialist].

2. A copy of my professional qualifications and experience are attached hereto and incorporated herein by reference.

3. The attached testimony on [list areas, e.g. Jurisdictional Waters (including wetlands and other aquatic resources) and the state and federal regulatory status of these Jurisdictional waters/aquatic resources] was either prepared by me or under my direction for the Mojave Solar project based on my independent analysis, supplements thereto, data from reliable 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 herein.

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: May 28, 2010 Signed: 

At: [San Diego, CA]

JOSHUA ZINN
PROJECT ECOLOGIST
WETLAND SCIENTIST
REGULATORY SPECIALIST
ISA CERTIFIED ARBORIST

1420 Kettner Blvd Suite 500 San Diego, CA 92101
415-939-9466
joshua.zinn@gmail.com

Education

M.S. ENVIRONMENTAL MANAGEMENT, UNIVERSITY OF SAN FRANCISCO

B.S. NATURAL RESOURCES PLANNING AND INTERPRETATION, HUMBOLDT STATE UNIVERSITY

Permit

CDFG RARE, THREATENED AND ENDANGERED PLANT VOUCHER COLLECTION PERMIT # 07019

CDFG SCIENTIFIC COLLECTING PERMIT # 801293-01 B FGVBFVG

FEDERAL ENDANGERED SPECIES ACT 10(A)(1)(A) INDEPENDENT SURVEY PERMIT TE-820658

Certification

ISA CERTIFIED ARBORIST WE-3192A

SOUTHERN CALIFORNIA COASTAL WATER RESEARCH PROJECT (SCCWRP) CALIFORNIA RAPID ASSESSMENT METHOD FOR RIVERINE, ESTUARINE, AND VERNAL POOL WETLAND HABITATS

Professional affiliations

AMERICAN SOCIETY OF CONSULTING ARBORISTS
ASSOCIATION OF ENVIRONMENTAL PROFESSIONALS
THE CALIFORNIA ACADEMY OF SCIENCES
THE CALIFORNIA NATIVE PLANT SOCIETY
CALIFORNIA OAKS FOUNDATION
CALIFORNIA URBAN FORESTS COUNCIL
INTERNATIONAL SOCIETY OF ARBORICULTURE
SOCIETY FOR ECOLOGICAL RESTORATION
SOCIETY OF WETLAND SCIENTISTS

Mr. Zinn has extensive experience in conducting field studies for formal U.S. Army Corps of Engineers (USACE), California Fish and Game Department (CDFG), and California Coastal Commission (CCC) wetland and other jurisdictional waters delineations and performing ecological and functional assessments of the resource utilizing California Rapid Assessment Method (CRAM), Habitat Evaluation Procedure (HEP), regional hydrogeomorphic (HGM) applications, Index of Biological Integrity (IBI), and the Wetland Rapid Assessment Procedure (WRAP).

Mr. Zinn also has extensive regulatory permitting experience and has develops, designed and implemented mitigation and monitoring plans under Clean Water Act (CWA) Section 404(b)(1) compliance guidelines, prepared CWA Section 404 Permitting (Individual and Nationwide), CWA Section 401 Water Quality Certification, California Fish and Game Code Section 1600 *et seq.* Lake and Streambed Alteration Agreements (SAA), Federal Endangered Species Act (FESA) Section 7 Consultations, Section 10 Habitat Conservation Plans (Low Effect HCPs), coordination with the National Marine Fisheries Service (NMFS), prepared biological sections of the California Energy Commission's (CEC) Application for Certification (AFC) documents and conducted project monitoring under the Migratory Bird Treaty Act (MBTA), and performed California Endangered Species Act (CESA) Section 2081 permitting.

Mr. Zinn has been an International Society of Arboriculture Certified Arborist (ISA Certification Number WE-3192A) continually since 1995 and has over 17 years of arboricultural and forestry related experience. Mr. Zinn prepares project-specific certified arborist reports, tree protection plans, and conceptual mitigation plans for tree projects impacting arboricultural resources. Mr. Zinn has been a project manager in conducting utility Right of Way (ROW) forestry, tree surveys and inventories (including timber cruising and mensuration) and tree/grove health and hazard assessments. Mr. Zinn also has experience in wildland-urban interface assessments and has participated in preparing fuel-load reduction plans and developing appropriate firewise plant selection plans.

Mr. Zinn specializes in quantitative and qualitative tree health and hazard assessments and project specific mitigation design (including afforestation plans) for arboricultural resources. Mr. Zinn has extensive experience with applications of the California Resource Codes for vegetation and utility vegetation management; including infrastructure clearance (and interface) in concert with public outreach and education. His utility ROW related work has involved conducting resource inventories, species selection and planning while overseeing intensive fuel load reduction operations within forested corridor of the utility ROW throughout multiple California counties in coordination with state resource agencies, local utility companies, municipal public works departments, private landowners, and private vendors for pre-inspection and post-auditing, notification, and confirmation of easement rights to maintain overhead and underground utility infrastructure (electrical and gas distribution, transmission and poles) and ensure compliance of California Public Resource Codes and utility ROW management.

Joshua Zinn

SELECTED EXPERIENCE FOR JURISDICTIONAL WATERS/WETLANDS

Confidential Solar Energy Project
Wetlands Project Manager and Lead Delineator
Southern California
CLIENT: Confidential Client
Performed and managed formal state and federal delineations of desert fluvial systems (ephemeral washes and playas) for three proposed large-scale parabolic trough, solar-thermal facilities. Project sites were located in the Mojave and Sonoran Deserts and ranged in area between 4,000 and 15,000 acres. Conducted and provided oversight to field teams conducting formal USACE jurisdictional delineations for federal waters (utilizing the 1987 Manual, the 2008 Arid Regional Supplement, the 2008 Field Guide to the Identification of the Ordinary High Water Mark [OHWM] in the Arid West, and all additional relevant guidance documents and federal code). Conducted and provided oversight to field teams conducting CDFG jurisdictional field delineations for state waters (utilizing the Cowardin Classification of Deepwater Habitats and all additional relevant guidance documents and state code). Performed statistical analysis of wash dependent vegetation to ascertain accurate mitigation requirements for potentially impacted ephemeral washes and playas. Assembled Jurisdictional Determination packages for submission to the USACE for each site. Wrote formal jurisdictional delineation report s (for state and federal waters) for all three proposed solar energy sites.

