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ALAMITOS ENERGY CENTER

Preliminary Staff Assessment for Alamitos Energy Center (AEC)

CALIFORNIA
ENERGY COMMISSION
Edmund G. Brown, Jr., Governor

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PRELIMINARY STAFF ASSESSMENT
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EXECUTIVE SUMMARY

Keith Winstead

INTRODUCTION

This Preliminary Staff Assessment (PSA) is a publication by California Energy Commission staff for the Alamitos Energy Center LLC's Supplemental Application for Certification (13-AFC-01) for the proposed Alamitos Energy Center (AEC), a nominal 1,040-megawatt electrical generating facility.

On October 26, 2015, AES Southland Development, LLC (AES) submitted a Supplemental Application for Certification (SAFC) to the California Energy Commission for the AEC project. The SAFC replaces the original Application for Certification (AFC) filed on December 27, 2013. The AEC would be constructed on the site of the Alamitos Generating Station, an existing and operating power plant located in the city of Long Beach, California.

This PSA contains staff's independent evaluation of the proposed Alamitos Energy Center project. The PSA examines engineering, environmental, public health and safety aspects of the proposed AEC project, based on the information provided by the applicant and other sources available at the time the PSA was prepared. The PSA contains analyses similar to those normally contained in an Environmental Impact Report (EIR) required by the California Environmental Quality Act (CEQA). When issuing a license, the Energy Commission is the lead state agency under CEQA and its certified regulatory program process is functionally equivalent to the preparation of an EIR.

The Energy Commission staff has the responsibility to complete an independent assessment of the project's engineering design and identify the potential impacts on the environment and public health and safety, and determine whether the project conforms to all applicable laws, ordinances, regulations, and standards (LORS). Upon identifying any potentially significant environmental impacts, staff recommends mitigation measures in the form of conditions of certification for construction, operation and eventual closure of the project. This PSA is not a decision document for these proceedings, nor does it contain findings of the Energy Commission related to environmental impacts or the project's compliance with local, state, and federal LORS.

After allowing for a public comment period on this PSA, staff will prepare and publish a Final Staff Assessment (FSA) that will serve as staff's formal testimony in evidentiary hearings to be held by the Energy Commission Committee assigned to hear this case. The Committee will hold evidentiary hearings and will consider the recommendations presented by the staff, applicant, interveners, government agencies, and the public, prior to proposing its decision. The Energy Commission will make the final decision, including findings, at a publically noticed hearing after the Committee's publication of its proposed decision.

PROPOSED PROJECT LOCATION AND DESCRIPTION

The AEC would be constructed on the site of the Alamitos Generating Station (AGS), an existing and operating power plant located at 690 North Studebaker Road in the city of Long Beach, Los Angeles County, California. The AEC site would be located on an approximately 21-acre site within the larger 71 acre AGS site. The project site is approximately 10 to 15 feet above mean sea level. The proposed project site is bounded to the north by Southern California Edison's (SCE) Alamitos switchyard and State Route 22 (East 7th Street); to the east by the San Gabriel River and, beyond that, the Los Angeles Department of Water and Power Haynes Generating Station; to the south by the former Plains West Coast Terminals petroleum storage facility and undeveloped property; and to the west by the Los Cerritos channel, AGS cooling-water canals, and the residences west of the channel. Land use in the region primarily includes urban development, industrial areas, undeveloped land, parklands, open space, and wetlands preserves. The AGS facility was built between 1955 and 1967. The facility included natural gas/oil, steam-turbine power generating units and was originally owned and operated by SCE. During the late 1990s, the electric industry was restructured, and SCE sold most of its generating facilities. In 1998, AES Southland purchased AGS from SCE.

The project site comprises Assessor's Parcel Numbers (APN) 7237-017-805, 7237-017-806, 7237-017-807, 7237-017-808, 7237-017-809, 7237-018-807, 7237-018-808, and 7237-019-808, and the construction lay down area consists of 10-acres of an adjacent parcel to the south (APN 7237-019-006).

The project description in the SAFC for the proposed AEC has changed from what was described in the AFC filed on December 27, 2013. The revised proposed AEC would be a nominal 1,040-MW, natural-gas-fired, combined-cycle and simple-cycle, air-cooled electrical generating facility consisting of two power blocks to provide fast starting and stopping, reliable, and flexible multistage generating resources. Power Block 1 would consist of two natural-gas-fired combustion turbine generators (CTG) in a combined-cycle configuration (collectively AEC CCGT), with two unfired heat recovery steam generators (HRSG), one steam turbine generator (STG), an air cooled condenser, an auxiliary boiler, and related ancillary equipment for a nominal 640 MW. Power Block 2 would consist of four natural gas-fired, simple-cycle CTGs with fin-fan coolers and ancillary facilities (collectively AEC SCGT) for a nominal 400 MW. The AEC is proposed to use potable water provided by the city of Long Beach Water Department (LBWD) for construction, operational process, and sanitary uses. This water would be supplied through existing onsite potable water lines.

The AEC would interconnect to the existing SCE 230-kilovolt (kV) switchyard adjacent to the northern side of the property. No new offsite natural gas lines would be necessary for the project. AEC would be supplied via the existing service pipeline for AGS Units 5 and 6 from the offsite 30-inch-diameter, high-pressure pipeline owned and operated by Southern California Gas Company (SoCalGas). Natural gas compressors, water treatment facilities, emergency services, and administration and maintenance buildings would be constructed within the existing site footprint. Storm water would be discharged into two retention basins and then ultimately to the San Gabriel River via existing storm water outfalls.

As described in the SAFC, the AEC CCGT would be located on the southern-most portion of the AEC site, on the former AGS fuel oil-storage site. AEC CCGT would include the following principal design elements:

- Two General Electric (GE) 7FA.05 CTGs with a nominal rating of 227 MW each. The CTGs would be equipped with evaporative coolers on the inlet air system and dry low oxides of nitrogen (NOx) combustors;
- Two HRSGs with no supplemental firing, each equipped with a selective catalytic reduction (SCR) unit in the ductwork for the control of NOx emissions, and an oxidation catalyst to control carbon monoxide (CO) and volatile organic compound (VOC) emissions;
- One, single-flow, impulse, down-exhaust-condensing STG with a nominal rating of approximately 229 MW;
- One air-cooled condenser;
- A new natural gas compressor and compressor building for the CCGT;
- One generator step-up (GSU) transformer per each GE 7FA gas turbine and one for the steam turbine; and
- One 230-kV interconnection to the existing SCE switchyard, which is adjacent to the site.

The AEC SCGT would be located on the northern portion of the AEC site, adjacent to the San Gabriel River. The AEC SCGT would include the following principal design elements:

- Four GE Energy LMS 100 PB natural gas-fired CTGs with a nominal rating of 100 MW each;
- Each CTG would be equipped with SCR equipment containing catalysts to further reduce NOx emissions, and an oxidation catalyst to reduce CO emissions;
- Auxiliary equipment associated with each CTG would include an inlet-air-filter house with evaporative cooler, turbine intercooler and associated intercooler circulating pumps;
- Each pair of CTGs would share one fin-fan heat exchanger and one GSU transformer;
- A new natural gas compressor and compressor building for the SCGT; and
- One 230-kV interconnection to the existing onsite SCE 230-kV switchyard.

The two power blocks would share the following design elements:

- Direct connection to an existing SoCalGas 30-inch-diameter natural gas pipeline and metering station;
- Connection to existing onsite municipal and industrial water lines;
- Fire water and suppression systems;
- A new 1,000-linear-foot process/sanitary wastewater pipeline to the first point of interconnection with the existing LBWD sewer system at the east end of East Vista Street in Long Beach;
- An existing storm water retention pond; and
- Water treatment and storage systems.

OFFSITE INFRASTRUCTURE IMPROVEMENTS

The AEC would include a new 1,000 linear-foot process/sanitary wastewater pipeline to the first point of interconnection with the existing LBWD sewer system and would eliminate the current practice of treatment and discharge of process/sanitary wastewater to the San Gabriel River. The upgrading of approximately 4,000 linear feet of the existing offsite LBWD sewer line downstream of the first point of interconnection discussed in the SAFC is no longer necessary and has been removed from the project design.

PROJECT OBJECTIVES

The applicant's SAFC identifies the project's primary objective to design a project that provides local area capacity at the existing AGS site. In addition to the primary objective, these are the basic project objectives:

- Develop a project capable of providing energy, generating capacity, and ancillary electrical services (voltage support, spinning reserve, inertia) to satisfy Los Angeles Basin Local Reliability Area requirements and transmission grid support, particularly in the western subarea of the Los Angeles Basin.
- Provide fast starting and stopping, flexible, controllable generation with the ability to ramp up and down through a wide range of electrical output to allow the efficient integration of renewable energy sources into the electrical grid, and replace older, once-through cooled and less efficient generation.
- Develop on a brownfield power plant site and use existing infrastructure, including the existing switchyard and related facilities, the SCE switchyard and transmission facilities, the SoCalGas natural gas pipeline system, the LBWD water connections, process water supply lines, and existing fire suppression and emergency service facilities.
- Use qualifying technology under the South Coast Air Quality Management District's Rule 1304(a)(2) exemption that allows for the replacement of older, less-efficient electric utility steam boilers with specific new generation technologies on a

megawatt-to-megawatt basis (that is, the replacement megawatts are equal or less than the megawatts from the electric utility steam boilers).

Staff's alternatives analysis broadly interprets the applicant's project objectives to foster a complete and robust discussion of potential alternatives to the applicant's proposed project.

PROJECT ALTERNATIVES

As required by CEQA staff evaluated a reasonable range of alternatives to the proposed project that would feasibly attain most of the basic objectives of the project and would avoid or substantially lessen any of the significant effects of the project. As a starting point, staff reviewed the alternatives analysis provided by the applicant in the SAFC. The applicant found that the alternatives considered in the SAFC were either infeasible, unable to reduce or avoid any adverse environmental impacts, or would not attain most of the basic objectives of the project; staff concurs with the applicant's assessment of their alternatives. The alternatives considered by staff in the PSA include one off-site alternative and the no-project alternative. The No-Project Alternative presented in staff's analysis evaluated a no-build scenario at the project site. Subsequently, the off-site alternative was eliminated from further consideration as infeasible, while the no-project alternative was carried forward for further evaluation. Staff also considered "preferred resources" (energy efficiency, demand response, utility-scale and distributed renewable generation, and storage) as alternatives to dispatchable natural gas-fired generation such as the proposed AEC. Staff has not identified a feasible alternative that would be environmentally superior to the proposed AEC.

PUBLIC AND AGENCY COORDINATION

On January 15, 2014, the Energy Commission staff issued a notification of receipt of the Application for Certification, together with a project description, to property owners within 1,000 feet of the proposed project and those located within 1,000 feet of the linear facilities. Staff sent a similar notification and a copy of the AFC to a comprehensive list of agencies and libraries. Staff's notification letters requested public and agency review and comment on the AFC, and invited continued participation in the Energy Commission's certification process.

Comments on the proposed project which were provided by agencies and individuals have been considered in staff's analysis. This PSA is intended to provide agencies and the public with an opportunity to review the Energy Commission staff's analysis of the proposed project.

LIBRARIES

On January 15, 2014, the Energy Commission staff also sent copies of the Alamitos Energy Center AFC to the following libraries:

Long Beach Main Library
101 Pacific Avenue
Long Beach, CA 90822

Long Beach Public Library – Los Altos Neighborhood
5614 E Britton Drive Long Beach, CA 95801

Bay Shore Neighborhood Library
195 Bay Shore Avenue
Long Beach, CA 90803

Los Alamitos-Rossmoor Library
12700 Montecito Road
Seal Beach, CA 90740

Brewitt Neighborhood Library
4036 E. Anaheim
Long Beach, CA 90804

In addition to these local libraries, copies of the AFC were also made available at the Energy Commission's Library in Sacramento, the California State Library in Sacramento, as well as state libraries in Eureka, Fresno, Los Angeles, San Diego, and San Francisco.

ENERGY COMMISSION'S PUBLIC ADVISER'S OFFICE

The Energy Commission's outreach program is also facilitated by the Public Adviser's Office (PAO). The PAO engages in continuous public outreach that has included placing a notice in the April 19, 2014 issue of the Long Beach Press-Telegram and Impacto USA newspapers announcing the Informational Hearing and Site Visit for this project that was held on April 29, 2014. The PAO also issued public notices informing the public of the availability of the project website where the public can obtain more information. The PAO requested public service announcements at a variety of organizations and distributed notices informing the public of the Commission's receipt of the AEC AFC.

CONSULTATION WITH LOCAL NATIVE AMERICAN COMMUNITIES

Energy Commission staff sent written correspondence to the Native American Heritage Commission, as well as to a number of Native American tribes who have expressed an interest in being contacted about development projects in the AEC area. This correspondence served as an invitation for tribes to consult on the project. Please see the **Cultural Resources** section of this staff assessment for details of staff's consultation with Native American tribes to date.

SUMMARY OF PROJECT IMPACTS, MITIGATION, AND LORS COMPLIANCE

Staff concludes that with implementation of staff's recommended mitigation measures described in the conditions of certification, the AEC would comply with all applicable laws, ordinances, regulations, and standards (LORS). Staff also concludes that for all areas, significant adverse direct, indirect, and cumulative impacts would not occur. In the technical area of Air Quality, additional information is needed to demonstrate thatl applicable LORS would be met, and all impacts would be mitigated to less than significant. Additional information is also rewuiewd in the te

The conclusions reached in each technical area (chapter) are summarized in the table and discussed below. For a detailed review of potentially significant impacts, related mitigation measures, and LORS compliance, please refer to each chapter of the PSA.

Executive Summary - Table 1
Summary of Environmental and Engineering Assessment

Technical Area	Complies with LORS	Impacts Mitigated	Additional Information Required
Air Quality/Greenhouse gases	**No**	**No**	**Yes**
Biological Resources	Yes	Yes	No
Cultural Resources	Yes	Yes	No
Facility Design	Yes	Yes	No
Geology and Paleontology	Yes	Yes	No
Hazardous Materials Management	Yes	Yes	No
Land Use	Yes	Yes	No
Noise and Vibration	Yes	Yes	No
Power Plant Efficiency	Yes	Yes	No
Power Plant Reliability	N/A	N/A	No
Public Health	Yes	Yes	No
Socioeconomics	Yes	Yes	No
Soil and Water Resources	Yes	Yes	No
Traffic and Transportation	Yes	Yes	No
Transmission Line Safety and Nuisance	Yes	Yes	No
Transmission System Engineering	Yes	N/A	**Yes**
Visual Resources	Yes	Yes	No
Waste Management	Yes	Yes	No
Worker Safety and Fire Protection	Yes	Yes	No

AIR QUALITY/GREENHOUSE GASES

Mitigation for operations would be provided in the form of Regional Clean Air Incentives Market (RECLAIM) Trading Credits and emission reduction credits to fully mitigate the project's emissions of all nonattainment pollutants and their precursors at a minimum ratio of one-to-one. These mitigation measures are expected to reduce potential operational impacts of the proposed project to less than significant. However, staff concludes that the proposed project presently does not comply with all applicable LORS and air quality impacts have not been fully mitigated because proper noticing of the proposed project to parents of nearby school children has not yet been completed by the South Coast Air Quality Management District and the applicant has not identified the source of the offset credits for sulfur dioxide. Once these two items are addressed, staff concludes that with the adoption of the proposed conditions of certification, the AEC would not result in significant air quality related impacts during project construction or operation, and the project would comply with all applicable federal, state and South Coast Air Quality Management District air quality LORS.

The applicant expects to operate the proposed gas turbines below an annualized plant capacity factor of 60 percent. Therefore the proposed AEC would not be considered a base load facility and the turbines would not be subject to the Greenhouse Gases Emission Performance Standard. The project would emit over 25,000 metric tonnes of carbon dioxide equivalent emissions and therefore would be subject to mandatory state and federal greenhouse gas reporting and state cap-and-trade requirements.

BIOLOGICAL RESOURCES

Vegetation in the project area is limited to weedy species and landscaping, and there is no natural wildlife habitat on site. Rare plants and special-status wildlife are not expected to occur on the site; however, nearby marshes and other natural areas support special-status species including the Pacific green sea turtle (federally listed threatened), Belding's savannah sparrow (state listed endangered), western snowy plover (federally listed threatened), California least tern (federally and state listed endangered), and California brown pelican (state fully protected). The proposed offsite wastewater pipeline alignment and adjacent areas could support the southern tarplant, a rare plant species. Staff concludes that the project, with implementation of proposed conditions of certification, would comply with all applicable LORS and direct, indirect, and cumulative impacts would be avoided, minimized, or mitigated to less than significant levels.

CULTURAL RESOURCES

Staff concludes that the proposed AEC could result in significant, direct impacts on buried archaeological resources, which may qualify as historical or unique archaeological resources under CEQA. The adoption and implementation of staff's proposed conditions of certification would ensure that the applicant would be able to respond quickly and effectively in the event that archaeological resources are found buried beneath the project site during construction-related ground disturbance, and ensure the project complies with applicable LORS. In regard to historic built environment resources, staff concludes that two historical resources are present in the project area of analysis: the San Gabriel River and Los Cerritos channels. Both are historic-age engineered structures that figured prominently in regional flood control management. Staff concludes, however, that the proposed project would not affect either channel. In regard to ethnographic resources, staff concludes that a tribal cultural resource, the Puvunga Ceremonial Site Complex, is present in the project area of analysis. The Puvunga Ceremonial Site Complex is recommended as eligible for the California Register of Historical Resources under criteria 1–3. However, staff's analysis concludes that the construction and operation of the proposed project would not have a direct or indirect impact on this ethnographic tribal cultural resource.

FACILITY DESIGN

Staff has evaluated the proposed engineering LORS, design criteria, and design methods in the SAFC, and concludes that the design, construction, and eventual closure of the proposed project would comply with applicable engineering LORS. Staff's proposed conditions of certification would ensure that AEC is designed and constructed in accordance with applicable engineering LORS. This would be accomplished through design review, plan checking, and field inspections that would be performed by the Delegate Chief Building Official (CBO). Energy Commission staff would audit the CBO to ensure satisfactory performance.

GEOLOGY AND PALEONTOLOGY

Staff concludes that the proposed AEC can be designed and constructed in accordance with all applicable LORS and in a manner that both protects environmental quality and assures public safety. The site is located in a geologically active area along the right bank of the San Gabriel River in coastal Southern California that could be subject to very strong levels of earthquake-related ground shaking, and therefore the effects of this shaking on structures must be mitigated. In addition to strong seismic shaking, the project may be subject to soil failure caused by liquefaction and/or dynamic compaction. A design-level geotechnical investigation required for the project by the California Building Code and staff's proposed conditions of certification would present standard engineering design requirements for mitigation of strong seismic shaking, liquefaction and potential excessive settlement due to dynamic compaction.

While not likely to occur during the project design life, the site is subject to inundation by tsunami. Sea level rise could exacerbate the potential for inundation. Staff recommends conditions of certification that would require the applicant to consider potential impacts from tsunami inundation on facility design and require the applicant to develop a tsunami hazard mitigation plan for preparedness and evacuation methods that would ensure public health and safety.

Fossils have not been found in close proximity to the project site. Potential impacts to paleontological resources due to construction activities are not likely, but if discovered during construction, they would be mitigated through worker training and monitoring by qualified paleontologists, as required by staff's proposed conditions of certification.

HAZARDOUS MATERIALS MANAGEMENT

Staff concludes that the proposed project's storage and use of hazardous materials at the site would not present a significant impact to the public and the project would comply with all applicable LORS. In response to California Health and Safety Code, the applicant would be required to develop a risk management plan. To ensure the adequacy of this plan, staff's proposed conditions of certification require that the risk management plan be submitted for concurrent review by the Long Beach Environmental Health Bureau and Energy Commission staff. In addition, staff's proposed conditions of certification require staff review and approval of the risk management plan prior to delivery of any hazardous materials to the AEC project site. Other proposed conditions of certification address the issue of the transportation, storage, and use of aqueous ammonia and site security.

LAND USE

The proposed project would be consistent with the applicable state and local LORS pertaining to land use planning, and would not cause a significant land use impact under the CEQA Guidelines. With the implementation of staff's proposed condition of certification, the applicant would be required to provide evidence that the project meets the design standards of the General Industrial Zone District of the Long Beach Zoning Code.

NOISE AND VIBRATION

If built and operated in conformance with the proposed conditions of certification, it is staff's position that AEC would comply with all applicable noise and vibration LORS. Staff concludes that the project would produce no significant adverse noise impacts under CEQA guidelines on people within the project area, directly, indirectly, or cumulatively. Staff recommends conditions of certification addressing worker and employee protection, measurement and verification that noise performance criteria are met at project's noise-sensitive residential receptors, and restrictions on construction activities (i.e, construction noise restrictions, steam blow restrictions, and pile drive management). Also, staff's proposed conditions of certification require that nighttime concrete pouring activities remain within the required noise limits, and provide for a process of noise complaint investigation and resolution.

POWER PLANT EFFICIENCY

Power Block 1 would be in a combined-cycle configuration with a maximum thermal efficiency of 56 percent lower heating value (LHV) at maximum full load and average design conditions. Power Block 2 would be a simple-cycle configuration with a maximum thermal efficiency of 41 percent LHV at maximum full load at average design conditions. While the project would consume substantial amounts of energy, it would do so in a sufficiently efficient manner to satisfy the project's objectives of providing fast-ramping capabilities and ancillary load-following services. It would not create significant adverse effects on energy supplies or resources, would not require additional sources of energy supply, and would not consume energy in a wasteful or inefficient manner. No energy standards apply to the project. Staff therefore concludes that the project would present no significant adverse impacts upon energy resources.