Confidential Solar Energy Project
Jurisdictional Delineation Wetland Functions and Values Assessment
Wetlands Project Manager and Lead Delineator
Southern California
CLIENT: Confidential Client
Performed and managed formal state and federal delineations of desert fluvial systems (desert sink, lacustrine, and playas) for a proposed 1,200-acre parabolic trough, solar-thermal plant. Project site is located in the Mojave Desert. Conducted and provided oversight to field teams conducting formal USACE jurisdictional delineations for federal waters (utilizing the 1987 Manual, the 2008 Arid Regional Supplement, the 2008 Field Guide to the Identification of the OHWM in the Arid West, and all additional relevant guidance documents and federal code). Conducted and provided oversight to field teams conducting CDFG jurisdictional field delineations for state waters (utilizing the Cowardin Classification of Deepwater Habitats and all additional relevant guidance documents and state code). Conducted a wetland functions and values assessment using CRAM and HGM. Designed methods to retain and expand existing marsh habitat for migrating shorebirds using industrial blow-down water and the design of treatment wetlands (bioswales) for supplemental hydrological inputs to the marsh. Developed baseline studies to monitor ambient conditions. Wrote formal jurisdictional delineation report s (for state and federal waters).

Jurisdictional Delineation and Wetland Functions and Values
Basewide Utilities Infrastructure Camp Pendleton
Wetlands Project Manager and Lead Delineator
CLIENT: U.S. Department of the Navy (Naval Facilities Engineering Command Southwest [NAVFAC Southwest])
Performed and managed formal USACE wetland and jurisdictional delineation (both 1987 Manual and Arid Regional Supplement) for 120 miles (1650 acres) of linear utility projects throughout Marine Corps Base Camp Pendleton (MCBCP). This project involved determining federal jurisdictional extents of major semi-arid riverine habitats and estuarine and/or marine habitats that present rare and sensitive habitat for listed and special status plant and animal species. Obtained agency concurrence for field methodology, and conducted and supervised delineation field teams during the formal USACE jurisdictional delineation. Wrote jurisdictional delineation report, prepared jurisdictional determination packages, and developed permitting strategy.

Joshua Zinn

Confidential Solar Energy Project
Jurisdictional Delineation Wetland Functions and Values Assessment
Wetlands Project Manager and Lead Delineator
Southern California
CLIENT: Confidential Client
Performed and managed formal state and federal delineations of a desert fluvial system (lacustrine) for a proposed 2,200-acre parabolic trough, solar-thermal plant. Project site is located in the Mojave Conducted and provided oversight to field teams conducting formal USACE jurisdictional delineations for federal waters (utilizing the 1987 Manual, the 2008 Arid Regional Supplement, the 2008 Field Guide to the Identification of the Ordinary High Water Mark [OHWM] in the Arid West, and all additional relevant guidance documents and federal code). Conducted and provided oversight to field teams conducting CDFG jurisdictional field delineations for state waters (utilizing the Cowardin Classification of Deepwater Habitats and all additional relevant guidance documents and state code). Conducted a wetland functions and values assessment using CRAM and HGM. Developed baseline studies to monitor ambient conditions. Wrote formal jurisdictional delineation reports (for state and federal waters).

Jurisdictional Delineation and Wetland Functions and Values
Grow the Force Camp Pendleton
Wetlands Project Manager and Lead Delineator
CLIENT: Department of the Navy
Performed and managed formal USACE wetland and jurisdictional delineation (both 1987 Manual and Interim Arid Regional Supplement) for multiple sites (650 acres) throughout Marine Corps Base Camp Pendleton. This project involved determining federal jurisdictional extents of major semiarid riverine habitats and estuarine and/or marine habitats that present rare and sensitive habitat for listed and special status plant and animal species. Obtained agency concurrence for field methodology, and conducted and supervised delineation field teams during the formal USACE jurisdictional delineation. Wrote jurisdictional delineation report, prepared jurisdictional determination packages, and developed permitting strategy.

Fort Rosencrans National Cemetery Annex, Marine Corps Air Station Miramar (MCAS), San Diego County, CA
Project Ecologist and Lead Delineator
CLIENT: U.S. Department of the Navy, NAVFAC Southwest
Performed and managed formal USACE wetland and jurisdictional delineation (both 1987 Manual and Arid Regional Guidelines). Conducted fairy shrimp and botanical surveys for vernal pool determinations and vernal pool functions and values assessment. Prepared and implementation a detailed restoration and enhancement plan (utilizing the jurisdictional delineation and vernal pool assessment) for 72 vernal pool basins on MCAS Miramar. Primary goal was to restore or enhance habitat for the endangered San Diego mesa mint (*Pogogyne abramsii*), button-celery (*Eryngium aristulatum*), and fairy shrimp (*Branchinecta sandiegonensis* and *streptocephalus wootini*) in areas that have been degraded by past activities. The plan included measures to monitor hydrology, and flora and fauna for the restored areas; and to identify control pools and sources of seed and invertebrate inoculum for the restored areas.