POWER PLANT RELIABILITY

Staff concludes that AEC would be built to operate in a manner consistent with industry norms for reliable operation and would be able to achieve the equivalent availability factor of approximately 98 percent predicted in the AFC. (The equivalent availability factor of a power plant is the percentage of time it is available to generate power, accounting for both planned and unplanned outages.) No conditions of certification are proposed for power plant reliability.

PUBLIC HEALTH

Staff has conducted a health risk assessment for the proposed AEC and found no potentially significant adverse impacts for any receptors, including sensitive receptors. In arriving at this conclusion, staff notes that its analysis complies with all directives and guidelines from the California Environmental Protection Agency Office of Environmental Health Hazard Assessment and the California Air Resources Board. Staff's assessment is biased towards protection of public health and takes into account the most sensitive individuals in the population. Using extremely conservative (health-protective) exposure and toxicity assumptions, staff's analysis demonstrates that members of the public potentially exposed to toxic air contaminant emissions of this project, including sensitive receptors such as the elderly, infants, and people with pre-existing medical conditions, would not experience any acute or chronic significant health risk or any significant cancer risk as a result of that exposure.

Staff incorporated every conservative assumption called for by state and federal agencies responsible for establishing methods for analyzing public health impacts. The results of that analysis indicate that there would be no direct or cumulative significant public health impact on any population in the area. Therefore staff concludes that construction and operation of the AEC would comply with all applicable LORS regarding long-term and short-term project impacts in the area of public health.

SOCIOECONOMICS

Staff concludes that construction and operation of the AEC would not cause significant direct, indirect, or cumulative adverse socioeconomic impacts on the project area's housing, schools, law enforcement services, or parks. Staff also concludes the project would not induce a substantial population growth or displacement of population, or induce substantial increases in demand for housing, parks, or law enforcement services. Staff's proposed conditions of certification would ensure project compliance with applicable LORS (i.e., school and police facility impact fees).

SOIL AND WATER RESOURCES

Staff concludes that the proposed project would not have significant impacts on water quality and supply, and would comply with applicable LORS with the implementation of staff's proposed conditions of certification. The AEC proposes to use potable water during construction at an annual rate not to exceed about 22 acre feet per year (AFY) (about 100 AF total) and 130 AFY for process and sanitary uses during operation. Once the Alamitos Generating Station ceases operation after completion of construction of the AEC, the reduction in potable water use would be about 272 AFY, which would result in additional supplies for other beneficial uses. Although the project would reduce potable water use relative to baseline conditions, staff conducted additional analysis to evaluate whether reclaimed water from nearby wastewater treatment plants or the city of Long Beach could be used as an alternative supply. Staff concluded that due to the small volume of water needed for operation, long distances to treatment plants and the nearest interconnection to the city's reclaimed water distribution system, it would be economically infeasible to use reclaimed water at this time. The AEC would include use of air cooled condensers for cooling of the steam cycle. This technology significantly reduces the potential for use of other water supplies and is encouraged in accordance with the Energy Commission's water policy. Development of alternative water supplies for remaining industrial uses does not appear to be feasible. Staff believes the project water use is consistent with Energy Commission water policy.

In addition, the project would use a number of systems to reuse wastewater and reduce wastewater volume. The proposed project would result in a reduction of 0.24 million gallons per day (mgd) in industrial wastewater discharge to the San Gabriel River and ultimately the Pacific Ocean and a similarly proportional decrease in pollutant loading associated with industrial wastewater, which would improve the water quality in the ocean and the Alamitos Bay.

The proposed project is located in Zone X and is separated from the 100-year flood stage (flood with a 1 percent probability of occurrence in any year) by at least six feet.

Recent Energy Commission studies show the project site and vicinity to be at increased risk of flooding due to relative sea level rise. However the proposed site would be sufficiently above sea level to ensure power plant reliability. Even with high-end estimates of relative sea-level rise of 61 centimeters (2.0 feet) by 2050 (relative to 2000), the site would still be about 4.0 feet above the current (2012) 100-year floodplain.

TRAFFIC AND TRANSPORTATION

Staff concludes that the proposed project would comply with all applicable LORS and impacts on the transportation system would be less than significant with the implementation of staff's proposed conditions of certification. Conditions are proposed to require the applicant to comply with applicable local and state agency requirements for vehicle size and weights, vehicle licensing, truck routes, and other applicable limitations, and to obtain all necessary permits for roadway use and encroachment. In addition, the applicant would be required to prepare and implement a traffic control plan to minimize the project's effects on the levels of service of impacted roadways. In regard to aviation safety, conditions of certification are proposed to require the applicant to notify the Federal Aviation Administration (FAA) prior to the use of tall construction equipment at the site and to install aviation warning marking and lighting on any construction equipment as required by FAA regulations. A condition of certification is proposed to require the applicant to request that the FAA implement various notifications advising pilots of the location of the power plant and the potential aviation hazards associated with thermal plumes, and to avoid direct overflight of the facility, consistent with the FAA's Aeronautical Information Manual.

TRANSMISSION LINE SAFETY AND NUISANCE

The applicant proposes to build two new single-circuit or double-circuit 230-kilovolt (kV) lines to connect the proposed AEC to the existing California Independent System Operator (California ISO)-operated and SCE-owned 230-kV substation located within the AGS site. The proposed lines would lie entirely within the boundaries of the AGS site and no offsite lines would be necessary. Since the proposed 230-kV lines would be operated within the SCE service area, they would be designed, constructed, operated, routed, and maintained according to SCE's guidelines for line safety and field management which conform to applicable LORS. The proposed lines would lie within the boundaries of an existing, operating power plant that would cease operations once AEC construction is complete. Since this is an existing power plant site and the connecting transmission lines would be short in length with no nearby residences, there would be no potential for the residential electric and magnetic field exposures, which have been of some health concern. With staff's proposed conditions of certification, any safety and nuisance impacts from construction and operation of the proposed line would be less than significant.

TRANSMISSION SYSTEM ENGINEERING

The proposed project facilities from the generator to the interconnection with the SCE Alamitos switchyard, including, the step-up transformer, the project switchyards, the 230-kV overhead transmission line, and the termination are acceptable, in accordance with good utility practices, and would comply with LORS. Staff expects the California ISO will find the AEC project to be substantially unchanged from the existing AGS plant and to have no significant impacts on the existing transmission system. The applicant has requested exemption from the California ISO generator interconnection study process in accordance with section 25.1 of the California ISO tariff which allows the California ISO to exempt a generator from the interconnection queue study process if the new generator is found to be substantially unchanged from the generator it replaces. The applicant is expected to submit the California ISO study report allowing exemption before staff publishes the Final Staff Assessment.

VISUAL RESOURCES

The proposed project would be constructed at the site of the existing Alamitos Generating Station. Staff did not identify significant visual resources impacts at three of the four critical offsite viewpoints, referred to as key observation points or KOPs, used in the analysis. Impacts at KOP 4 were found to be less than significant with mitigation. Staff evaluated the potential effects of the long-term schedule for the proposed construction of the AEC. Staff concludes that construction and commissioning activities would not substantially degrade the existing visual character and quality of the site and its surroundings. In addition, staff analyzed the potential for lighting of the project site and structures during construction, commissioning, and operation to create new sources of substantial light or glare. Staff proposes conditions of certification to reduce potential effects of lighting and glare on nighttime and daytime views to less than significant.

The project site is in the state's Coastal Zone. Section 30251 of the California Coastal Act requires that the scenic and visual qualities of coastal areas be considered and protected as resources of public importance. Permitted development must be sited and designed to restore and enhance visual quality in visually degraded areas where feasible. The applicant has indicated that a landscape design plan would be prepared for the AEC prior to commencement of construction. The plan would provide details as to how the project owner intends to enhance visual quality at the project site. Staff proposes a condition of certification to require preparation of landscaping plans prior to project implementation to satisfy the requirements of the city of Long Beach's South East Area Development and Improvement Plan Specific Plan, the certified local coastal program for this area of the state.

WASTE MANAGEMENT

The proposed project would be located on 21-acres within the existing Alamitos Generating Station. The AGS site is a highly disturbed brownfield site that requires remediation. AES, the current property owner, or Southern California Edison, the previous owner, would ensure that impacted or contaminated areas on the AEC site are remediated where necessary. The applicant would also implement a Soil Management Plan to provide guidance for proper identification, handling, disposal and containment of contaminated soil during demolition, construction and ground-disturbing activities. The AEC project's proposed waste management methods and mitigation measures, along with the proposed conditions of certification and demolition waste recycling and diversion requirements would ensure that wastes generated by the proposed project would not result in a significant impact to local waste management and disposal facilities.

WORKER SAFETY AND FIRE PROTECTION

Staff concludes that with the implementation of proposed conditions of certification there would be adequate levels of worker safety and fire protection, and the proposed project would comply with the applicable LORS. Staff recommends the applicant provide a Project Construction Safety and Health Program and a Project Operations and Maintenance Safety and Health Program to set forth the procedures to ensure worker safety and fire protection at the AEC. Staff confirmed that the Long Beach Fire Department would have the continued ability to provide emergency response for fires, hazardous materials spills, rescue, and routine code inspections during the construction and operation of the AEC.

CUMULATIVE IMPACT ANALYSIS

Preparation of a cumulative impact analysis is required under CEQA. In the CEQA Guidelines, “a cumulative impact consists of an impact which is created as a result of the combination of the project evaluated in the EIR together with other projects causing related impacts” (Cal. Code Regs., tit. 14, §15130(a)(1)). Cumulative impacts must be addressed if the incremental effect of a project, combined with the effects of other projects is “cumulatively considerable” (Cal. Code Regs., tit. 14, §15130(a)(2)). Such incremental effects are to be “viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects” (Cal. Code Regs., tit. 14, §15164(b)(1)). Together, these projects comprise the cumulative scenario which forms the basis of the cumulative impact analysis.

CEQA also states that both the severity of impacts and the likelihood of their occurrence are to be reflected in the discussion, “but the discussion need not provide as great detail as is provided for the effects attributable to the project alone. The discussion of cumulative impacts shall be guided by standards of practicality and reasonableness, and shall focus on the cumulative impact to which the identified other projects contribute rather than the attributes of other projects which do not contribute to the cumulative impact” (Cal. Code Regs., tit. 14, §15130(b)).

DEFINITION OF THE CUMULATIVE PROJECT SCENARIO

Cumulative impacts analysis is intended to identify past, present, and probable future actions that are closely related either in time or location to the project being considered, and consider how they have harmed or may harm the environment. Most of the projects on the Master Cumulative Project List presented in **Executive Summary Table 2** have, are, or will be required to undergo their own independent environmental reviews under CEQA. Staff created the AEC Master Cumulative Project List by contacting planning staff with the city of Long Beach, reviewing proposed project information from other agencies including the cities of Cypress, Huntington Beach, Los Alamitos, Paramount, and Seal Beach, as well as the California Department of Transportation and the CEQANet database.

Under CEQA, there are two acceptable and commonly used methodologies for establishing the cumulative impact setting or scenario: the “list approach” and the “projections approach.” The first approach would use a “list of past, present, and probable future projects producing related or cumulative impacts." (Cal. Code Regs., tit. 14, §15130(b)(1)(A)). The second approach is to use a "summary of projections contained in an adopted general plan or related planning document, or in a prior environmental document which has been adopted or certified, which described or evaluated regional or area wide conditions contributing to the cumulative impact." (Cal. Code Regs., tit. 14, §15130(b)(1)(B)). This PSA uses the "list approach" for purposes of state law to provide a tangible understanding and context for analyzing the potential cumulative effects of the proposed project. All projects used in the cumulative impacts analyses for this PSA are listed in the cumulative projects table (**Executive Summary Table 2**), and locations are shown on **Executive Summary Figure 1**.

APPROACH TO CUMULATIVE IMPACT ANALYSIS

This PSA evaluates cumulative impacts within the analysis of each resource area, following three steps:

- Define the geographic scope of cumulative impact analysis for each discipline, based on the potential area within which impacts of the AEC could combine with those of other projects.
- Evaluate the effects of the AEC in combination with past and present (existing) projects within the area of geographic effect defined for each discipline.
- Evaluate the effects of the AEC with foreseeable future projects that occur within the area of geographic effect defined for each discipline.

Executive Summary Table 2
AEC Master List of Cumulative Projects

ID #	Project Name	Project Description	Location	Distance to AEC (Miles)	Status
1	Alamitos Generating Station (AGS) Units 1 through 6	Existing units to remain operational during AEC construction. After construction of the AEC, demolition of the existing Units 1–6 to occur according to memorandum of understanding with the city of Long Beach.	690 N. Studebaker Rd., Long Beach	0.2	Unknown
2	Los Cerritos Wetlands Conceptual Restoration Plan and Mitigation Bank	Synergy intends to establish a mitigation bank and wetlands habitat restoration area on the Synergy Oil Field. Mitigation bank would cover 76 acres and restored wetlands would cover 72 acres of the 152 acre Synergy Oil Field. Project includes construction of public access improvements. Synergy would remove approximately 37 oil wells	Between the Pacific Coast Highway (PCH), Los Cerritos Channel, Studebaker Rd., and 2nd St., Long Beach	0.2	Environmental Review

ID #	Project Name	Project Description	Location	Distance to AEC (Miles)	Status
		from the restoration area. It would conduct oil production activities, including drilling of 70 new oil wells.			
3	Alamitos Generating Station Battery Energy Storage System (BESS)	BESS project at the AGS to include three 100 MW containment buildings, constructed in sequential phases from east to west. Each would contain two battery storage levels, electrical controls, and HVAC units. Construction proposed to start 3rd quarter 2019, after major mechanical completion of the AEC CCGT power block, with completion of the first 100-MW building planned for late 2020. The second and third 100 MW buildings to then be constructed and operational in 2021/2022.	North side of AEC project site, Long Beach	0.3	Planning Phase
4	Alamitos Barrier Improvement Project	This project has been recognized to produce significant noise and ground disturbance. Project involves construction and operation of up to 20 injection wells, four monitoring wells, and four piezometers along the existing alignment of the Alamitos Barrier. The project will be conducted under Orange County Water District Contract # AB-2014-1.	Multiple locations along the Los Alamitos Channel between San Gabriel River, El dorado Dr. and Canoe Brook Dr., Orange County	0.4	Planning Phase
5	Los Angeles Dept. of Water and Power Haynes Generating Station	Addition of six LMS100 simple cycle gas turbines and two emergency diesel-powered generators. Project is a stationary emission source with active emission permit.	6801 2nd St., Long Beach	0.6	Under Construction
6	Alamitos Bay Bridge Improvement Project	Improvements to the bridge are needed to enhance the safety of the structure and to maintain the level of service. Project could result in new bridge.	Project crosses the El Cerritos Channel on Pacific Coast Hwy., Long Beach	0.9	Environmental Review
7	PCH and 2nd	Demolition of the existing Seaport Marina Hotel and	6400 E Pacific Coast Hwy.,	0.9	Environmental Review

ID #	Project Name	Project Description	Location	Distance to AEC (Miles)	Status
		construction of a commercial center totaling approximately 250,000 sq ft of retail and restaurant space and a three level enclosed parking structure. The proposed commercial structures would be one- and two- story buildings with a maximum height of 35 feet. The project is on a 10.93-acre site.	Long Beach		
8	CalTrans #12, San Diego Freeway I-405 Improvement Project	I-405 Improvement Project would add one general purpose lane in each direction on I-405 from Euclid Street to the I-605 interchange, plus add a tolled Express Lane in each direction of I-405 from SR-73 to SR-22 East.	I-405 between SR-73 and I-605, Costa Mesa, Seal Beach	1.0	Planning Phase
9	Rehabilitation of Western Regional Sewers, Project No. 3-64	Orange County Sanitation District proposes to rehabilitate and/or replace entire lengths of the Orange Western Sub-Trunk, Los Alamitos Sub-trunk, Westside Relief Interceptor, and the Seal Beach Interceptor regional pipelines. In addition to pipeline and manhole replacement and/or rehabilitation, project includes rehabilitation/replacement of the Westside Pump Station force main, reconstruction of the Westside Pump Station wet well, and construction of a new vent line from the wet well to the downstream manhole or construction of an odor control scrubber.	Follows public rights-of-way (streets and easements) in cities of La Palma, Buena Park, Cypress, Anaheim, Los Alamitos, Seal Beach, and community of Rossmoor.	1.3	Environmental Review
10	Alamitos Bay Marina Rehabilitation Project	Renovate the existing Marina facilities and enhance existing recreational boating facilities in the Marina. The project encourages boating use by providing upgraded ADA-compliant facilities, upgraded restrooms, and dredged basins to ensure	Alamitos Bay Marina adjacent to and northwest of the mouth of the San Gabriel River, Long Beach	1.3	Under Construction

ID #	Project Name	Project Description	Location	Distance to AEC (Miles)	Status
		safe navigation. Project would provide longer average slip lengths. The existing 1,967 slips in Basins 1 through 7 would be replaced by 1,646 slips in these Basins, at a loss of approximately 321 slips.			
11	Ocean Place Residential Development	Construct single-family homes and open space park on about 11 acres (6-acre park). Approval of proposed 32 lots merged into a single lot for overnight lodging.	Area south of Marina Dr. between 1st St. and San Gabriel River, Long Beach	1.6	Planning Phase
12	Colorado Lagoon Restoration Project	The lagoon is an approximately 11.7 acre tidal water body that is connected to Alamitos Bay and the ocean through an underground tidal culvert to Marine Stadium. Project is to create habitat that can successfully establish and support native plant and animal communities in the long term, implement long-term water quality control measures, and enhance the Lagoon's value as a recreational resource.	Southeast portion of Long Beach, northwest of San Gabriel River mouth, and upstream from Marine Stadium and Alamitos Bay, Long Beach	1.9	Under Construction
13	Leeway Sailing Center Pier and Dock D3	Rebuild Leeway Sailing Center with 5,300 sq ft of office and facilities, and 3,200 sq ft of boat storage.	5437 E Ocean Blvd., Long Beach	2.0	Planning Phase
14	Sunset Gap Monitoring Well Project	Project involves destroying three wells that have reached the end of their lifespans and constructing six new wells. New wells will be installed on the Naval Weapons Station Seal Beach. Only off-site work is destruction of two wells to the south in Huntington Beach.	Near Case Rd. and Bolsa Ave., Seal Beach	2.5	Under Construction
15	Belmont Pool Revitalization	Demolition of the existing Belmont Pool complex (the indoor and outdoor features) and construction of a replacement indoor/outdoor pool complex. Spectator seating for approximately 3,500 people through a combination of permanent	4000 East Olympic Plaza, Long Beach	2.7	Under Construction

ID #	Project Name	Project Description	Location	Distance to AEC (Miles)	Status
		and portable seating.			
16	Safran Senior Housing Project	Conversion of the Immanuel Community Church into a senior housing project consisting of 24 independent low- or very-low-income senior dwelling units, a manager's unit and associated amenities/common areas in 31,006 sq ft of floor area. Project includes demo of the existing single-family home and detached garage at 304 Obispo Avenue, for construction of a surface parking lot to serve the project.	3215 E. 3rd St., Long Beach	3.1	Under Construction
17	Sunset/Huntington Harbor Maintenance Dredging and Waterline Installation Project	The City of Huntington Beach and the County of Orange are responsible for proposed Maintenance Dredging and Waterline Installation project components.	Edinger Ave. and Sunset Way, Huntington Beach	3.2	Under Construction
18	Los Alamitos Medical Center Specific Plan	Replacing and adding new buildings to the existing facility on an 18-acre site, including constructing two four-story hospital buildings. Planned in three phases with anticipated construction period of 25 years.	3751 Katella Ave., Los Alamitos	3.2	Under Construction
19	City of Long Beach East Division Police Substation	City of Long Beach is seeking a transfer of land under the Base Realignment and Closure (BRAC) program (or a transition of surplus military property to civilian uses); the project is also subject to environmental review under the National Environmental Policy Act (NEPA) (to be reviewed and approved by the U.S. Department of the Army).	3800 East Willow St., Long Beach	3.7	Completed
20	Humboldt Bridge Preventative Maintenance Project	Maintenance activities on the existing Humboldt Drive bridge to restore the integrity of its original design.	Humboldt Dr. bridge, west of Humboldt Dr. and Wimbledon Lane	3.8	Planning Phase

ID #	Project Name	Project Description	Location	Distance to AEC (Miles)	Status
			intersection, Huntington Beach		
21	Barton Place	Project includes two components: a senior residential community and commercial/retail improvements along Katella Ave. It includes the subdivision of the site into nine separate lots.	Northeast corner of Katella Ave. and Enterprise Dr., Cypress	3.8	Planning Phase
22	Tennis Estates Tree Trimming and Management Plan	Analyzes environmental impacts associated with a proposal to permit the establishment of a Tree Trimming and Management Plan for the Tennis Estates Homeowners Association property in the Coastal Zone. Addresses maintenance and management procedures of trees that have provided heronry functions for birds protected under the Migratory Bird Treaty Act.	16380 Wimbledon Lane, Huntington Beach	3.9	Under Construction
23	Rofael Marina and Caretaker Facility	Construction of marina on a 6,179 sq ft property.	16926 Park Ave., Huntington Beach	3.9	Under Construction
24	Harmony Cove Marina Development	Amend the city's zoning map on the project site to allow the development of a 23-boat slip marina, an eating and drinking establishment with outdoor dining area and alcoholic beverage sales, and ancillary uses to the marina.	3901 Warner Ave., Huntington Beach	4.4	Planning Phase
25	Pacific Pointe East Development Project	Project involves construction of three industrial buildings on an approximately 25-acre site with a paved surface parking lot. Buildings would have an open floor plan and are intended for light industrial, light manufacturing, warehouse, office, and/or research and development land uses.	Southeast corner of Lakewood Blvd. and Conant St., Long Beach	4.6	Planning Phase
26	Airport Circle Residential Project	General plan amendment and zoning map amendment to change existing designations to Residential	16911 Airport Circle, Huntington Beach	4.9	Plan Check