Joshua Zinn
1420 Kettner Blvd
Suite 500
San Diego, CA 92101
415-939-9466
joshua.zinn@gmail.com

Joshua Zinn

State Route Realignments and Widening Project
Southern California Region
Wetlands Project Manager
CLIENT: Caltrans District 11
Performed and managed formal USACE wetland and jurisdictional delineation (both 1987 Manual and Interim Arid Regional Guidelines) for multiple large-scale linear transportation projects (ranging in length between 9 and 35 miles) throughout the southern California region. All projects involved determining federal and state jurisdictional extents of semi-arid riverine and/or marine habitats that present rare and sensitive habitat for listed and special status plant and animal species. Obtained agency concurrence for field methodology, and conducted and supervised delineation field teams during the formal USACE jurisdictional delineation. Wrote jurisdictional delineation report, alternatives analysis, and wetlands/water section for the concomitant natural environment study (NES) and EIR/EIS.

SELECTED EXPERIENCE FOR REGULATORY PERMITTING

Confidential Solar Energy Project
Southern California
The project will involve development of a solar power facility on approximately 4,000 acres south of Harper Lake in San Bernardino County, CA. Biological surveys and a jurisdictional delineation were conducted for the environmental permitting of the project through submittal of the Application for Certification under the California Energy Commission power plant licensing process, and preparation and submittal of permit applications as part of federal and state biological resources-related permitting (incidental take permits/authorizations under the FESA and CESA acts, and CFGC Section 1600 *et seq.* SAA with the CDFG). Provided technical review for environmental documents prepared for the project.

Deep Water Port Levee Repair, Fields Landing, Humboldt County, CA
Wetland Scientist and Regulatory Specialist
CLIENT: Humboldt Bay Forest Products
A breeched levee repair project necessitated simultaneously conducting formal CCC and USACE wetland delineations to ascertain jurisdictional extent of aquatic resource(s) on site. Prepared biological assessment under Endangered Species Act (ESA) Section 7 for tidewater goby (*Eucyclogobius newberryi*). Prepared CCC Coastal Development Permit (CDP) and CWA Section 404 Nationwide Permit (NWP) 3, which included habitat mapping of transitional brackish and salt marsh wetland and mitigation by exotic removal of nonnative cordgrass (*spartina alterniflora*) and revegetation with native cordgrass (*spartina foliosa*).

Shoreline Development Project, Eureka, CA
Wetland Scientist and Permitting Specialist
CLIENT: CUE IV, LLC
Project was a 65-acre mixed-use development occurring within a relic fill site within Humboldt Bay. Simultaneously conducted formal USACE and CCC wetland delineations; performed or coordinated all required biological field studies, and prepared biological assessment. Assessed restored intertidal mudflat functions and values for mitigation. Designed in-kind compensatory wetland mitigation and enhancement plan. Prepared CDP and CWA Section 404 NWP 39 package with subsequent CWA Section 401/RWQCB water quality certification.

Joshua Zinn

Biological Assessments, 1375 Ludwig, Santa Rosa, CA
Project Ecologist and Regulatory Specialist
CLIENT: Nick Ryan Company
Conducted formal USACE wetland delineation, CWA Section 404 NWP 39 permit package (which incorporated wetland and rare plant restoration, enhancement, mitigation and monitoring plan); and prepared CWA Section 401/RWQCB water quality certification for a 63-acre planned development with preservation easement. Performed all required biological studies and prepared biological assessment. Duties included special-status species surveys (for a planned residential development) and CFGC Section 1600 *et seq.* SAA and 2081 permit package for compliance with CEQA, FESA Section 7 consultation, and CESA. All surveys and documents conducted within the Santa Rosa Plain Conservation Strategy (SRPCS [developed by regional agencies and the USFWS]) and General Plan policies of the City of Santa Rosa. Biological surveys (for CDFG and USFWS) were performed with a regional focus within the Santa Rosa Plain. Impact assessments were undertaken using the SRPCS, recent scientific literature, and field studies to analyze the impacts on sensitive plants and wildlife (with an emphasis on the California tiger salamander [*Ambystoma californiense*] and four federally listed plants) by the proposed project.

Chiquita Road Planned Development, Healdsburg, CA
Project Biologist and Permitting Specialist
CLIENT: Coldwell Banker Cooper-Sciarra Giovanni Realty
Biological assessment for an 18-acre parcel that contained tributary to the Russian River, Chiquita Road subdivision. Conducted formal USACE wetland delineation and prepared CWA Section 404 NWP 39 permit package and CWA Section 401/RWQCB water quality certification. Performed all biological field surveys (for listed flora and fauna) and conducted raptor survey within riparian oak woodland. Performed suspended silt-load measurements, and turbidity and sediment transport using Imhoff cones for a small tributary of the Russian River; determined habitat potential and presence for steelhead (*Oncorhynchus mykiss*) by performing stream-flow hydrograph storm drainage and precipitation readings and recordings and suspended silt-load measurements, sediment transport, and appropriate methods for determining spawning gravel potential, bedload sizes, and redd construction ability for the tributary. Coordinated with CDFG and National Marine Fisheries Service (NMFS); compiled all field studies and findings into Biological Assessment Report. Prepared CFGC Section 1600 *et seq.* SAA to remove riprap composed of old appliances within stream channel (occurring within ordinary high water mark), designed streambank stabilization, and riparian restoration and creation plans as a requirement of the 404 permit. Mitigation measures included installation of large organic debris and geotextile material for erosion control measures. Streambank revegetation included utilizing regional California native species.

Grant Street Village Planned Development, Healdsburg, CA
Project Biologist and Regulatory Specialist
CLIENT: Clovander, LLC
Conducted formal USACE wetland delineation, CWA Section 404 NWP 39, and CWA Section 401 Water Quality Certification for a 14.5-acre planned development with an on-site perennial stream. Prepared CFGC Section 1600 *et seq.* SAA for a planned stormwater outfall. Performed tree inventory and wrote tree preservation and protection plan. Performed riparian field surveys and wrote riparian biological assessment report for required riparian setback variance.