ID #	Project Name	Project Description	Location	Distance to AEC (Miles)	Status
		Medium High Density on a 2.5 acre site. Development of the site includes 45 condominium subdivision and associated open space. The site layout consists of 8 detached three-story buildings with four to eight attached dwelling units. Units are approximately 1,250-1,940 sq ft.			
27	925 East Pacific Coast Highway Lease Acquisition Project	Demolition or rehabilitation of the existing project site building for the purposes of blight removal. The project site totals 15,795 sq ft (about 0.36 acre).	925–945 E. Pacific Coast Hwy., Long Beach	4.9	Planning Phase
28	Douglas Park Rezone Project	Based on 2009 project description from addendum to the final Environmental Impact Report (EIR): Revised project to include up to approximately 3.75 million sq ft of commercial/light industrial uses (research and development uses), 250,000 sq ft of retail uses, and a hotel with 400 rooms. 10 acres of open space planned. The site covers 261 acres.	Bound by Carson St. on the north, the Airport south and southwest, Lakewood Blvd. on the east, and Lakewood Country Club Golf Course on the west.	5.0	Under Construction
29	Douglas Park Medical Office	Construction of three new industrial buildings with new parking stalls.	3828 Schaufele Ave., Long Beach	5.0	Under construction
30	Brightwater	Construction of 347 single-family units, a community pool and clubhouse, and over 37 acres for habitat restoration and trails. 105.3 acres of the upper bench portion of the Bolsa Chica mesa.	4884 Brightwater Dr., Huntington Beach	5.1	Under construction
31	207 Seaside Way Project	Construction of 113-unit multi-family apartment complex on the 0.67-acre site. Project would include a single structure consisting of eight levels (one subterranean level and seven aboveground levels). Bottom three levels would provide 144 on-site parking	207 E Seaside Way Long Beach	5.2	Environmental Review

ID #	Project Name	Project Description	Location	Distance to AEC (Miles)	Status
		spaces. Apartment structure would be 85 feet above the East Seaside Way grade. Apartment units would include a mix of studios, and one- and two-bedroom configurations. Amenities include a cafe, fitness center, retail space, and a lobby.			
32	Urban Village on Long Beach	Project would improve three abutting parcels with a five-story building containing 129 condominium units and 175 parking stalls located in an integrated five-level parking garage.	1081 Long Beach Blvd., Long Beach	5.3	Planning Phase
33	1235 Long Beach Boulevard Mixed-Use Project	Construct 42,000 sq ft of ground floor commercial space, 186 senior rental housing units, and 170 condominium units. Requires demo of two existing commercial buildings.	1235 Long Beach Blvd., Long Beach	5.3	Complete
34	Parkside Estates	Includes 111 single family residences, 23 acres of preserved, restored and enhanced open space, 1.6-acre neighborhood park, public trails, creation of a water quality treatment system that will treat over 25% of the dry-weather flow from Slater watershed that currently flows untreated to Bolsa Chica and the ocean.	West side of Graham St., south of Warner Ave., along East Garden Grove Wintersburg Flood Channel 17221, Huntington Beach	5.3	Planning Phase
35	Oceanaire Apartment	Construction of a 216-unit multi-family/mixed-use apartment complex on the 1.76-acre site.	150 West Ocean Blvd., Long Beach	5.3	Under Construction
36	Pine Square Theater Conversion to Residential	Conversion of movie theater into 69 residential apartment units.	250–270 Pacific Ave., Long Beach	5.4	Under Construction
37	New Civic Center Project	Construction of new City Hall, new Port Building for Harbor Department administration, new and relocated Main Library, redeveloped Lincoln Park, residential development, and commercial mixed use development. Includes	Downtown Long Beach on 15.87 acres. Separated into 2 discontinuous parcels generally bounded by	5.5	Under Construction

ID #	Project Name	Project Description	Location	Distance to AEC (Miles)	Status
		demolition of the former Long Beach Courthouse.	3rd St. to north, Pacific Ave. to east, Magnolia Ave. to west, and Ocean Blvd. to south., Long Beach		
38	Aquarium of the Pacific "Pacific Visions" Expansion	Construction of a 23,330 sq ft addition to an existing 166,447 sq ft aquarium. The project will be designed and built to the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) Gold standards with "add-alternate" design plans to bring the project to Platinum status if funding is available.	100 Aquarium Way, Long Beach	5.6	Under Construction
39	442 W. Ocean Boulevard Project	Construction of a 95-unit multi-family apartment complex on the 24,000 sq ft site.	442 West Ocean Blvd., Long Beach	5.6	Environmental Review
40	Cypress Village Shopping Center	Remodel and upgrade the shopping center. Project includes: demolition of 6,982 sq ft of retail area, exterior façade remodel of existing buildings, and improvements to existing parking lot.	9515–9575 Valley View St., Cypress	5.7	Environmental Review
41	Golden Shore Master Plan	Project includes three development options, a Residential Option and two Hotel Options, and all would be entitled through the city of Long Beach. The option ultimately constructed would be selected based on market conditions prevailing at the time entitlement is complete.	6-9 Golden Shore, Long Beach	5.9	Planning Phase
42	Edinger Walmart	Proposed to establish a community oriented anchor use within the Beach and Edinger Corridors Specific Plan by occupying existing 100,865-sq ft vacant retail building within existing commercial center. Exterior building improvements include new paint and new primary entry doors.	6856 Edinger Ave., Huntington Beach	5.9	Complete

ID #	Project Name	Project Description	Location	Distance to AEC (Miles)	Status
43	Drake Park Soccer Field	Create 64-acre park from Cesar E. Chavez Park to Drake Park and Loma Vista Park. Two new soccer fields are part of the project. Work primarily consists of demolition and grading, installation of drainage system, basketball court, synthetic soccer field, constructing Portland cement concrete infrastructure, installing asphalt paving, park furnishings, lighting and electrical, prefabricated restroom installation, underground water, sewer pipelines, electrical service, and landscape irrigation for approximate 8-acre site.	Along lower Los Angeles River in Long Beach to link Cesar E. Chavez Park to Drake Park and Loma Vista Park, Long Beach.	5.9	Under Construction
44	Shoemaker Bridge Replacement Project	Replace Shoemaker Bridge over the Los Angeles River with a new bridge located south of the existing bridge. Alternative 1 (no build), alternative 2 (re-purpose existing bridge for non-motorized transportation and recreational use, and alternative 3 (removal of existing bridge). Alternatives 2 and 3 include street improvements along West Shoreline Dr., 3rd St., 6th St., 7th St., Ocean Blvd., and Broadway Ave. NOP was published April of 2016.	Southern end of I-710, bisected by Los Angeles River, Long Beach	5.9	Environmental Review
45	Mackay Place Specific Plan	Construct 47 detached single-family homes around a central street system. Demolish all on-site buildings, parking lots, and grass and landscaped areas.	East of Walker St. and Delong St. intersection, Cypress	6.0	Planning Phase
46	Monogram Apartments (formerly Pedigo)	Four-story with lofts apartment building: 510 dwelling units, 25,815 sq. ft. public open space, 55,396 sq. ft. private open space, and approximately 5,097 sq. ft. leasing office wrapped around a six-level 862-space parking structure. (5	7262 Edinger Ave., Huntington Beach	6.2	Plan Check

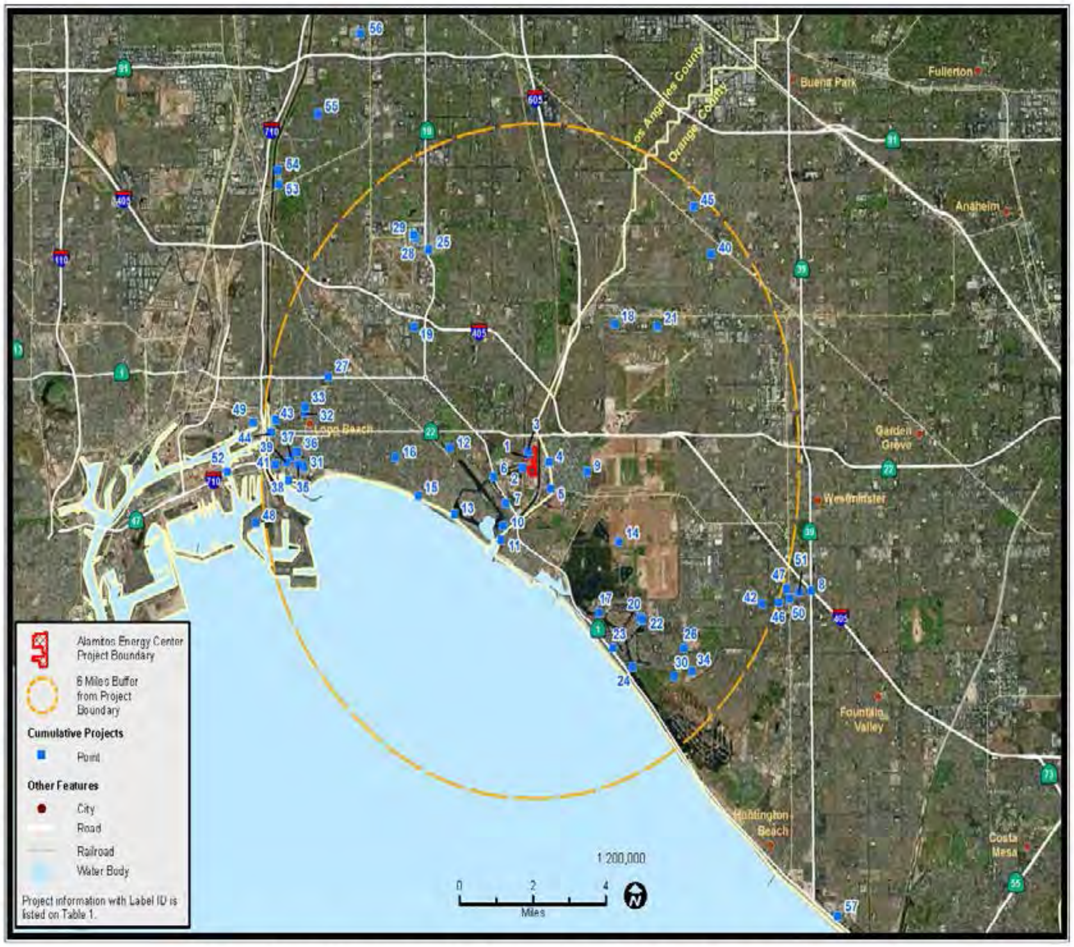
ID #	Project Name	Project Description	Location	Distance to AEC (Miles)	Status
		parcels located at the SW corner of Edinger Ave and Gothard St.)			
47	Huntington Beach Lofts	385 luxury residential units in five residential stories, located above approximately 10,000 square feet of street level retail and commercial uses.	7400 Center Ave., Huntington Beach	6.3	Under Construction
48	Mitsubishi Cement Facility Modification Project	Modify existing cement import facility, including construction of four, 10,000-metric-ton storage and truck loading silos; upgrade existing facilities and ship unloading equipment; and modify operating permit issued by South Coast Air Quality Management District for the facility.	1150 Pier F Ave., Long Beach	6.4	Planning Phase
49	Pacific Crane Maintenance Company Chassis Support Facility Project	Project is a chassis facility for the distribution, storage and maintenance of chassis used to move cargo containers. Facility components include: ingress and egress gates, admin and staff trailers, on-site parking spaces and designated areas for chassis storage, chassis maintenance, parts/miscellaneous storage, and tire support.	1402 Pier B St., Long Beach	6.4	Planning Phase
50	The Boardwalk (Murdy Commons)	Construction of 487 dwelling units and 14,500 sq ft commercial area. First two phases have opened for occupancy.	7461 Edinger Ave., Huntington Beach	6.4	Under Construction
51	The Village at Bella Terra	Planning Commission approved General Plan Amendment No. 10-001, Zoning Text Amendment No. 10-001, and Site Plan Review No. 10-001 for The Village at Bella Terra-Costco Wholesale, facilitating development of a regional commercial big-box retail with gasoline service station and a mixed-use retail and residential project. Construction of 154,113 sq	7777 Edinger Ave., Huntington Beach	6.6	Completed

ID #	Project Name	Project Description	Location	Distance to AEC (Miles)	Status
		ft Costco Wholesale store with tire sales/installation center, 16-pump gas station, and addition of two elevators on west side of the existing public parking structure. Project includes 467 multi-family residential units within four-story building along with approximately 13,500 sq ft of residential amenities, 17,500 sq ft of mixed-use retail and restaurant uses; additional 12,000 sq ft of freestanding retail and restaurants and a 1,920 sq ft pavilion building within landscaped greenbelt area.			
52	Gerald Desmond Bridge Replacement Project	The Gerald Desmond Bridge Replacement Project will provide three lanes in each direction to improve traffic flow, emergency lanes on both sides to reduce traffic delays and safety hazards, and 205 feet of vertical clearance to accommodate the world's largest, "greener" vessels.	Gerald Desmond Bridge, Port of Long Beach	7.0	Under Construction
53	Riverwalk Residential Development Project	Construction of 131 detached single family homes on lots.	4747 Daisy Ave., Long Beach	7.8	Planning Phase
54	Oregon Park	Develop a 3.3-acre lot with a neighborhood park. Proposed improvements would include a regulation soccer field with lights, a tot lot, group picnic area, walking path and prefabricated restrooms. A total of 42 parking spaces would be added and a portion of the public right of way.	4951 Oregon Ave., Long Beach	8.0	Environmental Review
55	North Village Center Redevelopment Project	Project involves redeveloping an approximately 6.3-acre site in Long Beach with a mixed-use “village center” project. Project is a mixed-use “village center” with the following primary	Bounded by South St., Linden Ave., 59th St., and Lime Ave, Long Beach	8.1	In Progress

ID #	Project Name	Project Description	Location	Distance to AEC (Miles)	Status
		components: up to 61 units of multi-family housing in a mix of row houses, courtyard units, and units built atop ground floor non-residential space; up to 36,000 sq ft of commercial retail space, including restaurant space, oriented primarily toward Atlantic Avenue, and; a public library and community center totaling 30,000 sq ft fronting Atlantic Avenue on the east block. A General Plan Amendment and Zoning Ordinance Amendment would be required to allow the proposed mix of uses and density. Parking for the project's residential components of the project would be provided as follows: two spaces per residential unit, and; guest parking to be provided through shared parking with the retail and institutional spaces based on the results of a shared parking analysis. The commercial components of the project would be parked at the shopping center standard of five spaces per 1,000 sq ft.			
56	Weber Metals Large Press Expansion	Proposed project includes expansion of the existing facility through installation of a new 60,000 ton forging press on the property. This proposed building would require an 85-foot deep excavation pit to house the press and a 65-foot high main roof to accommodate the height of the press.	16706 Garfield Ave., Paramount	8.9	Planning Phase
57	Huntington Beach Energy Project	The 2014 Energy Commission licensed project is a natural gas fired, combined cycle, air-cooled 939-MW electrical generating facility. Project would require demolition of existing power plant and	Huntington Beach Generating Station, Huntington Beach	10.9	Licensed 2014. Demo start estimated in the first quarter of 2015 with project completion 7.5 years later in

ID #	Project Name	Project Description	Location	Distance to AEC (Miles)	Status
		construction of project. The 2015 Petition to Amend the 2014 licensed project is a natural gas fired, combined cycle and simple-cycle, air-cooled 844-MW electrical generating facility.			the third quarter of 2022. PTA license submitted to Energy Commission is currently under review. Demo started in the first quarter of 2016 with project completion estimated 10 years later in the fourth quarter of 2025.
AQ-1	U.S Government, Veterans Affairs Medical Center	Stationary emission source with active emission permit	5901 E 7th St., Long Beach	1.4	Active
AQ-2	Trend Offset Printing Services, Inc.	Stationary emission source with active emission permit	3722 Catalina St., Los Alamitos	3.3	Active

EXECUTIVE SUMMARY - FIGURE 1
Alamitos Energy Center - Cumulative Projects



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: OpenStreetMap January 2014, ESRI, Bing Aerial Image

EXECUTIVE SUMMARY

ENVIRONMENTAL JUSTICE

The California Resources Agency recognizes that environmental justice (EJ) communities are commonly identified as those where residents are predominantly minorities or live below the poverty level; where residents have been excluded from the environmental policy setting or decision-making process; where they are subject to a disproportionate impact from one or more environmental hazards; and where residents experience disparate implementation of environmental regulations, requirements, practices, and activities in their communities. Environmental justice efforts attempt to address the inequities of environmental protection in these communities.

An EJ analysis is composed of the following:

- Identification of areas potentially affected by various emissions or impacts from a proposed project;
- Providing notice in appropriate languages (when possible) of the proposed project and opportunities for participation in public workshops to EJ communities;
- A determination of whether there is a significant population of minority persons, or persons below the poverty level living in an area potentially affected by the proposed project; and
- A determination of whether there may be a significant adverse impact on a population of minority persons or persons below the poverty level caused by the proposed project alone, or in combination with other existing and/or planned projects in the area.

California law defines EJ as “the fair treatment of people of all races, cultures and income with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies” (Gov. Code §65040.12; Pub. Resources Code, §§ 71000-71400). All departments, boards, commissions, conservancies and special programs of the Resources Agency must consider EJ in their decision-making process if their actions have an impact on the environment, environmental laws, or policies. Such actions that require EJ consideration may include:

- adopting regulations;
- enforcing environmental laws or regulations;
- making discretionary decisions or taking actions that affect the environment;
- providing funding for activities affecting the environment; and
- interacting with the public on environmental issues.

DEMOGRAPHIC SCREENING ANALYSIS

As part of its CEQA analysis for the Alamitos Energy Center AFC, Energy Commission staff used 2010 U.S. Census data to identify the minority populations and the most recent U.S. Census data from the American Community Survey (ACS) to identify below-poverty level populations within the six-mile radius of the AEC. The demographic screening is based on: Environmental Justice: Guidance Under the National Environmental Policy Act (CEQ, 1997) and Guidance for Incorporating Environmental

Justice Concerns in EPA’s Compliance Analyses (US EPA, 1998), which provides staff with information on outreach and public involvement.

Socioeconomics Figure 1 shows that the presence of an EJ population based on race and ethnicity within the six-mile radius of the AEC site. **Socioeconomics Table 3** shows that the cities of Long Beach and Hawaiian Gardens have a higher percent of people living below the federal poverty level compared with those in the reference geographies of Long Beach-Lakewood Census County Division (CCD), North Coast CCD, and Anaheim-Santa Ana-Garden Grove CCD. Staff concludes that the below-poverty-level population constitutes an EJ population based on poverty. Please refer to the **Socioeconomics** section of this document for a discussion of how staff identifies the presence of EJ populations within the six-mile radius.

Staff in the 11 technical areas of Air Quality, Hazardous Materials Management, Land Use, Noise and Vibration, Public Health, Socioeconomics, Soil and Water Resources, Traffic and Transportation, Transmission Line Safety and Nuisance, Visual Resources, and Waste Management has considered the impacts of the AEC on the EJ population.

ADDITIONAL ENVIRONMENTAL JUSTICE POPULATION CONSIDERATIONS

Final Guidance for Incorporating Environmental Justice Concerns in EPA’s Compliance Analyses (US EPA 1998) encourages outreach to community-based organizations and tribal governments to identify those minority groups who utilize or are dependent upon natural and cultural resources that could be potentially affected by the proposed action. The Public Advisor’s Office is responsible for outreach to local communities affected by a project. Cultural Resources staff initiates consultations with tribal governments to discern whether a proposed energy facility may impact cultural resources and related Native Americans practices.

CONCLUSION

The staff for the topics of Air Quality, Hazardous Materials Management, Noise and Vibration, Soil and Water Resources, Traffic and Transportation, Visual Resources, and Waste Management has proposed conditions of certification to reduce project impacts to less than significant. Therefore, with implementation of these conditions, impacts would be reduced to less than significant for any population in the project’s six-mile radius, including the EJ population.

Land Use, Public Health, and Transmission Line Safety and Nuisance staff concludes that the project impacts related to their technical area would be less than significant and therefore would have a less than significant impact to any population in the project’s six-mile radius, including the EJ population.

REFERENCES

AEC 2015f- Alamitos Energy Center Supplemental AFC (TN 206427-1). Submitted on October 26, 2015. CEC/Docket on October 26, 2015.

CEQ 1997 – Council on Environmental Quality. Environmental Justice: Guidance Under the National Environmental Policy Act. December 10, 1997, <http://www.epa.gov/compliance/ej/resources/policy/ej_guidance_nepa_ceq1297.pdf>.

US EPA 1998 – United States Environmental Protection Agency, Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses. April 1998. <http://www.epa.gov/compliance/ej/resources/policy/ej_guidance_nepa_epa0498.pdf>.

INTRODUCTION

Keith Winstead

PURPOSE OF THIS REPORT

The Preliminary Staff Assessment (PSA) is the California Energy Commission (Energy Commission) staff's independent analysis of the proposed Alamitos Energy Center (AEC). This PSA is a staff document. It is not a Committee document, nor a draft decision. The PSA describes the following:

- the proposed project;
- the existing environment;
- staff's analysis of whether the facilities can be constructed and operated safely and reliably in accordance with applicable laws, ordinances, regulations, and standards (LORS);
- the environmental consequences of the project including potential public health and safety impacts;
- the potential impacts of the project in conjunction with other existing and known planned developments;
- mitigation measures proposed by the applicant, interested agencies, intervenor, city of Long Beach and staff, which may lessen or eliminate potential impacts;
- staff's proposed conditions of certification (conditions) under which the project should be constructed and operated, if it is certified; and
- project alternatives.

Information for the analysis contained in this PSA comes from the following:

- the Application for Certification (AFC) and Supplemental AFC;
- responses to data requests;
- information from the local, state, federal agencies, interested organizations, and individuals;
- existing documents and publications;
- independent research; and
- comments made at public workshops or submitted in writing.

Using the information from above, the PSA presents preliminary conclusions about possible environmental impacts and conformity with LORS, as well as proposed conditions that apply to the design, construction, operation, and closure of the facility. The analyses for most technical sections include discussions of proposed conditions. The conditions contain staff's recommended measures to mitigate the project's environmental impacts and to ensure conformance with LORS. Each proposed condition is followed by a proposed means of verification to ensure the conditions are implemented.

The Energy Commission analysis was prepared in accordance with Public Resources Code section 25500 et seq., Title 20, California Code of Regulations section 1701 et seq., and the California Environmental Quality Act (CEQA) (Pub. Resources Code § 21000 et seq.).

ORGANIZATION OF THE PSA

The PSA starts with an Executive Summary, this Introduction, and a Project Description. The report then discusses 21 environmental and engineering technical sections and potential project alternatives. Finally, the report will conclude with a discussion of facility closure, project demolition, construction, and operation compliance monitoring plans, and a list of staff that assisted in preparing this report.

Each section of the environmental and engineering assessment includes:

- applicable laws, ordinances, regulations and standards (LORS);
- the regional and site-specific setting;
- project specific and cumulative impacts;
- mitigation measures;
- closure requirements;
- conclusions and recommendations;
- conditions of certification for both construction and operation, if applicable.

ENERGY COMMISSION SITING PROCESS

The Energy Commission has the exclusive authority to certify the construction, modification, and operation of thermal electric power plants 50 megawatts (MW) or larger. The Energy Commission certification is in lieu of any permit required by state, regional, or local agencies, and federal agencies to the extent permitted by federal law (Pub. Resources Code, § 25500). The Energy Commission must review thermal power plant applications for certification (AFC) to assess potential environmental impacts including potential impacts to public health and safety, potential measures to mitigate those impacts, and compliance with applicable governmental laws or standards (Pub. Resources Code, § 25519 and § 25523(d)).

The Energy Commission's siting regulations require staff to independently review the AFC, assess whether all of the potential environmental impacts have been properly identified, and whether additional mitigation or other more effective mitigation measures are necessary, feasible, and available (Cal. Code Regs., tit. 20, § 1742). In addition, staff must assess the completeness and adequacy of the measures proposed by the applicant to ensure compliance with health and safety standards and the reliability of power plant operations (Cal. Code Regs., tit. 20, § 1742). Staff is required to develop a compliance plan (coordinated with other agencies) to ensure that applicable laws, ordinances, regulations, and standards are met (Cal. Code Regs., tit. 20, § 1744(b)).

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

Staff prepares a PSA that presents for the applicant, intervenor organizations, agencies, tribes, other interested parties, and members of the public, the staff's analysis, conclusions, and recommendations. Where it is appropriate, the PSA incorporates comments received from agencies, the public, parties to the siting case, and comments made at the workshops.

Staff will provide a 30-day public comment period that follows the publication of the PSA. The comment period is also used to resolve issues between the parties and to narrow the scope of adjudicated issues in preparation for evidentiary hearings to be held later in the process. During this time, Energy Commission staff may conduct one or more workshops to discuss its conclusions, proposed mitigation, and proposed verification measures. Based on the workshop dialogue and any written comments received, staff may refine its analysis, correct any errors, and finalize conditions of certification to reflect any changes agreed to between the parties. Any revisions and all responses to comments received during the comment period will be presented in a Final Staff Assessment (FSA) that will be published and made available to the public and all interested parties.

The FSA is only one piece of evidence that will be considered by the Committee (two Energy Commission Commissioners who have been assigned to this project) in reaching a decision on whether or not to recommend that the full Energy Commission approve the proposed project. At the public evidentiary hearings that follow the FSA, all parties will be afforded an opportunity to present evidence and to rebut the testimony of other parties, thereby creating a hearing record on which a decision on the project can be based. The hearing before the Committee also allows all parties to argue their positions on disputed matters, if any, and it provides a forum for the Committee to receive comments from the public and other governmental agencies.

Following the hearings, the Committee's recommendation to the full Energy Commission on whether or not to approve the proposed project and the mitigation to be imposed, will be contained in a document entitled the Presiding Member's Proposed Decision (PMPD). Following publication, the PMPD is circulated for 30 days in order to receive written public comments. At the conclusion of the comment period, the Committee may prepare a revised PMPD. At the close of the comment period for the revised PMPD, the PMPD is submitted to the full Energy Commission for a decision.

AGENCY COORDINATION

As noted above, the Energy Commission certification is in lieu of any permit required by state, regional, or local agencies and federal agencies to the extent permitted by federal law (Pub. Resources Code, § 25500). However, staff typically seeks comments from, and works closely with, other regulatory agencies that administer LORS that are applicable to proposed projects or have other related expertise. The agencies associated with the AEC include the U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, California Coastal Commission, State Water Resources Control Board/Regional Water Quality Control Board, California Department of Fish and Wildlife, Caltrans, the California Air Resources Board, the South Coast Air Quality Management District, the city of Long Beach, and the Long Beach Fire and Police Departments.

OUTREACH

The Energy Commission's outreach program is primarily facilitated by the Public Adviser's Office (PAO). This is an ongoing process that provides a consistent level of public outreach, regardless of outreach efforts conducted by the applicant or other parties.

LIBRARIES

On January 15, 2014, Energy Commission staff sent the AEC AFC to the Long Beach Main Library; the Los Altos, Brewitt, and Bay Shore branches of the Long Beach Public Library; and the Los Alamitos-Rossmoor Library in Seal Beach. Copies were also provided to state libraries in Eureka, Sacramento, Fresno, San Francisco, Los Angeles and San Diego. On December 14, 2015, the Supplement to the AFC was also sent to the libraries.

INITIAL OUTREACH EFFORTS

The Public Adviser's Office (PAO) reviewed related information available from the applicant and others and then conducted its own, extensive outreach efforts to identify certain local officials, as well as interested entities, within a five-mile radius around the proposed site for the AEC. These entities include schools, as well as business, environmental, governmental, and ethnic organizations. By means of e-mail, the PAO notified these entities of the Informational Hearing and Site Visit for the project, held on April 29, 2014, at Grand Ballroom Recreation Park 18-hole Golf Course in Long Beach.

The PAO also identified and similarly notified local officials with jurisdiction in the project area. Notices directed the public to the website for more information. In addition, the PAO placed notices in the April 19, 2014 issues of the Long Beach Press-Telegram and Impacto USA newspapers announcing the Informational Hearing and Site Visit for this project.

Energy Commission regulations require staff to notice, at a minimum, property owners within 1,000 feet of a project and 500 feet of a linear facility (such as transmission lines, gas lines, and water lines). This was done for the project. Staff's ongoing public and agency coordination activities for this project are discussed under the Public and Agency Coordination heading in the **Executive Summary** section of the PSA.

PROJECT DESCRIPTION

Keith Winstead

INTRODUCTION

On October 26, 2015, AES Southland Development, LLC (AES) submitted a Supplemental Application for Certification (SAFC) (13-AFC-01) to the California Energy Commission for the Alamitos Energy Center AEC) project. The SAFC replaces the original Application for Certification (AFC) filed on December 27, 2013. The AEC would be constructed on the site of the Alamitos Generating Station (AGS), an existing and operating power plant located at 690 North Studebaker Road in the city of Long Beach, California. The new facility would utilize approximately 21 acres of the 71-acre, privately owned brownfield AGS site. The project site is approximately 10 to 15 feet above mean sea level.

The proposed project site is bounded to the north by the SCE switchyard and State Route 22 (East 7th Street); to the east by the San Gabriel River and, beyond that, the Los Angeles Department of Water and Power Haynes Generating Station; to the south by the former Plains West Coast Terminals petroleum storage facility and undeveloped property; and to the west by the Los Cerritos channel, AGS cooling-water canals, and the residences west of the channel. Land use in the region primarily includes urban development, industrial areas, undeveloped land, parklands, open space, and wetlands preserves. The AGS facility was built between 1955 and 1967. The facility included natural gas/oil, steam-turbine power generating units and was originally owned and operated by Southern California Edison (SCE). During the late 1990's, the electric industry was restructured, and SCE sold most of its generating facilities. In 1998, AES Southland purchased AGS from SCE.

AEC as currently proposed, would be a nominal 1,040-megawatt (MW), natural-gas-fired, combined-cycle and simple-cycle, air-cooled electrical generating facility consisting of two power blocks to provide fast starting and stopping, reliable, flexible multistage generating resources. Power Block 1 would consist of two natural-gas-fired combustion turbine, 640-megawatt (MW), generators (CTG) in a combined-cycle configuration (collectively AEC CCGT), with two unfired heat recovery steam generators (HRSG), one steam turbine generator (STG), an air cooled condenser, an auxiliary boiler, and related ancillary equipment. Power Block 2 would consist of four natural gas-fired, simple-cycle CTGs with fin-fan coolers and ancillary facilities (collectively, AEC SCGT) for a nominal 400-MW.

Existing Alamitos Generating Station Units 1–6 are currently in operation with a net generating capacity of 1,950 megawatts. Although AES still intends to demolish all six operating units, the demolition is not part of the proposed AEC project, but would take place through a Memorandum of Understanding with the city of Long Beach after the AEC begins commercial operation. Demolition is expected to occur after 2020. Demolition of retired Unit 7 remaining components is part of the proposed AEC project. Construction activities at the project site are anticipated to last 56 months, from first quarter 2017 until third quarter 2021.

The existing AGS facilities, utilizing once-through cooling. are not under the Commission's jurisdiction and are not directly part of the proposed project before the Commission. Regardless whether the AEC facility is licensed or constructed, these older units are scheduled to be shut down by 2020 under the State Water Resources Control Board phase out of once-through-cooling. The demolition of the older units will be considered as part of the staff's cumulative impacts analysis.

The AEC is proposed to use potable water provided by the city of Long Beach Water Department (LBWD) for construction, operational process, and sanitary uses. This water would be supplied through existing onsite potable water lines.

Construction of the AEC would require the use of onsite laydown areas, approximately 8 acres, dispersed throughout the existing site, and an additional approximately 10-acre laydown area located adjacent to the AGS site south of existing generating Units 5 and 6.

The AEC would interconnect to the existing SCE 230-kilovolt (kV) switchyard adjacent to the northern side of the property. No new offsite natural gas lines would be necessary for the project. AEC would be supplied via the existing service pipeline for AGS Units 5 and 6 from the offsite 30-inch-diameter, high-pressure pipeline owned and operated by SoCalGas. AEC would require a new natural gas metering facility and construction of two new natural gas compressor buildings (one for each power block) within the AEC footprint. Water treatment facilities, emergency services, and administration and maintenance buildings would be constructed within the existing site footprint. Storm water would be discharged into two retention basins and then ultimately to the San Gabriel River via existing storm water outfalls.

The AEC would include a new 1,000 linear-foot process/sanitary wastewater pipeline to the first point of interconnection with the existing LBWD sewer system and would eliminate the current practice of treatment and discharge of process/sanitary wastewater to the San Gabriel River. The upgrading of approximately 4,000 linear feet of the existing offsite LBWD sewer line downstream of the first point of interconnection discussed in the SAFC is no longer necessary and has been removed from the project design.

As described in the SAFC, the AEC CCGT will be located on the southern-most portion of the AEC site, on the former AGS fuel oil-storage site. AEC CCGT would include the following principal design elements:

- Two General Electric (GE) 7FA.05 CTGs with a nominal rating of 227 MW each. The CTGs would be equipped with evaporative coolers on the inlet air system and dry low oxides of nitrogen (NOx) combustors;
- Two HRSGs with no supplemental firing, each equipped with a selective catalytic reduction (SCR) unit in the ductwork for the control of NOx emissions, and an oxidation catalyst to control carbon monoxide (CO) and volatile organic compound (VOC) emissions;
- One, single-flow, impulse, down-exhaust-condensing STG with a nominal rating of approximately 229 MW;

- One air-cooled condenser that would replace the once-through system utilizing ocean water currently used for cooling the AGS and a closed-loop fin-fan cooler;
- A new natural gas compressor and compressor building for the CCGT;
- One generator step-up (GSU) transformer per each GE 7FA gas turbine and one for the steam turbine; and
- One 230-kV interconnection to the existing SCE switchyard, which is adjacent to the site.

The AEC SCGT would be located on the northern portion of the AEC site, adjacent to the San Gabriel River. The AEC SCGT would include the following principal design elements:

- Four GE Energy LMS 100 PB natural gas-fired combustion turbine generators (CTGs) with a nominal rating of 100 MW each;
- Each CTG is equipped with selective catalytic reduction (SCR) equipment containing catalysts to further reduce NOx emissions, and an oxidation catalyst to reduce carbon monoxide (CO) emissions;
- Auxiliary equipment associated with each CTG would include an inlet-air-filter house with evaporative cooler, turbine intercooler and associated intercooler circulating pumps;
- Each pair of CTGs would share one fin-fan heat exchanger and one GSU transformer;
- A new natural gas compressor and compressor building for the SCGT; and
- One 230-kV interconnection to the existing onsite SCE 230-kV switchyard (see Section 3.0, Transmission System Engineering).

The two power blocks would share the following design elements:

- Direct connection to an existing Southern California Gas Company 30-inch-diameter natural gas pipeline and metering station;
- Connection to existing onsite municipal and industrial water lines;
- Fire water and suppression systems;
- A new 1,000-linear-foot process/sanitary wastewater pipeline to the first point of interconnection with the existing LBWD sewer system at the east end of East Vista Street in Long Beach;
- An existing storm water retention pond; and
- Water treatment and storage systems.

ENERGY COMMISSION JURISDICTION

The Energy Commission has exclusive permitting jurisdiction for the siting of thermal power plants of 50 MW or more and related facilities in California. The Energy Commission also has responsibility for ensuring compliance with the California

Environmental Quality Act (CEQA) through the administration of its certified regulatory program and is the lead agency under CEQA.

PROJECT FACILITY FEATURES, DESIGN AND OPERATION

Project Description Figure 1 shows the regional location project site map.

Project Description Figure 2 shows the project boundary, sewer line, & project laydown area**.**

Project Description Figure 3 shows the arrangement and layout of the existing AGS facility. The AGS currently has six operating steam generating units (units 1-6), and one retired unit (unit 7).

Project Description Figure 4 shows the general arrangement and layout of the AEC. Primary access to the AEC is located at the existing entrance at 690 North Studebaker Drive, just south of the State Route CA 22.

MAJOR GENERATING FACILITY COMPONENTS CCGT POWER BLOCK

Combustion Turbine Generators

Natural gas combustion in the CTGs would produce thermal energy, which is converted into mechanical energy required to drive the combustion turbine compressors and two electrical generators. Each CTG system would contain supporting systems and associated auxiliary equipment.

Each combustion turbine would drive a hydrogen-cooled synchronous generator. Each CTG would be equipped with the following systems and components:

- Inlet air filters, inlet silencers, and evaporative coolers
- Metal acoustical enclosure for noise reduction
- Lubrication oil system for the combustion turbine and the generator
- Dry low-NOx combustion system
- Compressor wash system
- Fire detection and protection system (using either carbon dioxide or water mist spray)
- Fuel gas system, including flow meter, strainer, and duplex coalescing filter
- Static starter system
- Turbine controls
- Hydrogen-cooled synchronous generator
- Generator controls, protection, excitation, power system stabilizer, automatic voltage regulator (AVR) and automatic generation control

Heat Recovery Steam Generators

The HRSGs would transfer heat from the exhaust gases of the CTGs to the feedwater to produce, high-pressure, intermediate pressure, and low-pressure steam. Each HRSG is a triple pressure, reheat, natural circulation horizontal unit equipped with inlet and outlet ductwork, insulation, lagging, SCR/CO catalyst assemblies, and exhaust stack. The HRSGs would not employ duct burners.

Condensate would be pumped from the air-cooled condenser receiver tank through the HRSG low temperature economizer to the low-pressure (LP) evaporator and then to the LP steam drums. Steam from the LP drum would flow through superheater sections and then enter the LP section of the steam turbines.

The LP drums would provide suction to the feedwater pumps, which would provide feedwater to the high-pressure (HP) and intermediate pressure (IP) sections of the HRSG. The HP and IP sections each contain economizer sections, evaporator sections, drums and superheater sections. HP superheated steam is furnished to the HP section of the steam turbine. HP turbine exhaust steam, called cold reheat, is sent back to the HRSG where it is reheated in the HRSG reheater section, combined with the HRSG superheater IP steam, and then is sent to the steam turbine IP section. Attemperation would be provided upstream of all final HRSG superheater sections to control the steam temperature to the steam turbine.

Steam Turbine System

The steam turbine system consists of a condensing steam turbine, gland steam seal system, lubricating oil system, hydraulic control system, and steam admission/induction valves.

The steam turbine is a triple pressure, reheat, side exhaust turbine with a totally enclosed water to air-cooled generator. Turbine configuration is a single combined high-pressure/intermediate pressure casing and a single double flow low-pressure turbine. Steam is admitted through a combined main steam stop/control valve and a combined reheat stop/control valve. A separate LP steam induction point is also provided. Standard acoustical enclosures are provided for the HP/IP section and the generator.

MAJOR GENERATING FACILITY COMPONENTS SCGT POWER BLOCK

Combustion Turbine Generators

Natural gas combustion in the CTGs would produce thermal energy, which is converted into mechanical energy required to drive the combustion turbine compressors and electrical generators. Each CTG system would contain supporting systems and associated auxiliary equipment.

The combustion turbine would drive an air-cooled, 3-phase, 2-pole synchronous generator.

The CTGs would be equipped with the following systems and components:

- Inlet air filters, and evaporative coolers
- Intercooler
- Weather proof acoustical enclosure for noise reduction
- Lubrication oil system for the combustion turbine and the generator
- Dry low-NO_x combustion system
- Oxidation catalyst and SCR emissions control systems
- Compressor wash system
- Fire detection and protection system (using carbon dioxide)
- Fuel gas system, including strainer, and duplex filter
- Starter system
- Fire Protection System
- Turbine controls
- Generator controls, protection, excitation, power system stabilizer, and automatic generation control for each generator

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SITE ARRANGEMENT AND LAYOUT

Primary access to the AEC site would be provided via the existing main entrance off of North Studebaker Road, north of the intersection of Westminster Avenue. The 71-acre AGS parcel is bounded to the north by the SCE switchyard and State Route CA 22 (East 7th Street); to the east by the San Gabriel River and, beyond that, the Los Angeles Department of Water and Power Haynes Generating Station; to the south by the former Plains West Coast Terminals petroleum storage facility and undeveloped property; and to the west by the Los Cerritos channel, AGS cooling-water canals, and the residences west of the channel.

The existing AGS currently has six operating generating units (Units 1 through 6). Units 1, 2, and 5 would be retired once the AEC CCGT reaches the commissioning stage of development and becomes operational. The remaining units will retire consistent with the OTC regulations and local reliability needs. The existing plant has various ancillary facilities that would be used to support the AEC, such as the administration, maintenance, and certain warehouse buildings; existing SoCalGas natural gas pipeline; LBWD water connections; the southernmost existing stormwater retention pond and outfalls; and the existing SCE switchyard. Other existing infrastructure at the AGS, such as fire water distribution, including two emergency electric-driven fire water pumps and process water distribution and storage systems, would be reused to the greatest extent possible.

MAJOR ELECTRICAL EQUIPMENT AND SYSTEMS

Major Electrical Equipment and Systems CCGT Block

Electric power produced by the AEC CCGT blocks would be transmitted to the electrical grid through the 230-kV generation tie line connecting the project to the existing onsite

SCE switchyard. A small amount of electric station power would be used onsite to power auxiliaries such as gas compressors, pumps and fans, control systems, and general facility loads including lighting, heating, and air conditioning. A station battery system also would be used to provide direct current (DC) voltage as backup power for control systems and other critical uses. Transmission and auxiliary uses are discussed in the following subsections.

Major Electrical Equipment and Systems SCGT Power Block

The SCGT power block would consist of two sets of two CTGs operating at 13.8 kV and connected to a three-winding GSU transformer by way of isolated-phase bus duct. Each CTG would have a 13.8-kV generator circuit breaker located in-line in the isolated-phase bus duct to synchronize the CTG to the grid during startup. Each GSU transformer would step the output voltage of two CTGs to 230 kV for transmission to the grid. Each of the two GSU transformers would be connected to a 230-kV collector bus through 230-kV gas circuit breakers. The collector bus includes a 230-kV line disconnect switch to isolate the collector bus from the transmission system.