Joshua Zinn

KTRB AM Radio Transmission Facility, Sonoma, CA
Wetland Scientist and Permitting Specialist
CLIENT: Pappas Telecasting Companies
Conversion of a portion of diked agricultural land to a radio transmission facility. Project consisted of a 75-acre facility for the installation and facility maintenance of three 616-foot radio towers to be placed into jurisdictional wetland. Conducted formal USACE wetland delineation and prepared CWA Section 404 Individual Permit package and CWA Section 401 RWQCB water quality certification. Performed listed and special-status species (flora and fauna) surveys under CDFG and USFWS protocols, assessed relevance of the MBTA toward project (with an emphasis on the California clapper rail [*Rallus longirostris obsoletus*]). Wrote conceptual mitigation plan for impacted wetlands, prepared biological section of CEQA initial study (IS), and prepared zoning change under CEQA review concerning Williamson Act. Prepared National Pollution Discharge Elimination System (NPDES) permit compliance for storm water discharges associated with construction activities (≥1 acre) through the preparation and submittal of notice of intent (NOI), storm water pollution prevention plan (SWPPP), and notice of termination (NOT). Coordinated agency-client communications and attended EIR scoping meetings with lead agency.

Whales Tail/Alameda Creek, Alameda County
Project Ecologist and Regulatory Specialist
CLIENT: City of Fremont and City of San Leandro
A combination mechanical and chemical control was utilized (composed of mowing, mask and kill, and applications of glyphosate) to control nonnative cordgrass (*Spartina densiflora*) within the salt marsh areas. Developed control test areas for baseline effectiveness of eradication methods. Permits that would be required for early control work in coastal zone and clapper rail and salt marsh harvest mouse habitat were obtained (CWA Section 404 NWP 27) while demonstrating the activity to be exempt activity under Bay Area Conservation and Development Commission (BCDC [McAteer-Petris Act]) and compliant with California Coastal Act (CCA) Section 30233(a)(6a), and California Public Resources Code Sections 31160-31165.

Conde Village Subdivision, Windsor, CA
Project Ecologist and Regulatory Specialist
CLIENT: Conde Village, LLC
Mixed-use development project contained a 600-foot reach of Windsor Creek that presented a degraded riparian ecosystem (including a channelized section of the creek). Performed all required biological studies (including formal USACE jurisdictional delineation) and prepared biological assessment. Worked with project engineers and regulatory agencies in restoring channel morphology by creating artificial sinuosity. Prepared CWA Section 404 NWP 27, CFGC Section 1600 SAA package for planned creek restoration activities. Project permit requirements were contingent on restoration/mitigation efforts. Mitigation and landscape plan was developed focusing on stabilizing stream banks by installing silt fencing, laying fiber mats, and installing native riparian vegetation within the riparian corridor, and a 5-year monitoring plan. Permitting and restoration included the in-stream installation of a rock vane and cover, and construction of willow baffles to slow flood waters.

Joshua Zinn
1420 Kettner Blvd
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San Diego, CA 92101
415-939-9466
joshua.zinn@gmail.com

Elverta Road Widening and Bridge Extension
Biological Project Manager and Permitting Lead
CLIENT: County of Sacramento, Department of Transportation Sacramento County, CA
The Sacramento County Department of Transportation proposes to widen the existing two-lane Elverta Road in northern Sacramento County to accommodate transit facilities, 6-foot-wide bicycle lanes, pedestrian facilities, and two additional automobile lanes. The project includes replacing an existing two-lane bridge, over Dry Creek with a six-lane reinforced concrete bridge, and expanding an existing culvert carrying seasonal Goat Creek. Prepared a comprehensive permit application package to USACE, RWQCB, and CDFG. Approvals Obtained: CWA Section 404 NWP 14, CWA Section 401 Water Quality Certification, and CFGC Section 1600 *et seq.* SAA.

Suncrest Homes Sierra Vista Residential Development, Antioch, CA
Biological Project Manager and Permitting Lead
CLIENT: Suncrest Homes
Conducted impact analyses of the 166-acre Suncrest Homes Sierra Vista project in Antioch, Contra Costa County, for special-status species including Alameda whipsnake, California tiger salmander, California red-legged frog, San Joaquin kit fox, and rare plants. The project team prepared the permit applications and secured regulatory permits in coordination with USACE, CDFG, USFWS, and RWQCB. Drafted the Conservation Easement for a 134-acre site used for mitigation of project impacts. coordinated with USFWS, CDFG, and East Bay Regional Park District to garner approvals for the mitigation property, including the Conservation Easement, monitoring and management endowment, and transfer of fee title to the East Bay Regional Park District. Approvals Obtained: 404 NWP 29, 401 Water Quality Certification and Waiver of Waste Discharge Requirement, CFGC Section 1600 *et seq.* SAA, Biological Opinion from USFWS, CEQA EIR.

SELECTED EXPERIENCE FOR MITIGATION AND MONITORING

Natural Communities Conservation Plan Enhancement and Monitoring Program, San Diego County, CA
Restoration Ecologist
CLIENT: SDG&E
Provide management and monitoring for Years 4 and 5 of 0.03-acre wetland mitigation site west of Chollas Lake Park. The project is currently in Year 5 of the 5-year monitoring period. Monitor establishment of native plants, control of nonnative weed species, and general wildlife use of project. Collect annual quantitative data, analyze, and compare to project success standards. Prepare project documentation, such as annual reports. Responsible for coordinating landscape maintenance services.

San Diego Gas & Electric Natural Communities Conservation Plan On-Call Services, San Diego County, CA
Project Ecologist
CLIENT: SDG&E
As a biologist, provided on-call support to the client's Land Planning and Natural Resources for planned and emergency operations and maintenance activities associated with their electricity transmission and distribution lines within San Diego and Orange counties. Evaluated potential biological impacts from operations and maintenance activities being conducted under the client's Subregional Natural Communities Conservation Plan.

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Grant Hill Wetland Mitigation Project, San Diego County, CA
Project Manager
CLIENT: SDG&E
Coordinating and overseeing implementation of the mitigation project. Currently providing management and monitoring for Year 1 of a 5-year monitoring period. Monitor establishment of native plants, control of nonnative weed species, and general wildlife use of project. Collect and analyze annual data and compare to project success standards. Prepare project documentation, such as annual reports. Responsible for coordinating landscape maintenance services.

Escondido Creek Hale Avenue Resource Recovery Facility EIR, San Diego County, CA
Project Biologist
CLIENT: City of Escondido,
Conducted the general wildlife surveys at the Hale Avenue Resource Recovery Facility site. Undertook consultations with the City to determine appropriate mitigation and monitoring measures in order to protect sensitive biological resources such as nesting raptors and noise-sensitive riparian bird species.

La Costa Avenue Revegetation Project, San Diego County, CA
Project Ecologist and Regulatory Specialist
CLIENT: City of Carlsbad
Served as field revegetation supervisor for the La Costa Avenue project adjacent to Batiquitos Lagoon in the City of Carlsbad. Monitored construction installation, including site preparation and implementation of revegetation and remedial measures. Created salt marsh, brackish marsh, riparian woodland, and coastal sage scrub habitats. Conducted horticultural and botanical monitoring for preparation of annual reports for the 5-year monitoring program, which was signed off by USACE, California Department of Fish and Game (CDFG), and the CCC.

Batiquitos Lagoon Enhancement Project, San Diego County, CA
Wetland Scientist
CLIENT: T.L. James Co.
Conducted preconstruction surveys in coastal salt marsh habitat in the City of Carlsbad to document projected impacts from enhancement dredging in the lagoon. Conducted vegetation mapping to prepare salt marsh revegetation plans for the project's temporary and permanent impacts to ensure permit compliance.

Bonsall Road Station Conceptual Mitigation Plan
Project Ecologist and Regulatory Specialist
CLIENT: County of San Diego
Assessed site for compensatory mitigation suitability and potential for off-site County projects by conducting vegetation mapping, hydrological studies, and protocol level wildlife surveys. Wrote conceptual mitigation plan and coordinated with CDFG/USACE for concurrence; provided regulatory framework guidance to County for mitigation ratios. Served as field revegetation supervisor during implementation of landscape plan. Monitored construction installation, including site preparation and implementation of revegetation and remedial measures. Created freshwater marsh, southern willow scrub, riparian oak woodland, and coastal sage scrub habitats. Conducted horticultural and botanical monitoring for preparation of annual reports for the 5-year monitoring program, which was signed off by USACE and CDFG.

Mitigation Bank Assessments and Site Selection, San Diego, CA
Wetland Scientist
CLIENT: County of San Diego
Assessed multiple County-owned parcels as potential mitigation bank sites. Conducted baseline flood and hydrological studies, vegetation and soil mapping; determined mitigation approach for highest ratio value and potential (i.e., creation, restoration, or enhancement); provided letter reports on site potential and methods of implementation. Designed mitigation and monitoring plans.

Bonsall Road Station Conceptual Mitigation Plan
Project Ecologist and Regulatory Specialist
CLIENT: County of San Diego
Assessed site for compensatory mitigation suitability and potential for off-site County projects by conducting vegetation mapping, hydrological studies, and protocol level wildlife surveys. Wrote conceptual mitigation plan and coordinated with CDFG/USACE for concurrence; provided regulatory framework guidance to County for mitigation ratios. Served as field revegetation supervisor during implementation of landscape plan. Monitored construction installation, including site preparation and implementation of revegetation and remedial measures. Created freshwater marsh, southern willow scrub, riparian oak woodland, and coastal sage scrub habitats. Conducted horticultural and botanical monitoring for preparation of annual reports for the 5-year monitoring program, which was signed off by USACE and CDFG.

Morro Bay State Park Marina Renovation and Enhancement Pilot Study, Morro Bay, CA
Wetland Scientist
CLIENT: U.S. Environmental Protection Agency
Sedimentation measurements of the site were undertaken, using Flume Tube and Rod Surface-Elevation Tables, to ascertain long-term maintenance activities of the existing marina based on an optimal dredging depth and future sedimentation rates. Installed field instruments and conducted formal CCC and USACE wetland delineations to determine and delineate wetland jurisdictional extent and wetland habitats occurring on the site. Principal habitats associated with the site include eelgrass (*Zostera marina*) beds, intertidal mudflats, and salt marsh.

Copeland Creek Restoration Project
Project Ecologist
CLIENT: Sonoma County Water Agency
Performed suspended silt-load measurements and sediment transport utilizing Imhoff cones and bed surface transects, respectively. Installation of large organic debris and geotextile material for erosion control measures. Mitigation measures included willow fencing to protect established riparian vegetation (all stream bank revegetation occurred with native species). Assisted in biological survey for the purpose of determining bed load sizes and spatial distribution of redd construction and spawning gravel (estimation of adult steelhead salmon [*Oncorhynchus mykiss*] population occurring in the creek). Performed stream-flow hydrograph, storm drainage, and precipitation readings and recordings. Coordinated with USACE, USFWS, NMFS, CDFG, and RWQCB for all activities associated with this stream bank restoration and enhancement project.

Joshua Zinn
1420 Kettner Blvd
Suite 500
San Diego, CA 92101
415-939-9466
joshua.zinn@gmail.com

Portfield Creek Riparian Assessment
Project Ecologist
CLIENT: City of Cloverdale, CA
Prepared a detailed assessment of the hydrologic, hydraulic, sediment-transport, and geomorphic conditions of the north and south branches of Portfield Creek, in Cloverdale, CA. Fieldwork involved design and placement of Imhoff cones and bed surface transects for sediment load measurements. Design principles of fluvial geomorphology, which also emphasized riparian zone protection, were used to restore a channel capable of transporting both flood flows and sediment load while introducing natural stream restoration and riparian zone enhancement and protection measures.