Surge arresters would be provided at the high-voltage bushings of the GSU transformers to protect from surges on the 230-kV system caused by lightning strikes or other system disturbances. The transformers would be set on concrete pads within berms designed to contain transformer oil in the event of a leak or spill.

Plant Cooling Systems

The California State Water Resources Control Board's (SWRCB) *Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling (policy)* adopted on May 4, 2010, regulates the use of seawater for power generation plants utilizing the once-through-cooled (OTC) method. This requires AGS to cease or greatly reduce OTC impacts by December 31, 2020.

CCGT Plant Cooling

The steam turbine cycle heat rejection system would consist of an air-cooled condenser, which would eliminate the need for ocean water for once-through cooling. The heat rejection system would receive exhaust steam from the low-pressure section of the steam turbine and condense it to water (condensate) for reuse. The condenser would be designed to operate at a pressure of approximately 1.8 pounds per square inch absolute during base load operation at summer design conditions of 89°F dry bulb and 70°F wet bulb. It would transfer approximately 1,300 MMBtu/hr to the ambient air as a result of condensing steam at these operating conditions.

Balance of plant systems would be cooled by closed-loop fluid coolers using water. CTG, STG, gas compressors, and other balance-of-plant auxiliary equipment requiring cooling would be integrated into the closed cooling water loop.

SCGT Plant Cooling

The simple-cycle heat rejection system would consist of one air-cooled closed loop fluid cooler per two CTGs to reject waste heat from the intercooler and other gas turbine auxiliaries. Each cooler would reject approximately 222 MMBtu/hr to the ambient air.

Water Supply and Use

The AEC would use water provided by the LBWD for process and potable uses. The project would continue to use the existing water main connection along Studebaker Road.

Plant makeup water would be fed directly from LBWD service connections through metering equipment into the new service water tank. A new 340,000-gallon deionized water tank would be added to the project to provide operational service water storage.

AEC Summary Water Requirements

For the site average ambient conditions, AEC would use approximately 68 gpm and the maximum water consumption at the highest ambient conditions, water use would be 357 gpm. The maximum annual AEC water consumption would be 130 acre-feet per year.

Stormwater Drainage System

Stormwater that falls within process equipment containment areas would be collected and discharged to a process drain system, which would consist of oil/water separators, sump, and a retention basin. Stormwater that falls within the plant in pavement area and outside the process equipment containment areas would either percolate directly into the soil or drain over the surface and be directed into the retention basin to assist with the removal of suspended solids. The stormwater collected in the retention basin would be discharged through the existing outfalls. The residual oil containing sludge collected in the oil/water separation tanks would be collected via vacuum truck and disposed of as hazardous waste. The water balance diagrams show the expected wastewater streams.

FIRE PROTECTION

The existing fire protection system would be modified for the AEC and the rest of the AGS site and equipment to meet all LORS while reusing existing equipment to the maximum extent possible. The system design would protect personnel and limit property loss and plant downtime in the event of a fire. The primary source of fire protection water would be a connection to the existing water distribution system. A new 8-inch onsite fire water loop and hydrants would be constructed around each of the new power blocks and tied into existing onsite firewater hydrant lines. No new offsite linears would be needed for fire protection.

The secondary source of fire protection water would be the 600,000-gallon service water storage tank, which would provide 2 hours of protection for the onsite worst-case single fire.

Two existing electric fire pumps, connected to two independent power feeds from the SCE distribution system, would pump water from the onsite storage tank. Fire protection water from the existing water supply connection and service water storage tank would be provided to a dedicated underground fire loop piping system. Fixed fire-suppression systems would be installed at determined fire risk areas. Sprinkler systems also would be installed in the administration and maintenance buildings as required by NFPA and local code requirements. The CTG units would be protected by a carbon dioxide fire protection system. Hand-held fire extinguishers of the appropriate size and rating would be located in accordance with NFPA 10 throughout the facility. Please refer to the **Worker Safety and Fire Protection** and **Socioeconomics** sections of this PSA for more specifics related to fire response and emergency services for the AEC demolition, construction and operation.

HAZARDOUS MATERIALS

There would be a variety of hazardous materials used and stored during demolition, construction, and operation of the project. The storage, handling and use of all chemicals would be conducted in accordance with applicable laws, ordinances, regulations and standards (LORS). Hazardous materials that would be used during demolition and construction include gasoline, diesel fuel, oil, lubricants, solvents and paints. All hazardous materials used during demolition, construction and operation would be stored on site in storage tanks, vessels and containers specifically designed for the characteristics of the materials to be stored; when appropriate, the storage facilities would include secondary containment in case of tank/vessel failure. The **Hazardous Materials Management** section of this PSA provides additional data on the hazardous materials that would be used during demolition, construction and operation, including quantities, associated hazards and permissible exposure limits, storage methods, and special handling precautions.

EMISSIONS CONTROL AND MONITORING

Air emissions from the combustion of natural gas in the CTGs and auxiliary boiler would be controlled using state-of-the-art systems. To ensure that the systems perform correctly, continuous emission monitoring of stack exhaust flow rate, temperature, oxygen, NO_X, and CO would be performed as well as the natural gas heat input, generator output, and ammonia injection rate into the pollution control system. To ensure that the system performs correctly, continuous emission monitoring would include stack exhaust flow rate, temperature, oxygen, NO_x and carbon monoxide, as well as the natural gas heat input, generator output, and ammonia injection rate into the pollution control system as required by the South Coast Air Quality Management District (SCAQMD). The **Air Quality** section of this PSA discusses in detail the anticipated emissions resulting from project demolition, construction, and operation, the types of equipment proposed to limit emissions, as well as mitigation measures that would ensure emissions are at levels consistent with required LORS.

WASTE MANAGEMENT

Waste Management is the process whereby all wastes produced at the project site are properly collected, treated (if necessary), and disposed. Wastes include process and sanitary wastewater, nonhazardous waste, and hazardous waste, both liquid and solid. The AEC waste would include oily rags, broken and rusted metal and machine parts, defective or broken electrical materials, empty containers, and other solid wastes, including the typical municipal refuse generated by workers. The **Waste Management** section of this PSA details the types of waste generated by the project and the process by which both hazardous and nonhazardous wastes from project demolition, construction, and operation would be appropriately stored, transferred and disposed.

PROJECT CONSTRUCTION SCHEDULE

If the Energy Commission approves the AEC AFC, construction activities at the project site are anticipated to last approximately 57 months, from the first quarter of 2017 to the third quarter of 2021. All construction equipment and supplies would be trucked directly to the project site laydown areas. **Project Description Figure 4** shows the simulated site appearance for the proposed aboveground facilities, laydown area and parking for the proposed AEC.

If approved, the AEC would include the following principal schedule elements:

- Begin Site Preparation – Q1, 2017
- Begin Construction of CCGT Power Block – Q2, 2017
- Commercial Operation of CCGT – Q1 2020
- Begin Construction of SCGT Power Block – Q2, 2020
- Commercial Operation of SCGT – Q3, 2021.

For the CCGT, there would be an average and peak workforce of approximately 182 and 306, respectively, of construction craft people, supervisory, support, and construction management personnel onsite during construction. Peak workforce would occur in July 2019 (month 26).

For the SCGT, there would be an average and peak workforce of approximately 222 and 512, respectively, of construction craft people, supervisory, support, and construction management personnel onsite during construction. Peak workforce would occur in January 2021 (month 44).

The construction plan is based on a single shift composed of a 10-hour workday, Monday through Friday, and a single 8-hour shift on Saturday. Construction would typically take place between the hours of 7:00 a.m. and 7:00 p.m., Monday through Friday, and 9:00 a.m. and 6:00 p.m. on Saturday, consistent with City of Long Beach ordinances. Overtime and additional shift work may be used to maintain the construction schedule or to complete critical construction activities (for example, pouring concrete at night during hot weather, working around time-critical shutdowns and constraints). During the commissioning and startup phase of each of the power blocks, some activities may continue 24 hours per day, 7 days per week.

REFERENCES

AEC 2013a – Alamitos Energy Center (TN 201620-1 to -72) Application for Certification Volume 1 & 2, dated December 27, 2013. Submitted to CEC/Docket Unit on December 27, 2013.

AEC 2014a – Alamitos Energy Center (TN 201751) Data Adequacy Supplement dated February 17, 2014. Submitted to CEC/Docket Unit on February 17, 2014

AEC 2014b – Alamitos Energy Center (TN 202381) Data Response Set 1A dated May 27, 2014. Submitted to CEC/Dockets Unit on May 27, 2014.

AEC 2015a- Alamitos Suppl. AFC Appendix 1-B 1000 of AEC (TN 206427-6) Submitted on October 26, 2015. CEC/Docket Unit on October 26, 2015.

AEC 2015b- Alamitos Suppl. AFC Appendix 1-B 500 of sewer Line (TN 206427-5). Submitted on October 26, 2015. CEC/ Docket on October 26, 2015.

AEC 2015c- Alamitos Suppl. AFC Appendices 5.10 to 5.15A (TN 206427-4). Docket on October 26, 2015. CEC/Docket Unit on October 26, 2015.

AEC 2015d- Alamitos Suppl. AFC Appendices 5.1G to 5.10B (TN 206427-3). Submitted on October 26, 2015. CEC/Docket on October 26, 2015.

AEC 2015e- Alamitos Suppl. AFC Appendices 1A to 5.1F (TN 206427-2). Submitted on October 26, 2015. CEC/ Docket on October 26, 2015.

AEC 2015f- Alamitos Energy Center Supplemental AFC (TN 206427-1). Submitted on October 26, 2015. CEC/Docket on October 26, 2015.

AEC 2015g- Alamitos Suppl. AFC Appendices 5.1G to 5.10B (TN 206428-3). Submitted on October 26, 2015. CEC/Docket on October 26, 2015.

AEC 2015h- Alamitos Suppl. AFC Appendices 1A to 5.1F (TN 206428-2). Submitted on October 26, 2015. CEC/Docket on October 26, 2015.

AEC 2015i- Alamitos Energy Center Supplemental AFC (TN 206428-1). Submitted on October 26, 2015. CEC/ Docket on October 26, 2015.

AEC 2015j- SAFC Cultural Resources Figure 5.3-1. Figure 5.3-1 (TN 206505). Submitted on November 3, 2015. CEC/Docket Unit on November 3,2015.

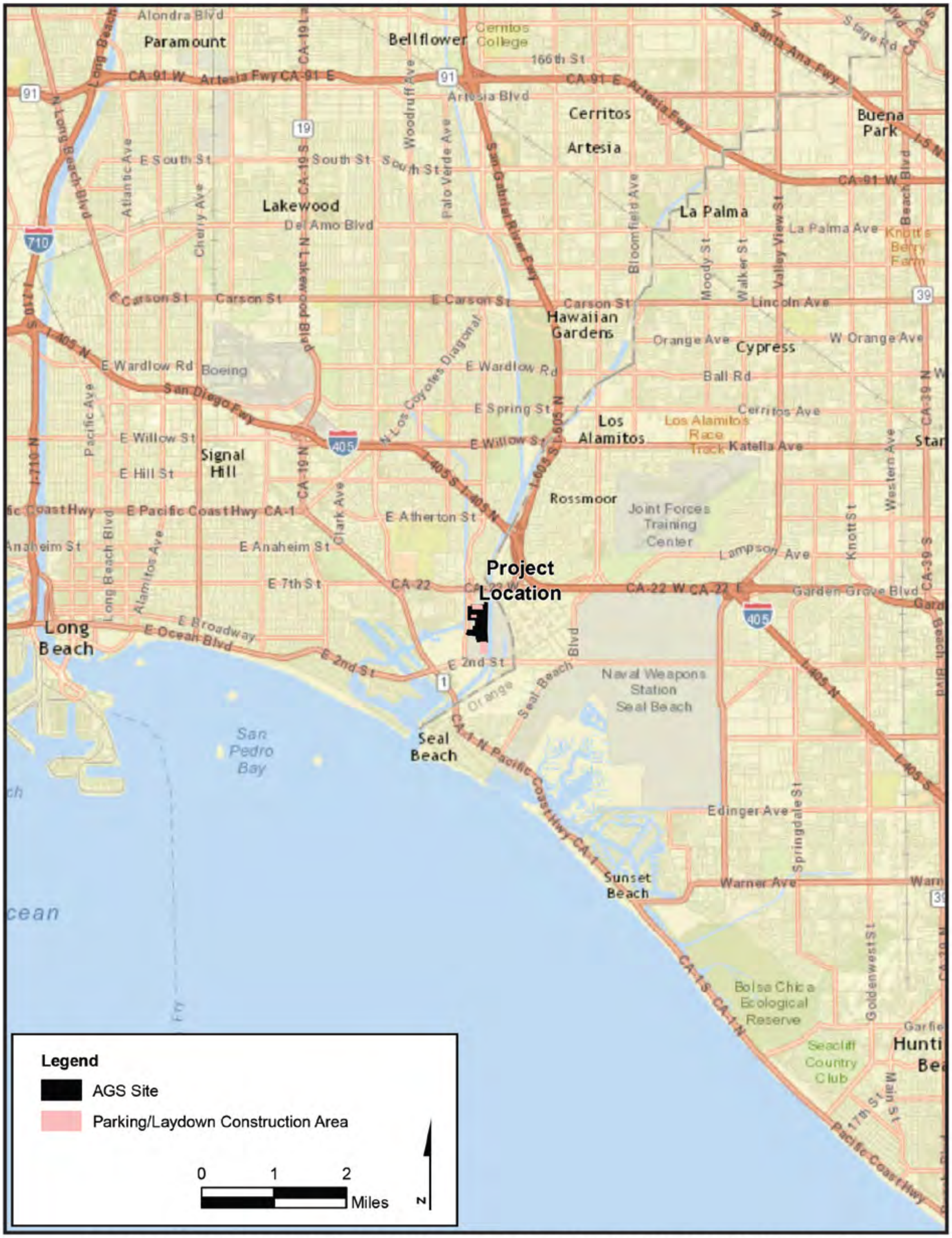
AEC 2015k- Alamitos Suppl. AFC Appendix 1-B 500' of Sewer Line TN 206427-5) Submitted on October 26, 2015. CEC/Docket on October 26, 2015.

AEC 2015l- Alamitos Suppl. AFC Appendix 1-B 1000' of AEC (TN 204627-6) Submitted on October 26, 2015. CEC/Docket on October 26, 2015.

AEC 2015s- Alamitos Data Response Set 6 (TN 207013) dated December 14, 2015. Submitted on CEC/Docket on December 14, 2015.

CEC 2016k- Alamitos Energy Center Status Report 15 (TN 210341) dated February 16, 2016. Submitted to CEC/Dockets on February 16, 2016

PROJECT DESCRIPTION - FIGURE 1
Alamitos Energy Center - Regional Location Map



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: AFC, Volume 1, Figure 1 1-2, December 2013, Ch2MHill

PROJECT DESCRIPTION

PROJECT DESCRIPTION - FIGURE 2
Alamitos Energy Center - Project Boundry and Sewer Lines

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: Ch2MHill Figure 1.1-3

PROJECT DESCRIPTION

PROJECT DESCRIPTION - FIGURE 3
Alamitos Energy Center - Existing View

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: AFC, Volume 1, Figure 11-4, December 2013, Ch2MHill

PROJECT DESCRIPTION - FIGURE 4
Alamitos Energy Center - Simulated View

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: AFC, Volume 1, Figure 1 1-1, December 2013, Ch2MHill

AIR QUALITY

Nancy Fletcher

SUMMARY OF CONCLUSIONS

Staff concludes that the proposed Alamitos Energy Center (AEC or project) does not comply with all applicable laws, ordinances, regulations and standards (LORS) or with California Environmental Quality Act (CEQA) requirements because offset credits for SO2 have not been identified and proper noticing of the proposed project to parents of nearby school children has not yet been completed. Once these two items are addressed, Staff concludes that with the adoption of the attached conditions of certification, the proposed AEC would not result in significant air quality related impacts during project construction or operation, and that the AEC would comply with all applicable federal, state and South Coast Air Quality Management District (SCAQMD or District) air quality LORS.

Staff concludes that prior to approval the AEC would be required to demonstrate the project air quality impacts would be completely mitigated to below significant levels. The project owner has currently not identified the source of the SO_2 mitigation. If emission reduction credits (ERCs) are used for mitigation the credits need to be enforceable, permanent, quantifiable, real and surplus. The source of mitigation needs to be identified to allow comment prior to project approval.

In addition, public noticing is required for any new or modified equipment that may emit air contaminants within 1,000 feet from the outer boundary of a school. Distribution of public notice to the parents or legal guardians of students in any school within a ¼ mile of the facility and to all addresses within 1,000 feet from the outer property line is required. Documentation of compliance with Health and Safety Code §42301.6 and SCAQMD Rule 212(c)(1) and 212(c)(2) is required prior to project approval. Documentation of compliance includes post office receipts, mail service receipts, distribution service invoices or other methods approved by the SCAQMD. If the notice is distributed by the school, a short letter (on school letterhead and signed by a school official) confirming distribution and the date of distribution.

In addition staff is recommending minor modification to the language in Condition of Certification **AQ-C1** as written by the SCAQMD. Condition of Certification **AQ-C1** proposes separate limits for hot and warm startup events for the proposed combined-cycle turbines. However, the emission limits and durations are identical. Staff recommends combining the warm and hot start up events to a single warm/hot startup category. In addition the limits on the number of hot and warm startup events could be combined for additional flexibility and streamlined compliance monitoring.

Staff concludes that mitigation for operations would be provided in the form of Regional Clean Air Incentives Market (RECLAIM) Trading Credits (RTCs) and ERCs to fully mitigate emissions of all nonattainment pollutants and their precursors at a minimum ratio of one-to-one. These mitigation measures are expected to reduce potential operational impacts of the proposed project to less than significant.

Staff has assessed the potential for localized impacts and regional impacts for the project's proposed construction, commissioning, and operation. Staff is recommending mitigation and monitoring requirements sufficient to reduce potential adverse construction, commissioning, and operating emission impacts to less than significant.

Staff has considered the potential for adverse air quality impacts to the minority population surrounding the site. The adoption of the recommended conditions of certification is expected to reduce the project's direct and cumulative air quality impacts to less than significant. The included cumulative analysis is based on information the applicant confirmed for the original application. This information will be updated if necessary for the Final Staff Assessment (FSA). However, the project is not expected to result in a significant or adverse impact to an identified environmental justice population.

Global climate change and greenhouse gas emissions from the proposed project are discussed and analyzed in AIR QUALITY APPENDIX AIR-1. The project owner expects to operate the proposed gas turbines below an annualized plant capacity factor of 60 percent. Therefore the proposed plant would not be considered a base load facility and the turbines would not be subject to the Greenhouse Gases Emission Performance Standard

The California Air Resources Board (ARB) adopted regulations implementing cap-and-trade regulations on December 22, 2011. The cap-and-trade program became active in January 2012, with enforcement beginning in January 2013. ARB staff continues to develop and implement regulations to refine key elements of the Greenhouse Gases (GHG) reduction measures to improve their linkage with other GHG reduction programs. The proposed facility modifications are expected to be subject to federal and state mandatory GHG reporting and state cap-and-trade requirements. The project would emit over 25,000 metric tonnes of carbon dioxide equivalent ($MTCO_2e$) emissions and therefore would be subject to mandatory state and federal GHG reporting requirements. A full discussion of the GHG emissions is included as Appendix AQ-1.

INTRODUCTION

On December 27, 2014, AES Southland Development, LLC (AES-SD) submitted an Application for Certification (AFC) to construct and operate a combined cycle generating facility. Due to changes in the project design, AES Alamitos Energy-LLC (AES) submitted a Supplemental Application for Certification (SAFC) for a combined cycle Power Block 1 and simple cycle Power Block 2 electrical generating facility on October 26th 2015.

This analysis evaluates the expected air quality impacts of criteria air pollutant emissions from the demolition, construction and operation associated with the proposed AEC.

Criteria air pollutants are defined as air contaminants for which the state and/or federal government has established an ambient air quality standard to protect public health. The criteria pollutants analyzed are nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), ozone (O_3), inhalable particulate matter (PM10), and fine particulate matter (PM2.5). In addition, nitrogen oxides (NOx, consisting primarily of nitric oxide [NO] and NO_2), sulfur oxides (SOx) and volatile organic compounds (VOC) are also analyzed. NOx and VOC readily react in the atmosphere as precursors to ozone. NOx and SOx emissions also readily react in the atmosphere to form particulate matter, and are major contributors to acid rain. Global climate change and greenhouse gas (GHG) emissions from the project are discussed and analyzed in the context of cumulative impacts (AIR QUALITY APPENDIX AIR-1).

In carrying out this analysis, the California Energy Commission (Energy Commission) staff evaluated the following major points:

- Whether the AEC is likely to conform with applicable federal, state, and SCAQMD air quality laws, ordinances, regulations and standards (Title 20, California Code of Regulations, section 1742 (d));
- Whether the AEC is likely to cause significant air quality impacts, including new violations of ambient air quality standards, or make substantial contributions to existing violations of those standards (Title 20, California Code of Regulations, section 1744.5); and
- Whether the mitigation measures proposed for AEC are adequate to lessen the potential impacts to a level of insignificance (Title 20, California Code of Regulations, section 1742 (b)).