Todd Road Transfer Station Wetland Delineation and Mitigation Bank Assessment, Santa Rosa Plain, Sonoma County, CA
Project Biologist and Regulatory Specialist
CLIENT: North Bay Construction
Conversion of a 22-acre parcel of formerly agricultural land to a recycling facility. Conducted USACE formal wetland delineation. Findings at project site were verified by the USACE to be composed of approximately 90% jurisdictional waters of the U.S. in the form of degraded wetlands. Analyzed client needs within regulatory framework and wrote constraints analysis and evaluation for the purpose of transforming site as a mitigation bank. Designed wetland restoration plan to meet USACE performance standards and CWA Section 404(b)(1) Guidelines. Prepared CWA Section 404 NWP 27 package. Performed listed and special-status species surveys with a regional focus within the Santa Rosa Plain and utilizing the Santa Rosa Plain Conservation Strategy. Prepared and organized all required biological field studies into a biological assessment report (project triggered federal nexus [FESA Section 7 consultation]).

Klamath Watershed Riparian Restoration
Intern Biologist
CLIENT: CDFG
CDFG streambank restoration and enhancement projects for the Smith River, Prairie Creek, Boyes, and Mill Creek. Installation of large organic debris and geotextile material for erosion control measures. Streambank revegetation occurred with native species. Mitigation measures included willow fencing to protect riparian vegetation for the purpose of elk and stock exclusion along portions of the creek. Assisted in biological survey to determine spatial distribution of redd construction which included coordination with NMFS contributing to the estimated number of adult Coho salmon. Performed stream-flow hydrograph storm drainage and precipitation readings and recordings. Performed suspended silt-load measurements, sediment transport.

SELECTED ARBORICULTURAL PROJECT EXPERIENCE:

ROW Vegetation Management of San Bruno Mountain
Project Manager and Arborist
CLIENTS: County of San Mateo and PG&E
ROW vegetation management within a biologically sensitive corridor. Coordination between PG&E, U.S. Fish and Wildlife Service (USFWS), and San Mateo County department of Parks and Recreation during vegetation management (removal of blue gum eucalyptus) operations occurring within San Bruno Mountain transmission corridor. Project manager for botanical survey and vegetative mapping of host plants, perennial lupines (*Lupinus albifrons, L. variicolor,* and *L. formosus*) for the Mission blue butterfly (*Icaricia icarioides missionensis*). Conducted presence/absence surveys and population monitoring. Inventoried, planned, notified for, and supervised all transmission line clearance of blue-gum within the corridor.

Joshua Zinn

Vegetation Management/Maintenance of Pacific Gas and Electric (PG&E) Electrical Infrastructure
Multiple California Counties
Utility Forester
CLIENT: PG&E
Ensure compliance of CPRC4741, 4291-4294, CCR Title 8, 2700 (Group 3: [Articles 12, 13, 36, 37, 38]) and CCR Title 14, Sections 1250-1258, and CPUC and ANSI 300 and General Order 95: Rule 35. Pre-inspection, notification, confirmation of easement rights. and post auditing for contract utility forestry operations to maintain utility infrastructure (electrical distribution, transmission and poles)for ROW managment. Working with regulatory compliance requirements of PG&E electrical transmission and distribution electric utility system, inspecting utility poles & structures for vegetative hazard conditions within the Right-of-Way. Inspections and identifications of tree and brush control work and provide project information to line-clearance crews, locate and document work using hand-held GPS and computer, property owner notification of pending work, discuss and negotiate line-clearance crew access issues, and Special biological projects as assigned. Vegetation management utilizing U.S. Environmental Protection Agency (USEPA) Class III herbicides for invasive species control and re-sprout inhibition for ROW projects occurring within the Bay Area Counties. Herbicides used: Accord, Roundup Pro, Rodeo, Garlon, and Pathfinder II.

San Diego Gas & Electric, 2007 Firestorm Emergency Monitoring Services, San Diego County, CA
CLIENT: San Diego Gas and Electric (SDG&E)
Provided support to SDG&E in their emergency response efforts following the wildfires that occurred in San Diego County during fall 2007 (Firestorm 2007). Responded to SDG&E request to quickly provide biologists and water quality specialists to perform monitoring during emergency repairs immediately following the fires. performed monitoring before and after the repair work, documenting pre-repair and post-repair conditions to estimate impacts to NCCP-covered habitats and species. In addition, staff assessed potential impacts to water crossings and provided recommendations for best management practices (BMPs) across the burned areas within the SDG&E service territory. Provided NEPA documentation for Southern California Edison operations and maintenance activities associated with hydroelectric facilities on four National Forests: San Bernardino, Inyo, Sequoia, and Sierra. Conducted surveys for sensitive plants, sensitive wildlife habitat, Native American plants of cultural significance, and noxious weeds on Sierra and Sequoia National Forests. Wrote wildlife sections for biological assessment/evaluation and coordinated preparation of entire document. Worked closely with client and Forest Service personnel to ensure project success.

U.S. Embassy Tree Survey and Relocation Assessment, Asuncion, Paraguay
Project Arborist
CLIENT: U.S. State Department
Conducted a formal tree survey of a 5-acre tropical woodland, occurring within the Embassy grounds, composed of over 600 rare and endangered native trees endemic to the region for the purpose of assessing collective arboricultural resources and candidates for relocation as a result of Embassy expansion and security infrastructure upgrades. Tree survey included health and hazard assessment and trunk and canopy metrics. Created arboricultural resources spreadsheet and mapped individual trees using GPS. Designed transplantation protocols and appropriate relocation methods pursuant to equipment availability and designed TPP. Wrote existing conditions, ecological findings, and mitigation measures sections of Embassy tree report submitted to the State Department Engineering services branch.

Joshua Zinn

Fuel Load Assessment and Tree Preservation Plan, Marin County, CA
Project Manager
CLIENT: Marin County Community Development Agency (MCCD)
Project consisted of implementing a fuel reduction program to create defensible spaces around future or potential home sites, community easements, and to provide for preventative maintenance by hazard fuels reduction and creating firebreaks between local communities, state and federal lands. Conducted a comprehensive tree inventory and botanical surveys for multiple unmanaged and undeveloped parcels. Findings included increased fuel loads due to the effects of Sudden Oak Death towards native oak resources. Monitored thinning/removal of diseased, declining and suppressed trees to improve stand health within the designated home site tracts, and assessed the potential for effects of tree removal on soil stability, accelerated erosion and increased runoff. Developed management plans which designated areas for tree preservation and erosion abatement. Worked in collaboration with architects on resource mitigation and amending original building plans. Coordination with MCCD, Marin County Fire Department, and FIREsafe Marin in efforts with local public agencies and private entities in addressing areas requiring vegetation management operations. Implementation of Best Management Practices (BMP's), for improvement of erosion control structures and maintenance of roads to reduce the sediment contribution from roads and hillsides from existing conditions.

Coast Guard Tracking Station, Yerba Buena Island, CA
Project Arborist
CLIENT: U.S. Coast Guard
Survey and assessment of 75-acres of urban forest for the selected removal and maintenance of all established large-scale blue gum eucalyptus (*Eucalyptus globulus*) obstructing tracking radar at the U.S. Coast Guard Vessel Tracking Station facility at Yerba Buena Island, within San Francisco Bay. Performed GIS mapping and database management and botanical survey for listed plants. Wrote Certified Arborist Report detailing the findings and providing management recommendations.

San Gabriel River Discovery Center, Los Angeles County, CA
Project Arborist
CLIENT: LADPW
Conducted a formal tree survey of riparian woodland composed of over 150 California native trees. Tree survey took place within a 20-acre survey area which was to become a nature interpretive center and include riparian restoration. Tree survey included health and hazard assessment and trunk and canopy metrics. Mapped all arboricultural resources using GIS and created a tree location map and tree protection and conceptual mitigation plan under Los Angeles County Oak Tree Ordinance.

Malibu Creek State Park, Calabasas, CA
Project Arborist
CLIENT: California State Parks
Conducted a formal tree survey of a climax oak woodland composed of over 1600 native California oak trees. Woodland grove included the Listed (threatened) Engelmnann oak (*Quercus engelmannii*). Tree survey took place within a 40-acre survey area which presented declining oak stands and was scheduled to have facility maintenance. Designed oak survey protocol to ascertain ambient conditions of individual trees and the collective grove. Tree survey included health and hazard assessment and trunk and canopy metrics. Mapped all arboricultural resources using GIS and created a tree location map and tree protection and conceptual mitigation plan under City of Calabasas Oak Ordinance. Wrote Arboriculture resources report on the current condition of the grove which included management recommendations.

Joshua Zinn

Santa Anita Reservoir, Arcadia, CA
Project Arborist
CLIENT: Los Angeles Department of Public Works (LADPW)
Conducted a formal tree survey of a climax oak woodland composed of over 200 native California oak trees. Woodland grove included the Listed (threatened) Engelmnann oak (*Quercus engelmannii*). Tree survey took place within a 14-acre survey area which was to become a sediment basin. Tree survey included health and hazard assessment and trunk and canopy metrics. Mapped all arboricultural resources using GIS and created a tree location map and tree protection and conceptual mitigation plan under City of Arcadia Oak Tree Ordinance.

San Dimas Spreading Grounds, Los Angeles County, CA
Project Arborist
CLIENT: LADPW
Conducted a formal tree survey of flood control basin populated by native sycamore-oak riparian woodland composed of over 80 trees. Tree survey took place within a 35-acre survey. Riparian woodland was to become impacted as a result of flood control infrastructure improvements. Tree survey included health and hazard assessment and trunk and canopy metrics. Mapped all arboricultural resources using GIS and created a tree location map and tree protection and conceptual mitigation plan under City of Arcadia Oak Tree Ordinance. Wrote conceptual mitigation plan for riparian woodland as part of California Fish and Game Code Section 1600 et seq. permit.

Citracado Parkway
Project Arborist
CLIENT: City of Escondido
Conducted a formal tree survey of an oak woodland composed of over 300 native California oak trees. Woodland grove included the Listed (threatened) Engelmnann oak (*Quercus engelmannii*). Tree survey took place within a 60-acre ROW and included health and hazard assessment and trunk and canopy metrics. Mapped all arboricultural resources using GIS and created a tree location map and tree protection and conceptual mitigation plan under San Diego County Biological Mitigation Ordinance.

Consulting and Permitting Arborist, San Francisco Bay Area, CA
Project Arborist
CLIENTS: San Francisco Bay Area Municipalities
Tree preservation and protection plans and protocols for planned development projects throughout Northern California. Work involved in tree inventories, tree health and hazard assessments, and Heritage Tree mitigation and preservation plans (and if required, permitting for removal or hazard abatement). Mapping of native and exotic urban groves and individual trees, designing and installing Tree Protection Zones prior to construction, and performing construction monitoring and post construction maintenance.

Urban Grove Hazard Assessment, San Francisco, CA
Project Arborist
CLIENT: San Francisco Water Department (SFWD)
Conducted a formal and comprehensive tree survey of over 1300 individual trees for hazard potential to life, property and utility infrastructure at the Lake Merced water supply line. Designed a Tree Hazard Assessment protocol for the City of San Francisco and supervised a large vegetation management project involving the large and critical infrastructure of the Lake Merced-Sunset Supply Line. This water distribution system supplied one-third of the City of San Francisco and required an urban grove health, hazard and liability assessment performed for the City Distribution Division of the San Francisco Water Department. Project included coordination with California Department of Food and Agriculture plant pathologists to document presence of disease at site and quarantine protocols.