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

The following federal, state, and local LORS and policies pertain to the control of criteria pollutant emissions and the mitigation of air quality impacts. Staff's analysis describes or evaluates the proposed facility's compliance with these requirements, shown in **Air Quality Table 1**. Additional analysis of AEC's compliance with these LORS is included in the **Compliance with LORS** section.

Air Quality Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law or Regulation	Description
Federal	**U.S. Environmental Protection Agency**
Title 40 Code of Federal Regulations (CFR) Part 50 (National Primary and Secondary Ambient Air Quality Standards)	National Ambient Air Quality Standards (NAAQS) are set in this part. NAAQS define levels of air quality that are necessary to protect public health.
Title 40 CFR Part 51 (Requirements for Preparation Adoption and Submittal of Implementation Plans)	Requires new source review (NSR) facility permitting for construction or modification of specified stationary sources. NSR applies to sources of designated nonattainment pollutants. This requirement is addressed through SCAQMD Regulation XIII.

Applicable Law or Regulation	Description
Title 40 CFR Part 52 (Approval and Promulgation of Implementation Plans)	Prevention of Significant Deterioration–Establishes requirements for attainment emissions. PSD requirements apply on a pollutant specific basis for major stationary sources. Twenty-eight source categories are subject to PSD requirements for attainment pollutants if facility annual emissions exceed 100 tons per year. SCAQMD has partial delegation of PSD authority from the United States Environmental Protection Agency (U.S. EPA) depending on the calculation methodology and plant wide applicability limits.
Title 40 CFR Part 60, Subpart A (General Provisions)	Outlines general requirements for facilities subject to standards of performance including, notification, work practice, monitoring and testing requirements.
Title 40 CFR Part 60, Subpart Dc (Standards of Performance for Small Industrial Commercial Institutional Steam generating Units)	Establishes new source performance standards (NSPS) for steam generating units with heat input rates between 10 and 100 MMBtu/hr. The auxiliary boiler would be subject to the requirements and fuel records would need to be retained.
Title 40 CFR Part 60, Subpart KKKK (Standards of Performance for Stationary Combustion Turbines)	Establishes NSPS for new combustion turbines and the associated HRSG and duct burners. NOx emissions are limited to 15 parts per million (ppm) at 15 percent oxygen (O_2) and fuel sulfur limit of 0.060 pounds (lbs) of SOx per MMBtu heat input.
Title 40 CFR Part 60, Subpart TTTT (Standards of Performance for Greenhouse Gas Emissions for electrical Generating Units)	Establishes standards of performance for carbon dioxide (CO_2). Affected base load electric generating units are subject to a gross energy output standard of 1,000 lbs of CO_2 per megawatt hour (MWh).
Title 40 CFR Part 63 (National Emission Standards for Hazardous Air Pollutants)	Establishes National Emission Standards for Hazardous Air Pollutants (NESHAPS). The proposed AEC would not exceed the major source thresholds for hazardous air pollutants (HAPs) (10 tons per year for any one pollutant or 25 tons per year for HAPs combined). In additional this project does not include any stationary reciprocating internal combustion engines.
Title 40 CFR Part 64 (Compliance Assurance Monitoring)	Compliance Assurance Monitoring (CAM) establishes operation and maintenance requirements for emission control systems. The proposed emission control system would require continuous emission monitoring under a Title V permits and are therefore exempt from the requirements.
Title 40 CFR Part 68 (Chemical Accident Prevention Provisions)	The proposed project would be exempt from this requirement. The proposed project would be subject to California's Accidental Release Prevention Program for aqueous ammonia storage and use.
Title 40 CFR Part 70 (State Operating Permit Programs) 42 USC 7661-7661 (Permits)	The proposed project would be considered a federal major source and subject to the Title V Operating Permit Program. Title V permits consolidate federally enforceable operating limits. AEC would exceed major source thresholds and a Title V permit would be required. AEC has submitted an application to modify the existing Title V permit. The Title V program is within the jurisdiction of the SCAQMD with U.S. EPA oversight [SCAQMD Regulation XXX].
Title 40 CFR Part 72 (Permits Regulation)	Electrical generating units greater than 25 megawatts (MW) are subject to the provisions involving NOx and SO_2 reductions. Requires a Title IV permit and compliance with acid rain provisions, implemented through the Title V program. This program is within the jurisdiction of the SCAQMD with U.S. EPA oversight
State	**California Air Resources Board and Energy Commission**
California Health & Safety Code (H&SC) §21080, 39619.8, 40440.14	Requires the executive officer of the SCAQMD, upon making a specified finding, to transfer emission reduction credits for certain pollutants from the SCAQMD's internal emission credit accounts to

Applicable Law or Regulation	Description
(AB 1318)	eligible electrical generating facilities
H&SC §40910-40930 (District Plans to Attain State Ambient Air Quality Standards)	State Ambient Air Quality Standards should be achieved and maintained. The permitting of the source needs to be consistent with the approved clean air plan. The SCAQMD New Source Review (NSR) program needs to be consistent with regional air quality management plans.
H&SC §41700 (Nuisance Regulation)	Prohibits discharge of such quantities of air contaminants that cause injury, detriment, nuisance, or annoyance.
H&SC §44300-44384 (Air Toxic "Hot Spots" Information and Assessment)	Requires preparation and biennial updating of facility emission inventory of hazardous substances; health risk assessments. The SCAQMD requires participation in a district level inventory and reporting program.
California Public Resources Code §25523(a); 2300-2309 (CEC & ARB Memorandum of Understanding)	Requires that an Energy Commission Decision on a proposed Application for Certification include requirements to assure protection of environmental quality.
Title 13 California Code of Regulations (CCR), §2449 (General Requirements for In-Use Off-Road Diesel Fueled Fleets)	In-Use Off-road Diesel Vehicle Regulation. Imposes idling limits of five minutes, requires a plan for emissions reductions for medium to large fleets, requires all vehicles with engines greater than 25 horsepower (hp) to be reported to the ARB and labeled, and restricts adding older vehicles into fleets.
Title 17 CCR, Subchapter 10 (Climate Change)	Established requirements for mandatory greenhouse gas reporting, verification and other requirements pursuant to cap and trade regulations.
Title 20 CCR, §2900-2913 (Provisions Applicable to Power Plants 10 MW and Larger)	Establishes the greenhouse gases emission performance standard (EPS), applicable to 10 megawatts (MW) and larger power plants. (SB1368)
Local	**South Coast Air Quality Management District**
Regulation II – Permits	This regulation sets forth the regulatory framework of the application for issuance of construction and operation permits for new, altered and existing equipment. **Rule 201 –** Permit to Construct. Established procedures for the review of new and modified emission sources through the issuance of permits. No further analysis necessary. **Rule 201.1** – Permit Conditions in Federally Issued Permits to Construct. Establishes requirements for federal permits. No further analysis necessary. **Rule 212 –** Standards for Approving Permits and Issuing Public Notice. Outlines specific criteria for approving permits and issuing public notice. Includes requirements for RECLAIM facilities. **Rule 218 –** Continuous Emission Monitoring. Requires specified facilities to install and maintain stack monitoring systems. The proposed project would be required to install and maintain stack monitoring systems by permit condition. Per Rule 2001, RECLAIM facilities for NOx and SOx are exempt from NOx and SOx requirements.
Regulation III – Fees	**Rule 301 –** Permitting and Associated Fees. Establishes application fees for the SCAQMD.
Regulation IV – Prohibitions	This regulation sets forth the restrictions for visible emissions, odor, nuisance, fugitive dust, various air emissions, and fuel contaminants. This regulation also specifies additional performance standards for specific emission units. **Rule 401 –** Visible Emissions. Establishes limits on visible emissions from stationary sources. **Rule 402 –** Nuisance. Prohibits the discharge of air contaminants

Applicable Law or Regulation	Description
	or other material which could cause injury, detriment, nuisance or annoyance to the public or could damage business or property. **Rule 403 –** Fugitive Dust. Establishes requirements for controlling man-made fugitive dust. The provisions apply to any activity of man-made condition capable of generating fugitive dust. **Rule 404 –** Particulate Matter -Concentration. Specifies standards for particulate matter emission concentrations based on exhaust flow rate. This rule is not applicable to emissions from the combustion of gaseous fuels in steam generators or combustion turbines. **Rule 407 –** Liquid and Gaseous Contaminants. Limits emissions of CO and sulfur compounds calculated as sulfur dioxide (SO_2) from stationary sources. **Rule 408 –** Circumvention. Prohibits hidden or secondary rule violations. No further analysis required. **Rule 409 –** Combustion Contaminants. Limits total particulate emissions on a density basis. **Rule 429 –** Start-Up and Shutdown Exemption Provisions for Oxides of Nitrogen. Establishes limited exemptions during start up and shutdown and establishes record-keeping provisions. Per Rule 2001, RECLAIM facilities for NOx and SOx are exempt from NOx and SOx requirements. **Rule 430 –** Breakdown Provisions. Requires the reporting of breakdowns and excess emissions. Per Rule 2001, RECLAIM facilities for NOx and SOx are exempt from NOx and SOx requirements. **Rule 431.1 –** Sulfur Content of Gaseous Fuels. Limits sulfur content in gaseous fuels to reduce SOx emissions. **Rule 474 –**Fuel Burning Equipment –Oxides of Nitrogen. Establishes limits for NOx emissions from stationary sources. Per Rule 2001, RECLAIM facilities for NOx and SOx are exempt from NOx and SOx requirements. **Rule 475 –** Electric Power Generating Equipment. Limits combustion contaminant (PM10) emissions from any equipment with a maximum rating of more than 10 MW used to produce electric power. Combustion contaminants are limited to 11 pounds per hour and 0.01 grains per dry standard cubic feet (gr/dscf) calculated at 3 percent O_2 over 15 consecutive minutes. Per Rule 2001, RECLAIM facilities for NOx and SOx are exempt from NOx and SOx requirements. **Rule 476 -** Steam Generating Equipment. Limits NOx and particulate matter and specifies monitoring and recordkeeping from steam generating equipment with heat input ratings over 50 MMBtu/hr.
Regulation IX: Standards of Performance for New Stationary Sources (NSPS)	Adopts national standards of performance provisions from Part 60 in the CFR for specific source categories. Establishes the SCAQMD as the Administrator for specific source standards of performance.
Regulation X: National Emission Standards for Hazardous Air Pollutants (NESHAPS)	Adopts national emission standards for hazardous air pollutants from Part 63 in the CFR for specific source categories. Establishes the SCAQMD as the Administrator for specific source standards.
Regulation XI: Source Specific Standards	Establishes requirements for specific source categories. **Rule 1134 –** Emissions of Oxides of Nitrogen from Stationary Gas Turbines. Establishes NOx limits and monitoring and testing requirements for applicable gas turbines. Per Rule 2001, RECLAIM facilities for NOx and SOx are exempt from NOx and

Applicable Law or Regulation	Description
	SOx requirements. **Rule 1135 –** Emissions of Oxides from Electric Power Generating Systems. Establishes NOx limits and monitoring and testing requirements for applicable electric power generating systems. Per Rule 2001, RECLAIM facilities for NOx and SOx are exempt from NOx and SOx requirements. No further analysis necessary. **Rule 1146 –** Emissions of Oxides from Industrial, Institutional and Commercial Boilers, Steam Generators, and Process Heaters. Establishes NOx limits and monitoring and testing requirements for applicable boilers. Per Rule 2001, RECLAIM facilities for NOx and SOx are exempt from NOx and SOx requirements.
Regulation XIII: New Source Review	Establishes the pre-construction review requirements for new, modified or relocated facilities to ensure that these facilities do not interfere with progress in attainment of the national ambient air quality standards and that future economic growth in the SCAQMD is not unnecessarily restricted. For RECLAIM facilities this regulation only applies to pollutants not addressed by Regulation XX (RECLAIM). **Rule 1303 –** Requirements. Establishes Best Available Control Technology (BACT), modeling and offset requirements. **Rule 1304 –** Exemption. Establishes modeling and offset exemptions for specific categories including electric utility steam boiler replacements. A fee is established for projects utilizing the exemption. **Rule 1313 –** Permits to Operate. Established requirements for the existing AGS. **Rule 1325 –** Federal PM2.5 New Source Review Program. Outlines requirements for particulate matter less than 2.5 microns (PM2.5) for any new major polluting facility or major modification to a major polluting facility located in areas designated as nonattainment for PM2.5.Establishes the use of lowest achievable emission rate (LAER), offsets, certification of compliance with emission limits and alternative analysis for applicable projects.
Regulation XIV: Toxics and Other Non-Criteria Pollutants	**Rule 1401 –** New Source review of Toxic Air Contaminants.. Specifies limits for maximum individual cancer risk and acute and chronic hazard index for modifications to existing facilities emitting toxic air contaminants. Best Available Control Technology for Toxics (T-BACT) is required for projects with potential exposures over an established threshold. **Rule 1401.1 –** Requirements for New and Relocated Facilities Near Schools. Established additional health protection for children at schools located within 500 feet of new facilities.
Regulation XVII: Prevention of Significant Deterioration	Prevention of Significant Deterioration (PSD). Establishes requirements for preconstruction review to ensure that the air quality in attainment does not significantly deteriorate and maintains a margin for future growth. Requirements for PSD review include use of BACT, modeling, and impact analysis. SCAQMD has partial delegation of PSD authority from the U.S. EPA depending on the calculation methodology and plant wide applicability limits. **Rule 1701, 1702, 1706** – Applicability. Establishes applicability requirements for PSD. **Rule 1703 –** Top Down BACT, Certificate of Compliance, Copy of Application, Analysis. Establishes process to perform Top-Down BACT analysis, requires certification of compliance and distribution to affected agencies and establishes procedures for analysis.

Applicable Law or Regulation	Description
	Rule 1714 – Prevention of Significant Deterioration for Greenhouse Gases. Establishes requirements for the review of GHGs. Review includes a BACT analysis however modeling and monitoring is not required for GHGs.
Regulation XX: Regional Clean Air Incentives Market (RECLAIM)	RECLAIM is designed to allow facilities flexibility in achieving emission reduction requirements for NOx and SOx through controls, equipment modifications, reformulated products, operational changes, shutdowns, other reasonable mitigation measures or the purchase of excess emission reductions. **Rule 2005 –** New Source review for RECLAIM. BACT is required for increases of any nonattainment air contaminant, ozone-depleting compound or ammonia. Major sources must also verify that all stationary sources in jurisdiction of the project are in compliance with the CAA. Alternative analysis, compliance through CEQA, visibility protection, public notice, compliance –including compliance with state and federal NSR are all included in the RECLAIM analysis. **Rule 2011 –** Requirements for Monitoring, Reporting, and Recordkeeping for Oxides of Sulfur (SOx) Emissions. Outlines the specific monitoring and reporting requirements for SOx. **Rule 2012 –** Requirements for Monitoring, Reporting, and Recordkeeping for Oxides of Nitrogen (NOx) Emissions. Outlines the specific monitoring and reporting requirements for NOx.
Regulation XXX: Title V Permits	The Title V federal program is the air pollution control permit system required by the CAA as amended in 1990. Regulation XXX defines the permit application and issuance as well as compliance requirements associated with the program. Any new or modified major source which qualifies as a Title V facility must obtain a Title V permit prior to construction, operation or modification of that source. Regulation XXX also integrates the Title V permit with the RECLAIM program such that a project cannot proceed without both.
Regulation XXXI Acid Rain Permits	Title IV of the federal Clean Air Act provides for the issuance of acid rain permits for qualifying facilities. Regulation XXXI integrates the Title V program with the RECLAIM program. Regulation XXXI requires a subject facility to obtain emission allowances for SOx emissions as well as monitoring SOx, NOx, and carbon dioxide (CO_2) emissions from the facility.

ENVIRONMENTAL IMPACT ANALYSIS

SETTING

The proposed project site is in the city of Long Beach in Los Angeles County. The AEC would be located in the South Coast Air Basin (SCAB). The proposed AEC site is a gently sloping coastal terrace above the Alamitos Bay Marina, ranging in elevation from approximately 7 to 20 feet above mean sea level. There are no significant terrain features within the immediate area surrounding the AEC site. The only complex terrain feature within 6 miles of the AEC is Signal Hill, a city on a hill surrounded by the city of Long Beach. Signal Hill is approximately 365 feet above Long Beach and is not considered a significant terrain feature due to the gradual rise and small width.

The AEC would be located on approximately 21 acres of a 71-acre parcel within the existing AGS site located at 690 N. Studebaker Road. The 71-acre site is bordered by the Southern California Edison (SCE) switchyard and State Route 22 to the north, the San Gabriel River and Los Angeles Department of Water and Power Haynes Generating Station to the east, the former Plains West Coast Terminals petroleum storage facility and some undeveloped property to the south and the Los, Cerritos channel, AGS cooling water canals and residences to the west. The Rosie the Riveter Charter High School is located on the northwest corner of the AGS parcel.

CLIMATE AND METEOROLOGY

The dispersion of pollutants in the atmosphere affects the air quality in the region. Meteorological conditions such as wind velocity, atmospheric turbulence, stability, temperature and humidity all play a role in how pollutants are dispersed.

The climate of the SCAB is strongly influenced by local terrain and geography. The SCAB is a coastal plain with connecting broad valleys and low hills, bounded by the Pacific Ocean on the west and south, and the San Gabriel, San Bernardino and San Jacinto Mountains to the north, and east. The climate is mild, tempered by cool sea breezes and is dominated by the semi-permanent high pressure of the eastern Pacific. The mild climatological pattern is interrupted infrequently by periods of extremely hot weather, winter storms, and Santa Ana winds.

The Long Beach WSCMO climatological station (045085) is located near the AEC site. The station measures site data including precipitation, temperature, humidity and wind movement. Information from the station indicates December and January are the coldest months, while the warmest month is August. The monthly average high is 84 degrees F in August and record highs of 111 degrees F have been reported in September and October of 2011. The annual average high is 74 degrees F and the average annual low is reported as 55 degrees F. The monthly average low is reported as 46 degrees F in January and December. The majority of the rainfall falls during the period from October through April, and the maximum average precipitation occurs in February. The annual average rainfall is reported as12.01 inches per year (WRCC 2016).

Wind flow patterns affect air movement in the atmosphere and influence the transport of pollutants to and from the site. The applicant provided quarterly and annual wind rose data collected at the Long Beach station from 2006-2009 and 2011. The data displays the wind direction, speed and frequency at the monitoring site. The most predominant annual wind direction is from the west. There are also less frequent winds from the south and northeast occurring throughout the year. The annual average wind speed is 1.89 meters/second (m/s).

Along with the wind flow, atmospheric stability and mixing heights are important factors in the determination of pollutant dispersion. Atmospheric stability reflects the amount of atmospheric turbulence and mixing. In general, the less stable an atmosphere, the greater the turbulence, which results in more mixing and better dispersion. The vertical temperature profile influences the atmospheric stability of a region. The mixing height, measured from the ground upward, is the height of the atmospheric layer in which convection and mechanical turbulence promote mixing. Good ventilation results from a high mixing height and at least moderate wind speeds within the mixing layer. In general, mixing is more limited at night and in the winter in the basin when there is a higher potential for lower level inversion layers being present along with low speed surface winds.

The southern California coast is characterized by the cooling effect of the ocean on the surface air. As the surface air cools, it becomes denser than the warmer air above it producing an inversion layer. Inversion layers are formed when temperature increases with height. Inversion layers are present on approximately 87 percent of the days in the year along the southern California coast. The inversion layer forms a stable layer that limits the mixing of air near the surface and therefore pollutants tends to be trapped close to the surface.

The meteorological conditions present affect the formation and concentrations of air pollutants. The potential for high concentrations of pollutants can vary seasonally. Temperature can influence the vertical mixing height and affects chemical and photochemical reaction time. During late spring, summer and early fall, light winds, low mixing heights and sunshine combine to create an environment favorable to the production of photochemical oxidants, particularly ozone. During the spring and summer, deep marine layers are frequently formed along the southern California coast and sulfate concentrations are at their peak.

Representative meteorological data is used in the dispersion modeling analysis to determine potential project impacts. The SCAQMD and U.S. EPA both have criteria for the data used for modeling. It is generally recommended that meteorological data from the closest station to the project site be used. However, besides proximity the guidelines also take into consideration the complexity of the terrain, the exposure of the meteorological monitoring site and the period of time the data is collected.

SCAQMD runs two monitoring stations in close proximity to the proposed site that collect meteorological data. The North Long Beach station is located 6.4 miles northwest of the project site and the Anaheim station is located 10.1 miles to the east-northeast of the project site. The meteorological data collected at the North Long Beach site was selected for the modeling because the station is the closest to the proposed site, there is no complex terrain between the station and the proposed site, and the land uses surrounding the monitoring site and AEC are similar. Specifically both are surrounded by a mix of low, medium and high intensity land use and have open water within 10 miles to the south-southwest.

AMBIENT AIR QUALITY STANDARDS

The United States Environmental Protection Agency (U.S. EPA) and the ARB have both established allowable maximum ambient concentrations of criteria air pollutants. These are based upon public health impacts and are called ambient air quality standards. The California Ambient Air Quality Standards (CAAQS), established by ARB, are typically lower (more stringent) than the federally established National Ambient Air Quality Standards (NAAQS).

Ambient air quality standards are designed to protect people who are most susceptible to respiratory distress such as asthmatics, the elderly, very young children, people already weakened by other disease or illness, and people engaged in strenuous work or exercise. The ambient air quality standards are also set to protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

Current state and federal ambient air quality standards are listed in **Air Quality Table 2**. The averaging time for the various ambient air quality standards (the duration of time the measurements are taken and averaged) ranges from one hour to one year. The standards are read as a concentration, in parts per million (ppm), parts per billion (ppb), or as a weighted mass of material per unit volume of air, in milligrams (mg) or micrograms (µg) of pollutant in a cubic meter (m^3) of ambient air, drawn over the applicable averaging period.

Air Quality Table 2
Federal and State Ambient Air Quality Standards

Pollutant	Averaging Time	Federal Standard	California Standard
Ozone (O_3)	8 Hour	0.070 ppm (137 µg/m^3)[a]	0.070 ppm (137 µg/m^3)
	1 Hour	—	0.09 ppm (180 µg/m^3)
Carbon Monoxide (CO)	8 Hour	9 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)
	1 Hour	35 ppm (40 mg/m^3)	20 ppm (23 mg/m^3)
Nitrogen Dioxide (NO_2)	Annual	53 ppb (100 µg/m^3)	30 ppb (57 µg/m^3)
	1 Hour	100 ppb (188 µg/m^3)[b]	180 ppb (339 µg/m^3)
Sulfur Dioxide (SO_2)	24 Hour	—	0.04 ppm (105 µg/m^3)
	3 Hour	0.5 ppm (1300 µg/m^3)	—
	1 Hour	75 ppb (196 µg/m^3)[c]	0.25 ppm (655 µg/m^3)
Respirable Particulate Matter (PM10)	Annual	—	20 µg/m^3
	24 Hour	150 µg/m^3	50 µg/m^3
Fine Particulate Matter (PM2.5)	Annual	12 µg/m^3	12 µg/m^3
	24 Hour	35 µg/m^3 [b]	—
Sulfates (SO_4)	24 Hour	—	25 µg/m^3
Lead	30 Day Average	—	1.5 µg/m^3
	Rolling 3-Month Average	1.5 µg/m^3	—
Hydrogen Sulfide (H_2S)	1 Hour	—	0.03 ppm (42 µg/m^3)
Vinyl Chloride (chloroethene)	24 Hour	—	0.01 ppm (26 µg/m^3)
Visibility Reducing Particulates	8 Hour	—	In sufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70 percent.

Source: ARB 2015c, U.S. EPA 2016 a,b
Note: [a] Fourth- highest maximum 8 – hour concentration, averaged over 3 years.
[b] 98th percentile of daily maximum value, averaged over 3 years
[c] 99th percentile of daily maximum value, averaged over 3 years

AMBIENT AIR QUALITY ATTAINMENT STATUS

The U.S. EPA, ARB, and the local air district have established air monitoring plans designed to obtain representative data on the ambient levels of pollutants. This data is used to classify an area as attainment, unclassified, or nonattainment, depending on whether or not the monitored ambient air quality data indicates compliance, insufficient data is available, or non-compliance with the ambient air quality standards, respectively. In general, an area is designated as attainment if the concentration of a particular air contaminant does not exceed the standard. Likewise, an area is designated as nonattainment for an air contaminant if that contaminated standard is violated.

Exceptional events that are out of human control that create very high pollutant concentrations such as wind storms and fires are generally excluded from attainment designations. In circumstances where there is not enough ambient data available to support designations as either attainment or nonattainment, the area can be designated as unclassified or unclassifiable. An unclassified area is normally treated the same as an attainment area for regulatory purposes. In addition, an area could be designated as attainment for one air contaminant nonattainment for another, or attainment for the federal standard and nonattainment for the state standards for the same air contaminant.

The federal and state attainment status for specified pollutants in the SCAQMD is summarized in **Air Quality Table 3**. This area is designated as nonattainment for the federal and state ozone, state PM10 (both 24-hr and annual standards) and PM2.5 standards. The SCAQMD is designated as attainment or unclassified for federal PM10 (national 24-hour standard), CO, NO_2, and SO_2. Los Angeles County is also currently classified as federal nonattainment for lead (Pb).

Air Quality Table 3
Attainment Status of South Coast Air Quality Management District (SCAQMD)

Pollutants	**Attainment Status**	
	Federal Classification	**State Classification**
Ozone (1-hr)	No Federal Standard[a]	**Nonattainment**
Ozone (8-hr)	**Nonattainment**	**Nonattainment**
CO	Unclassified/Attainment	Attainment
NO_2	Unclassified/Attainment	Attainment
SO_2	Attainment	Attainment
PM10	Attainment	**Nonattainment**
PM2.5	**Nonattainment**	**Nonattainment**
Sulfates	Attainment	Attainment
Lead	**Nonattainment**[b]	Attainment
Hydrogen Sulfide (H2S)	No Federal Standard	Unclassified
Visibility Reducing Particulates	No Federal Standard	Unclassified

Source: ARB 2016a, EPA 2016 a,b.
Note: [a] The federal 1-hour standard was revoked in June 2005, however the South Coast Air Basin has not attained this standard and is subject to anti-backsliding requirements.
Note: [b] Los Angeles County portion of the basin

AMBIENT AIR QUALITY MONITORING STATIONS

There are several monitoring stations located near the project site summarized in **Air Quality Table 4**. South Coast Los Angeles County 2 (South Long Beach) station is located approximately 4.6 miles northwest of the project site. The South Long Beach station has been in operation since 2003 and monitors PM10, PM2.5, lead and sulfate (SO_4). The South Coast Los Angeles County 1(North Long Beach) station is located 6.4

miles northwest and currently measures PM2.5. Prior to the decommissioning in September, 2013 the North Long Beach monitoring site measured O_3, NO_2, CO, SO_2, PM10, PM2.5, and lead. The South Coastal Los Angeles 3 (Hudson Long Beach) station is located approximately 7.2 miles northwest of the project site and monitors O_3, NO_2, CO, SO_2 and PM10. The Long Beach Route 710 station is located approximately 8.5 miles north-northwest and measures NO_2 and PM2.5.The Central Orange County (Anaheim) station is located 10.1 miles to the east-northeast and measures O_3, NO_2, CO, PM10, and PM2.5. The South Central Los Angeles County (Compton) station is located 10.9 miles north-northwest and measures O_3, NO_2, CO, PM10, PM2.5 and lead. An additional monitoring station, Long Beach Route 710, was also identified.

Air Quality Table 4
Pollutant Monitoring Summary of Surrounding Stations

Monitoring Station	Distance	Ozone	NO_2	CO	SO_2	PM10	PM2.5
South Coastal Los Angeles County 2 (South Long Beach)[a]	4.6 NW	N/A	N/A	N/A	N/A	Yes	Yes
South Coastal Los Angeles County 1 (North Long Beach)[a,b]	6.4 NW	Yes	Yes	Yes	Yes	Yes	Yes
South Coastal Los Angeles County 3 (Long Beach or Hudson)	7.2 NW	Yes	Yes	Yes	Yes	Yes	N/A
Los Angeles County (Long Beach Route 710)	8.5 NNW	N/A	Yes	N/A	N/A	N/A	Yes
Central Orange County (Anaheim)	10.1 ENE	Yes	Yes	Yes	N/A	Yes	Yes
South Central Los Angeles County (Compton)[a]	10.9 NNW	Yes	Yes	Yes	N/A	N/A	Yes

Source: AEC2013a, CH2 2016s, staff analysis
Note: [a] Station also monitors lead.
Note: [b] Station currently only monitors PM2.5.

The maximum ambient background concentration is used in combination with the modeled pollutant concentrations from the project in order to assess potential impacts from the project. According to federal requirements, the background data used to evaluate the potential air quality impacts needs to be representative but it is not required to be collected at the project site. The ambient concentrations of criteria pollutants for at least three years from ARB certified monitoring sites is evaluated to determine appropriate background ambient concentrations of criteria pollutants at the proposed project site. The selection of background data was based on location, data quality and time period of the data collected.

The data from the monitoring stations surrounding the proposed site were considered for use as representative data in the impact analysis. The South Long Beach monitoring station is the closest station to the proposed project site; however, the station only measures limited pollutants. The station measures the pollutants at a neighborhood scale and is considered to be a highest concentration type monitoring site for these pollutants. The South Long Beach station is considered to be representative of the project site. The impact analysis required for both PM10 and PM2.5 will use data from this monitoring station as representative.

The North Long Beach monitoring station is the next closest station to the proposed project site and measures each of the pollutants required in the air quality impact analysis. The station is located close to the Port of Long Beach and the Long Beach airport. The station measures pollutants on either a microscale, middle scale or neighborhood scale basis and is considered to be representative of highest concentrations or population exposure depending on the specific pollutant.

The Hudson monitoring station is slightly further away from the proposed AEC site than the North Long Beach. The Hudson monitoring station measures pollutants on a microscale basis and is considered to collect data representing the highest concentrations. The SCAQMD has requested hourly NO_2 data from this monitor be used as representative background data for hourly NO_2 impact assessment. AES proposed the use the North Long Beach monitoring data for annual background NO_2 in the impact analysis.

Data from several monitoring sites were not considered for use as representative data in the impact analysis. The Long Beach Route 710 station began operation in January 2015. Due to the limited data available from this station, it is not known if the station data could be classified as representative background data. The Anaheim station is downwind to the proposed site but is further away and more inland than several other monitoring stations. The Compton station is further away and more inland than the other sites and is therefore not considered representative of the project site. Therefore the Long Beach Route 710, Anaheim and Compton monitoring stations ware not evaluated any further in this analysis.

Ambient data collected at the South Long Beach monitoring station was used as representative background data for PM10 and PM2.5. Ambient data collected at the North Long Beach station was used as representative data for other pollutants not measured at the South Long Beach monitoring station with the exception of NO_2. The SCAQMD requested NO_2 data be used from the Long Beach monitoring station. The Long Beach station was commissioned in 2010. U.S. EPA Region 9 believes that is representative and captures large NOx sources in the Port area upwind from the project site.

CRITERIA POLLUTANTS

Ambient monitoring data for select criteria pollutants (nitrogen dioxide, ozone, particulate matter, carbon monoxide and sulfur dioxide) collected from 2009 to 2014 from the monitoring stations near the project site is summarized in the following tables. Data marked in bold indicate that the current standard was exceeded in that period. Note that an exceedance is not necessarily a violation of the standard, and that only persistent exceedances lead to designation of an area as nonattainment.

Nitrogen Dioxide (NO_2)

NO_2 is a component of a group of highly reactive gases collectively known as NOx. NOx includes nitric oxide (NO) and nitrogen NO_2. NOx is formed from the reaction of nitrogen and oxygen during combustion. Approximately 75 to 90 percent of the NOx emitted from combustion sources is NO. NO is oxidized in the atmosphere to NO_2 through reactions with oxidants such as oxygen and ozone. NO and oxygen slowly react to form NO_2. NO and ozone reactions occur primarily during the nighttime without the presence of sunlight. Sunlight can cause NO_2 to disintegrate into NO and O_2. High ambient concentrations of NO_2 usually occur during the fall and winter when atmospheric conditions tend to trap ground-level emissions but lack significant photochemical activity due to less sunlight. NO_2 concentrations are more prevalent during midmorning than midday or afternoon. In the summer, NO is converted to NO_2, but the relatively high temperatures and windy conditions (atmospheric unstable conditions) generally disperse pollutants and also engage NO in reactions with VOCs to form ozone. The formation of NO_2 in the presence of ozone is according to the following reaction:

$$NO + O_3 \rightarrow NO_2 + O_2$$

Urban areas typically have high daytime ozone concentrations that drop substantially at night as the above reaction takes place, and ozone scavenges the available NO. If ozone is unavailable to oxidize the NO, less NO_2 will form because the reaction is "ozone-limited." This reaction explains why, in urban areas, ground-level ozone concentrations drop at night, while aloft and in downwind rural areas (without sources of fresh NO emissions), nighttime ozone concentrations can remain relatively high.

The U.S. EPA implemented a 1-hour NO_2 standard of 0.1 ppm, which became effective on April 12, 2010. The standard is expressed as a 3-year average of the 98th percentile of the daily maximum 1-hour concentration (i.e., the 8th highest of daily highest 1-hour concentrations). **Air Quality Table 5** includes the maximum 1-hour NO_2 concentrations, the 1-hour 98^{th} percentile average, and the annual arithmetic mean at North Long Beach and Long Beach stations. NO_2 concentrations measured at these stations from 2009 to 2014, do not exceed either the federal or state standards. The SCAQMD is currently designated as unclassified/attainment for the federal NO_2 standard. On February 26, 2014, the 2013 amendment to area designations for the state standards were finalized classifying the South Coast Air Basin in attainment for the state NO_2 standard.

Air Quality Table 5
Nitrogen Dioxide Concentrations, 2009-2014

Nitrogen Dioxide (ppm)							
Monitoring Station	**Averaging Time**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
North Long Beach	1-hour (Max)	0.11	0.0928	0.1064	0.0772	0.0669	----
	1-hour (98^{th})	0.07	0.0702	0.0676	0.0625	0.0557	----
	Annual	0.0212	0.0198	0.0177	0.0208	0.0140	----
Hudson Long Beach	1-hour (Max)	----	0.1178	0.0900	0.0978	0.0813	0.1359
	1-hour (98^{th})	----	0.0710	0.0740	0.0774	0.0713	0.0848
	Annual	----	0.022	0.0212	0.0253	0.0215	0.0207

Source: SCAQMD 2015, ARB 2016a, U.S. EPA 2016c

<u>Ozone</u>

Ozone is a colorless gas found in two regions of the atmosphere. In the upper region, it protects the earth from harmful rays from the sun. In the lower region, ozone forms what is generally called smog. Ozone is not directly emitted from stationary or mobile sources. It is a secondary pollutant formed through complex chemical reactions between NOx and VOCs in the presence of sunlight. Ozone formation is highest in the summer and fall when abundant sunshine and high temperatures trigger the necessary photochemical reactions, and lowest in the winter. The days with the highest ozone concentrations in this region commonly occur between May and October. The SCAQMD is classified as a nonattainment area with respect to both state and national ambient air quality standards for ozone. **Air Quality Table 6** displays the maximum 1-hour and 8-hour concentrations at both the North Long Beach and Hudson Long Beach stations.

Air Quality Table 6
Ozone Concentrations, 2009-2014

Ozone (ppm)							
Monitoring Station	**Averaging Time**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
North Long Beach	1-hour	0.089	0.101	0.073	0.084	**0.092**	----
	8-hour	0.068	**0.084**	0.061	0.067	0.070	----
Hudson Long Beach	1-hour	----	**0.099**	0.074	0.080	0.090	0.087
	8-hour	----	**0.084**	0.063	0.066	0.069	**0.072**

Source: SCAQMD 205, ARB 2016a, U.S. EPA 2016c

Respirable Particulate Matter (PM10)

PM10 is a mixture of small solid particles and liquid droplets with a size less than or equal to 10 microns diameter. PM10 can be emitted directly or it can be formed many miles downwind from emission sources when various precursor pollutants interact in the atmosphere. Gaseous emissions of pollutants like NOx, SOx and VOC from turbines, and ammonia from NOx control equipment, given the right meteorological conditions, can form particulate matter in the form of nitrates (NO_3), sulfates (SO_4), and organic particles. These pollutants are known as secondary particulates, because they are not directly emitted but are formed through complex chemical reactions in the atmosphere.

PM nitrate (mainly ammonium nitrate) is formed in the atmosphere from the reaction of nitric acid and ammonia. Nitric acid originates from NOx emissions from combustion sources. The nitrate ion concentrations during the wintertime are a significant portion of the total PM10, and an even higher contributor to particulate matter of less than 2.5 microns (PM2.5), described more fully below. The nitrate ion is only a portion of the PM nitrate, which can be in the form of ammonium nitrate (ammonium plus nitrate ions) or sodium nitrate.

As shown with 2009-2014 monitoring data included in **Air Quality Table 7**, the CAAQS 24-hour and annual standards have been exceeded at both the South Long Beach and North Beach monitoring stations. The federal 24-hour PM10 standard of 150 µg/m3 has not been exceeded at the stations near the project site from 2009 through 2014. The SCAQMD is characterized as nonattainment for the state 24-hour and annual PM10 standard and attainment/maintenance for the federal 24-hour PM10 standard. The SCAQMD redesignation of attainment and PM10 maintenance plan was approved by the U.S. EPA in 2013.

Air Quality Table 7
Particulate Matter Less Than 10 Microns, 2009-2014

PM10 (μg/m³)							
Monitoring Station	**Averaging Time**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
South Long Beach	24-hour	**83**	**76**	50	**54**	**54**	**59**
	Annual	**33.2**	**27.3**	**28.7**	**25.5**	**27.3**	**26.6**
North Long Beach	24-hour	**62**	44	43	45	37	----
	Annual	**30.5**	**22.0**	**24.2**	**23.3**	**23.2**	----

Source: SCAQMD 205, ARB 2016a, U.S. EPA 2016c

Fine Particulate Matter (PM2.5)

PM2.5 refers to particles and droplets with a diameter less than or equal to 2.5 microns. PM 2.5 is believed to pose a greater health risk than PM10 because it can lodge deeply into the lungs due to the small size. PM2.5 includes nitrates, sulfates, organic carbon and elemental carbon, which mainly result from combustion and atmospheric reactions. Almost all combustion-related particles, including those from wood smoke and cooking, are smaller than 2.5 microns. Nitrate and sulfate particles are formed through complex chemical reactions in the atmosphere. Particulate nitrate (mainly ammonium nitrate) is formed in the atmosphere from the reaction of nitric acid and ammonia. Nitric acid in turn originates from NOx emissions from combustion sources. The nitrate ion concentrations during the winter make up a large portion of the total PM2.5.

Air Quality Table 8 summarizes the ambient PM2.5 data collected from the surrounding stations. The national 24-hour average NAAQS is met if the 3-year average of the 98th percentile concentration is 35 μg/m³ or lower. The high 24-hour average maximum concentrations listed in **Air Quality Table 8** include values above the NAAQS standard. The maximum 24-hour concentrations however do not reflect the 3-year 98th percentile designation value. The 3-year 98th percentile values were not exceeded at either the South Long Beach or North Long Beach stations. The state and federal annual arithmetic mean designation value was exceeded at both the South Long beach and North Long Beach stations in 2009. For purpose of state and federal air quality planning and permitting, the SCAQMD is classified as nonattainment with both the federal and state PM2.5 standards.

Air Quality Table 8
Particulate Matter Less Than 2.5 Microns, 2009-2014

PM2.5 (μg/m³)							
Monitoring Station	**Averaging Time**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
South Long Beach	24-hour (Max)	**55.8**	33.7	**42.0**	**46.7**	**42.9**	**52.2**
	24-hour (98th)	30.5	26.5	26.6	25.1	24.6	27.2
	Annual	**12.5**	10.4	10.7	10.57	10.97	10.72
North Long Beach	24-hour (Max)	**63**	35.0	**39.7**	**49.8**	**47.2**	**51.5**
	24-hour (98th)	34.2	28.3	27.8	26.4	26.1	31.3
	Annual	**30.5**	10.5	11.0	10.37	11.34	11.42

Source: SCAQMD 205, ARB 2016a, U.S. EPA 2016c

Carbon Monoxide

Carbon monoxide is a product of incomplete combustion due to the insufficiency of oxygen content at the point of combustion. Mobile sources are the main sources of CO emissions. Ambient concentrations of CO are highly dependent on motor vehicle activity. CO is a local pollutant, with high concentrations usually found near the emission sources. The highest CO concentrations occur during rush hour traffic in the mornings and afternoons. Ambient CO concentrations attain the air quality standards due to two statewide programs: 1) the 1992 wintertime oxygenated gasoline program, and 2) Phase I and II of the reformulated gasoline program. New vehicles with oxygen sensors and fuel injection systems have also contributed to reduced CO emissions. **Air Quality Table 9** includes the maximum 1-hour and 8-hour CO concentrations from the North Long Beach and Hudson Long Beach monitoring stations. These values are well below respective ambient air quality standards.

Air Quality Table 9
Carbon Monoxide, 2009-2014

Carbon Monoxide (ppm)							
Monitoring Station	**Averaging Time**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
North Long Beach	1-hour	2.9	3.2	3.2	2.6	2.7	----
	8-hour	2.2	2.1	2.6	2.2	1.9	----
Hudson Long Beach	1-hour	----	4.1	3.7	4.2	4.1	3.7
	8-hour	----	2.6	3.3	2.6	2.6	2.6

SCAQMD 205, ARB 2016a, U.S. EPA 2016c

Sulfur Dioxide

Sulfur dioxide is typically emitted as a result of the combustion of fuels containing sulfur. This proposed project would use natural gas, which contains very little sulfur and consequently has very low SO_2 emissions when burned. By contrast, fuels with high sulfur content, such as coal, emit very large amounts of SO_2 when burned. Sources of SO_2 emissions come from every economic sector and include a wide variety of fuels in gaseous, liquid and solid forms. The whole state is designated attainment for all state and federal SO_2 ambient air quality standards. **Air Quality Table 10** includes maximum state1-hour, federal 1-hour, and 24-hour SO_2 concentrations at the North Long Beach and Long beach stations.