Joshua Zinn
1420 Kettner Blvd
Suite 500
San Diego, CA 92101 | 415-939-9466 | joshua.zinn@gmail.com

Street Tree Hazard Abatement Program, San Francisco, CA
Project Arborist
Client: San Francisco Department of Public Works (SFDPW)
Contract arborist for the Public Works Department of San Francisco at over 300 sidewalk, street and utility repair sites involving multiple S.F. Street Trees and several urban groves. Project entailed notification, designing proactive mitigation plans, and supervising all construction and hazard abatement methods potentially impacting the urban forest. Assignment also included post-monitoring of any affected or impacted resource.

Lombard Street Reservoir Repair, San Francisco, CA
Project Arborist
CLIENT: SFWD
Assess impact to grove of mature Monterey Pine (*Pinus radiata*) and Monterey cypress (*Cupressus macrocarpa*) and design Tree preservation and Protection Plan while implementing mitigation measures. Compiled large-scale tree biological inventory and mitigation plans while assessing the impacts of the retrofitting project of the Lombard Street Reservoir. As part of developing the feasible and cost-effective mitigation measures, daily field inspections were undertaken during construction, for over two months, which included modifying excavation methods to minimize impacts of the affected resources during all construction activities in immediate proximity to the created buffer zones.

WUI Assessment, Arcata, CA
Project Ecologist
CLIENT: California Department of Forestry & Fire Protection (CDF) and the City of Arcata
Under CPRC 4741 Coordinated with CDF and the City of Arcata, and the Arcata Fire Protection District in developing fire hazards and fire hazard reduction plan. The plan included conducting educational community forums and assisting local government in fuels reduction through vegetation management applications based upon vegetation management and structure/infrastructure proximity.

Telecommunications Assessment and Permitting, San Francisco Bay Area, CA
Project Arborist and Permitting Specialist
CLIENTS: General Dynamics/GTE, ATT, and Sprint
Tee surveys, assessments, and mitigation/permit compliance for wireless telecommunication facilities throughout the S.F. Bay Area. Assessed biological (tree and habitat) and visual construction impact to trees, under the rubric of all local tree ordinances, as a result of the installation of telecommunications towers.

San Francisco Hillside Repairs: Interstate 280, San Francisco, CA
Project Arborist
CLIENT: Caltrans (District 4)
Road repair and bank stabilization. Stabilization project included installation of rip-rap and drainage. Implemented and oversaw installation of geotextile and hydro-seeding as a method to reduce cutbank instability and erosion concerns towards established trees. Post-construction monitoring and assessment of a damaged (by mechanical contact) Monterey cypress grove along a major thoroughfare.

STATE OF CALIFORNIA

Energy Resources Conservation
and Development Commission

Application for Certification for the ABENGOA MOJAVE SOLAR POWER PLANT	)	Docket No. 09-AFC-5

PROOF OF SERVICE

I, Karen A. Mitchell, declare that on June 1, 2010, I served the attached *APPLICANT'S OPENING TESTIMONY* via electronic and U.S. mail to all parties on the attached service list.

I declare under the penalty of perjury that the foregoing is true and correct.

Karen A. Mitchell

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 *ABENGOA MOJAVE SOLAR POWER PLANT*

Docket No. 09-AFC-5
PROOF OF SERVICE
(Revised 5/27/2010)

APPLICANT
Emiliano Garcia Sanz
General Manager
Abengoa Solar Inc.
11500 West 13th Avenue
Lakewood, CO 80215
emiliano.garcia@solar.abengoa.com

Scott D. Frier
Chief Operating Officer
Abengoa Solar Inc.
13911 Park Ave., Ste. 206
Victorville, CA 92392
scott.Frier@solar.abengoa.com

Tandy McMannes
2030 Addison Street, Suite 420
Berkeley, CA 94704
tandy.mcmannes@solar.abengoa.com

APPLICANT'S CONSULTANTS
Frederick H. Redell, PE
Engineering Manager
Abengoa Solar, Inc.
11500 West 13th Avenue
Lakewood, CO 80215
frederick.redell@solar.abengoa.com

COUNSEL FOR APPLICANT
Christopher T. Ellison
Ellison, Schneider & Harris
2600 Capitol Ave.
Sacramento, CA 95816
cte@eslawfirm.com

INTERESTED AGENCIES
California ISO
E-mail Preferred
e-recipient@caiso.com

INTERVENORS
* County of San Bernardino
Ruth E. Stringer, County Counsel
Bart W. Brizzee, Deputy County Counsel
385 N. Arrowhead Avenue, 4th Floor
San Bernardino, CA 92415-0140
bbrizzee@cc.sbcounty.gov

California Unions for Reliable Energy ("CURE")
Tanya A. Gulesserian
Marc D. Joseph
Elizabeth Klebaner
Adams Broadwell Joseph & Cardozo
601 Gateway Boulevard, Suite 1000
South San Francisco, CA 94080
E-mail Preferred
tgulesserian@adamsbroadwell.com
eklebaner@adamsbroadwell.com

Luz Solar Partners Ltd., VIII
Luz Solar Partners Ltd., IX
Jennifer Schwartz
700 Universe Blvd
Juno Beach, FL 33408
jennifer.schwartz@nexteraenergy.com

ENERGY COMMISSION
ANTHONY EGGERT
Commissioner and Presiding Member
aeggert@energy.state.ca.us

JAMES D.BOYD
Vice Chairman and Associate Member
jboyd@energy.state.ca.us

Kourtney Vaccaro
Hearing Officer
kvaccaro@energy.state.ca.us

Craig Hoffman
Project Manager
choffman@energy.state.ca.us

*indicates change

Christine Hammond
Staff Counsel
chammond@energy.state.ca.us

Jennifer Jennings
Public Adviser's Office
publicadviser@energy.state.ca.us