Air Quality Table 10
Sulfur Dioxide, 2009-2014

Sulfur Dioxide (ppb)							
Monitoring Station	**Averaging Time**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
North Long Beach	1-hour (Max)	17	40.0	14.8	22.2	21.8	----
	1-hour (99th)	12	16	10.7	14.3	10.1	----
	24-hour	4.4	6	4.1	3	1.7	----
Hudson Long Beach	1-hour (Max)	----	35.6	43.3	22.7	15.1	14.7
	1-hour (99th)	----	16	24.7	21.3	11.6	10.1
	24-hour	----	4.4	11.6	4	3.9	3

SCAQMD 205, ARB 2016a, U.S. EPA 2016c

Visibility

Visibility in the region of the project site depends upon the area’s natural relative humidity and the intensity of both particulate and gaseous pollution in the atmosphere. The most straightforward characterization of visibility is probably the visual range (the greatest distance that a large dark object can be seen). However, in order to characterize visibility over a range of distances, it is more common to analyze the changes in visibility in terms of the change in light-extinction that occurs over each additional kilometer of distance (1/km). In the case of a greater light-extinction, the visual range would decrease.

The SCAQMD is currently designated as unclassified for visibility reducing particles.

Lead

Lead is a naturally occurring metal that is soft and resistant to chemical corrosion. Lead forms compounds with both organic and inorganic substances. Lead has been used for many purposes for thousands of years and has accumulated in the environment. As an air pollutant, lead is present in small particles. Sources of lead emissions include industrial processes and emission from sources using coal and lead-based fuels such as aviation gas. In 1970, the ARB set the CAAQS for lead. In addition, the ARB has identified lead as a toxic air contaminant and is therefore involved in risk management activities for lead. In 1978, U.S. EPA set the NAAQS for lead. The NAAQS was substantially strengthened in 2008.

Lead is monitored as a toxic substance at the South Long Beach and North Long Beach monitoring sites. The SCAB is federally designated partial nonattainment for the Los Angeles County portion of the Basin for near-source monitors. **Air Quality Table 11** includes data from the South Long Beach and North Long Beach monitors. The values are well below respective ambient air quality standards.

Due to the very low concentrations shown in the available ambient monitoring data and the insignificant lead emissions from this project it is assumed that the project would not create significant impacts based on the ambient lead standards. The Public Health Section provides additional information regarding the quantity of emissions and the health risks of the lead emissions from this project.

Air Quality Table 11
Lead, 2009-2014

Lead (µg/m³)							
Monitoring Station	**Averaging Time**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
South Long Beach	30-day	0.01	0.01	0.013	0.007	0.012	0.012
	3-month	0.01	0.01	0.009	0.005	0.009	0.01
North Long Beach	30-day	0.01	0.01	0.010	0.005	0.006	----
	3-month	0.01	0.01	0.007	0.005	0.006	----

SCAQMD 205, ARB 2016a, U.S. EPA 2016c

SUMMARY OF BACKGROUND AMBIENT AIR QUALITY

In summary, staff recommends using the background ambient air quality concentrations in **Air Quality Table 12** as the baseline for the modeling and impacts analysis. The highest criteria pollutant concentrations from the last three years of available data collected from the surrounding monitoring stations are used to determine the recommended background values. Concentrations in excess of their ambient air quality standard are shown in bold.

The pollutant modeling analysis was limited to the pollutants listed in **Air Quality Table 12**. Therefore recommended background concentrations were not determined for the other criteria pollutants (ozone, lead, visibility, etc.).

Air Quality Table 12
Staff-Recommended Background Concentrations (µg/m³)

Pollutant	Averaging Time	Recommended Background	Limiting Standard	Percent of Standard
NO_2	State 1 hour	256	339	75
	Federal 1 hour	146	188	78
	Annual	48	57	84
PM10	24 hour	**59**	50	118
	Annual	**27.3**	20	137
PM2.5	24 hour	27.2	35	89
	Annual	10.97	12	95
CO	1 hour	3,665	23,000	16
	8 hour	2,978	10,000	30
SO_2	1 hour	58	655	9
	Federal 1 hour	31	196	10
	Federal 3 hour	58[a]	1,300	4
	24 hour	11	105	16

Source: SCAQMD 205, ARB 2016a, U.S. EPA 2016c and staff analysis.

Note: An exceedance is not necessarily a violation of the standard, and that only persistent exceedances lead to designation of an area as nonattainment.

[a] The maximum one hour background is conservatively used for background.

PROJECT DESCRIPTION AND PROPOSED EMISSIONS

The AEC would consist of two natural gas fired power blocks. Power Block 1 includes two GE Frame 7FA.05 CTGs with nominal ratings of 227 MW each, and one shared STG with a nominal rating of 229 MW. Each CTG would exhaust to a HRSG without supplemental firing capabilities. Both of the CTG/HRSG trains would feed into the common STG, forming a standard 2-on-1 configuration.

Power Block 1 would also include an air-cooled condenser, a 70.8 MMBtu/hr Babcock and Wilcox auxiliary boiler and related ancillary equipment. The air-cooled condenser for the proposed project would eliminate the existing once-through-cooling system of the existing AGS. The auxiliary boiler would provide enhanced startup times by maintaining the steam cycle in a ready state. Prior to a combined-cycle startup, the auxiliary boiler increases load from a minimum turndown rate to produce steam. The steam is directed to the system for HRSG sparging, turbine seals, pipe warming, condenser dearating and fuel gas heating.

The Power Block 1 operating profile includes multiple operating scenarios based on the operating range of the proposed turbines. The Air Quality Conditions of Certification include operating conditions proposed by the SCAQMD. The equipment descriptions included in the SCAQMD conditions is based off the operating scenario yielding the highest BTU/hr consumption. This scenario is identified as Case 1(28 degrees Fahrenheit, maximum load) in the combined-cycle turbine operating scenarios provided in the SAFC. The expected combustion turbine generator rating at Case 1 conditions is 236.645 MW-gross and 235.907 MW-net. The STG is rated at 219.615 MW-gross and 208.965 MW-net at Case 1 conditions. These equipment ratings will be included in the Condition of Certification equipment descriptions.

The two combined-cycle gas turbines (CCGT) Power Block 1 exhaust stacks would be equipped with SCR and CO oxidation catalysts to control NOx, CO and VOC emissions. The SCR will utilize 19% aqueous ammonia as the reducing agent for the SCR system. One new 40,000 gallon tank would be used to store ammonia solution. An oil/water separator would also be used to collect equipment wash water and rainfall.

Power Block 2 would include four 100 MW GE LMS-100PB simple-cycle, intercooled CTGs. Each CTG would include dry low NOx combustors, SCR equipment for NOx reduction and a catalyst to reduce CO emission. Ancillary equipment includes an inlet filter house with an evaporative cooler, turbine inter-cooler and associated intercooler circulating pumps. Two simple CTGS would share a fin-fan heat exchanger and one generator step up transformer and other ancillary equipment.

The four simple gas turbine (SCGT) Power Block 2 exhaust stacks would be equipped with SCR and CO oxidation catalysts to control NOx, CO and VOC emissions. The SCR will utilize 19% aqueous ammonia as the reducing agent for the SCR system. A second 40,000 gallon tank will be used to store ammonia solution. A second oil/water separator will also be used to collect equipment wash water and rainfall.

The proposed AEC would provide fast-starting and stopping capabilities and flexible generating resources. The AEC is proposed to be configured and deployed as a multi-stage generating facility allowing power generations across a wide operating range. The project is proposing multiple generators that could operate singly or in different combinations to provide a large range of generating capacity. The proposed facility would have rapid startup and turndown capabilities and the ability to quickly ramp when needed. The facility would be capable of serving peak and intermediate loads and capable of operating in either load following or partial shutdown mode. AES is proposing this configuration in order to support the growth of California's renewable energy portfolio by accommodating the intermittent properties associated with many renewable resources.

The SAFC stated some of the existing infrastructure at the AGS, including two emergency electric-driven fire water pumps would be reused to the greatest extent possible. Energy Commission staff were informed by AES staff that the construction of AEC would include the installation of two new electric fire pumps. Since the proposed emergency engines are electric, emissions of criteria pollutants do not need to be quantified.

The proposed AEC would be constructed on the site of the existing AGS. The demolition of existing AGS Units 1-6 equipment and ancillary equipment is not necessary for the construction of the proposed AEC and is therefore not considered part of the scope of the project. AGS Unit 7 has already retired; however, demolition of the unit and associated structures has not been completed. The removal of former Unit 7's building and ancillary equipment, fuel storage tank, tank berms, small maintenance shops and two wastewater retention basins is needed to prepare the site for the construction of the AEC including Power Block 1. Therefore the remaining demolition of Unit 7 and the remaining site preparation is considered part of the proposed project scope and is evaluated in this analysis.

Existing AGS Units 1-6 will remain in operation throughout the AEC development and construction. Units 1, 2 and 5 will be retired once the AEC CCGT reaches the commissioning stage and become operational. Unit 3 would be retired once the AEC SCGT reaches the commissioning stage and becomes operational. Units 4 and 6 may operate through December 31, 2020 OTC Policy compliance deadline.

Separate emissions estimates for the proposed project during the construction phase, initial commissioning, and operation are each described in the following sections.

CONSTRUCTION

Construction of the AEC would consist of the installation of the AEC CCGT and AEC SCGT and is expected to last approximately 56 months. The AEC will reuse existing onsite water, natural gas, storm water pipelines, and electrical transmission facilities. There is the possibility some modifications may be required to interconnect the AEC facility with these systems. AEC would require a new 1,000 foot process/sanitary wastewater pipeline.

The project would commence with the completion of the demolition of retired AGS Unit 7 scheduled for the first quarter of 2017. Remaining demolition activities for Unit 7 include the removal of former Unit 7's building and ancillary equipment, fuel storage tank, tank berms, small maintenance shops and two wastewater retention basins. The completion of the demolition of Unit 7 is expected by May 2017 and will allow for the construction of the AEC CCGT.

Construction of the AEC CCGT is expected to commence during the second quarter of 2017 and would be completed by the second quarter of 2020. The AEC CCGT is expected to commence commercial operation before May 1, 2020. Construction of the AEC SCGT is scheduled to start in May 2020 and last until through August 2021. The SCGT is expected to begin commercial operation in the third quarter of 2021.

Onsite laydown areas throughout the site would be used during construction. An offsite laydown area approximately ten acres adjacent to the project site would also be used to store equipment and material during construction. This offsite laydown area is also being proposed for use in the Huntington Beach Energy Project (HBEP). The preparation of this laydown area is expected to occur prior to the proposed construction of AES and associated emissions are included in the HBEP analysis. Due to uncertainty in the schedule for the HBEP and AEC projects, AES indicated there is a potential for the preparation of the adjacent laydown area to overlap with the construction of the AEC.

The proposed construction and demolition equipment would include equipment such as excavators, backhoes, dozers, loaders, cranes, graders, forklifts, aerial lifts, air compressors, generators, pick-up, stake and dump trucks, support vehicles, etc. During the construction period, air emissions would be generated from: 1) vehicle and construction equipment exhaust; 2) fugitive dust from vehicle and construction equipment, including grading, bulldozing and truck loading during construction.

Emissions of NOx, SOx, VOC CO, PM10 and PM2.5 were quantified for the construction period. Maximum daily and annual emissions were estimated based on the expected construction equipment and workforce. Fugitive dust and construction equipment exhaust emissions were quantified using methodologies and emission factors consistent with the California Emissions Estimator Model. It was assumed the construction equipment would meet Tier 4 final engine control standards and construction activities were assumed to be scheduled for 10 hours per day, 23 days per month. Vehicle exhaust emissions were estimated using EMFAC 2014. Fugitive dust emissions would be mitigated with watering. The control efficiency for mitigation was determined per SCAQMD's CEQA Air Quality Handbook.

Estimates for the maximum daily, maximum monthly and total annual emissions over the 56-month construction period are included in **Air Quality Table 13**. The maximum daily emissions are expected to occur during month 18 for NOx, VOC, CO and SOx, and during month 20 for PM10 and PM2.5. The maximum annual emissions vary depending on the pollutant. Maximum annual emissions occur between months 14 and 25 for VOC, SOx, and PM2.5, months 13 and 24 for NOx, months 15 and 26 for PM10, and months 16 and 27 for CO. The activity associated with the maximum daily and annual emissions includes the proposed construction of the AEC CCGT.

Air Quality Table 13
AEC, Estimated Maximum Construction Emissions

Construction Activity	NOx	VOC	PM10	PM2.5	CO	SOx
Maximum Daily Construction Emissions (lbs/day)	142	7.16	23.4	7.90	113	0.61
Maximum Monthly Construction Emissions (lbs/month)	3,258	165	537	182	2,809	14
Peak Annual Construction Emissions (tons/year)	15.2	0.82	2.73	0.91	14.9	0.069

Source: AEC 2015
Note: Different activities have maximum emissions at different times during the construction period; therefore, total maximum daily, monthly, and annual emissions might be different from the summation of emissions from individual activities.

Estimates for the emissions from the laydown construction area correlated to the HBEP are included in **Air Quality Table 14**.

Air Quality Table 14
Laydown Area Construction Emissions

Construction Activity	NOx	VOC	PM10	PM2.5	CO	SOx
Maximum Daily Emissions (lbs/day)	13.1	1.28	0.96	0.70	6.29	0.0082
Peak Annual Construction Emissions (tons/year)	0.13	0.013	0.010	0.0070	0.063	0.000082

Source: AEC 2014b

INITIAL COMMISSIONING

New electrical generation facilities must go through initial commissioning phases before becoming commercially available to generate electricity. The commissioning period begins when the turbines and boiler are prepared for first fire and ends upon successful completion of initial performance testing. Emissions of NOx, CO, and VOC during the commissioning period are typically higher than during normal operations due to the fact that the combustors may not be optimally tuned and the emission control systems may be only partially operational or not operational at all. The commissioning period is needed to ensure the facility's operation is fine-tuned to minimize emissions during normal operations. The emission rates for PM10, PM2.5 and SOx during initial commissioning are not expected to be higher than normal operating emissions. PM and SOx emissions are proportional to fuel use and the potential maximum fuel use and not the emission control equipment. Emissions from PM10, PM2.5 and SOx are expected to be at or below emissions from full load operations.

The commissioning period for the AEC CCGT is expected to last 6 months. Commissioning activities for the combined-cycle turbines are expected to occur over approximately 1,992 operating hours total for both combustion turbines (996 hours per combustion turbine). During this period, each combustion turbine would require 216 hours of operation without or with partial emission control systems in place. Unabated commissioning activities include 48 hours of CTG testing, 120 hours of steam blows, 12 hours of setting unit HRSG & steam safety valves, 12 hours of DLN emissions tuning, and 24 hours of other emissions tuning. Abated commissioning activities include 338 hours of tuning and cleaning activities, 84 hours of pre-performance testing, 168 hours of source testing, 132 hours of performance testing and 60 hours of California Independent System Operator (California ISO) certification testing per CTG.

Air Quality Table 15 presents the applicant's anticipated maximum commissioning emissions and emission rates of criteria pollutants for the AEC CCGT. Commissioning emissions of NOx, VOC and CO are estimated based on information from the turbine vendor included in the SAFC. Maximum commissioning emissions for SOx, PM10, and PM2.5 are based on the maximum emission rates at 28 degrees Fahrenheit. Maximum hourly emission rates for NOx, VOC and CO correspond to the initial CTG testing phase (full speed no load).

Air Quality Table 15
Maximum Initial CCGT Commissioning Emissions

Combined-Cycle	Maximum Commissioning Emissions and Fuel				
	NOx	CO	VOC	SOx[a]	PM10/2.5
Per CTG (lb/hr)	130	1,900	270	8.5	4.86
Total Commissioning (tons/CTG)	13.8	50.7	7.3	2.42	4.23
Total Commissioning (tons)	27.6	101	14.7	8.47	4.84
Total Commissioning (lbs/CTG)	27,597	101,328	14,682	8,466	4,841
Commissioning Fuel Per CTG	1,656.24 (mmcf/CTG)				
Emission Factor (lb,mmcf)	16.66	61.18	8.86	2.92	5.11

Source: CH2 2016s, SCAQMD 2016b and staff analysis.
Note: [a] Based upon 0.75 gr/100 scf; worst case, short-term sulfur content of natural gas.

The SCAQMD grouped the commissioning activities by duration to determine expected monthly activities and associated emissions. **Air Quality Table 16** presents the expected maximum monthly commissioning emissions for the AEC CCGT including the month associated with the maximum commissioning emissions. All months is used to designate there is no expected emission difference between the months.

Air Quality Table 16
Maximum Combined-Cycle Monthly Commissioning Emissions

Combined-Cycle	Maximum Monthly Commissioning Emissions				
	NOx	CO	VOC	SOx[a]	PM10/2.5
Maximum Month	1	1	1	5	All Months
Emissions per CTG (lb/month)	14,294	95,023	13,314	809	1,411

Source: SCAQMD 2016b
Note: [a] Based upon 0.75 gr/100 scf; worst case, short-term sulfur content of natural gas. Due to low emissions and rounding, the estimated SOx emissions vary slightly between the months.

The commissioning period for the AEC SCGT is expected to last 3 months. Commissioning activities for the simple-cycle turbines are expected to occur over approximately 1,120 operating hours total for both combustion turbines (280 hours per combustion turbine). During this period, each combustion turbine would require up to 4 hours of operation without or with partial emission control systems in place for unit testing. Abated commissioning activities include up to 24 hours of tuning, 12 hours of base load testing, 12 hours of re-firing, 168 hours of source testing, 24 hours of performance preparation, 24 hours of unit performance testing and 12 hours of California ISO certification per CTG.

Air Quality Table 17 presents the applicant's anticipated maximum commissioning emissions and emission rates of criteria pollutants for the AEC SCGT. Commissioning emissions of NOx, VOC and CO are estimated based on information from the turbine vendor included in the SAFC. Maximum commissioning emissions for SOx, PM10, and PM2.5 are based on the maximum emission rates at 65.3 degrees Fahrenheit. Maximum hourly emission rates for NOx, VOC and CO correspond to the initial CTG testing phase.

Air Quality Table 17
Maximum Initial Simple-Cycle Commissioning Emissions

Simple-Cycle	Maximum Commissioning Emissions and Fuel				
	NOx	**CO**	**VOC**	**SOx**[a]	**PM10/2.5**
Per CTG (lb/hr)	40.1	244	5.08	1.62	6.23
Total Commissioning (tons/CTG)	2.9	12.7	0.42	0.23	0.87
Total Commissioning (tons)	11.4	50.8	1.67	0.91	3.49
Total Commissioning (lbs/CTG)	5,772	25,395	836	454	1,744
Commissioning Fuel Per CTG	226.68 (mmcf/CTG)				
Emission Factor (lb/mmcf)	25.24	112.03	3.69	7.69	2.00

Source: SCAQMD 2016b and staff analysis.
Note: [a] Based upon 0.75 gr/100 scf; worst case, short-term sulfur content of natural gas.

The SCAQMD grouped the commissioning activities by duration to determine expected monthly activities and associated emissions. **Air Quality Table 18** presents the expected maximum monthly commissioning emissions for the SCGT including the month associated with the maximum commissioning emissions.

Air Quality Table 18
Maximum Simple-Cycle Monthly Commissioning Emissions

Simple-Cycle	Maximum Monthly Commissioning Emissions				
	NOx	**CO**	**VOC**	**SOx**[a]	**PM10/2.5**
Maximum Month	3	1	3	3	3
Emissions per CTG (lb/month)	1,913	8,594	285	151	583

Source: SCAQMD 2016b.
Note: [a] Based upon 0.75 gr/100 scf; worst case, short-term sulfur content of natural gas.

Air Quality Table 19 presents the anticipated maximum commissioning emissions of select criteria pollutants for the AEC auxiliary boiler. The auxiliary boiler commissioning activities includes first burner light-off, conditioning, establishing the air/fuel ratio and SCR ammonia injection curves. The commissioning will occur over five days and will require up to 6 fired hours per day. The commissioning emissions are expected to be the same as two cold startup events (additional details on cold startup emissions for the boiler are presented in the Proposed Operation section below).

Air Quality Table 19
Maximum Initial Boiler Commissioning Emissions

Boiler	Commissioning Emissions (lbs) and Fuel Use		
	NOx	CO	VOC
Daily Emissions	8.44	8.681	9.36
Total Commissioning Emissions	42.2	43.4	46.8
Total Fuel Use	414 MMBtu or 0.39 mmscf		

Source: AEC 2015s, SCAQMD 2016b

PROPOSED OPERATION

After commissioning the combined-cycle, simple-cycle turbines and boilers have different operational modes: startup, shutdown and normal or steady state operation. During turbine startup and shutdown operating modes higher emission rates (relative to steady state operating mode) are expected for VOC, CO and NOx because the emission control systems are not fully functional or within the operating temperature range. Emissions from the different operational modes are quantified separately based on manufacturer data and engineering estimates.

Combined–Cycle Turbines

The turbine startup events for combined-cycle combustion turbines include three classifications: cold, warm and hot. The Air Quality Conditions of Certification includes proposed definitions for these classifications. The events are currently described as follows:

- **Cold Start Event:** The combustion turbine and steam generation system are at ambient temperature at the time of startup. These conditions are expected to occur if the equipment has been non-operational for 48 hours. It can take up to 60 minutes from fuel initiation for the equipment to reach a base load operating rate.
- **Warm Start Event:** The combustion turbine and steam generation system have been non-operational between 10 and 48 hours. It can take up to 30 minutes from fuel initiation for the equipment to reach a base load operating rate.
- **Hot Start Event:** The combustion turbine and steam generation system have been non-operational up to10 hours. It can take up to 30 minutes from fuel initiation for the equipment to reach a base load operating rate.

A shutdown event for the AEC CCGT starts at the initiation of the turbine shutdown sequence and ends with the cessation of turbine firing. The emissions associated with a shutdown event are expected to be less than startup events but more than normal operation. During the shutdown event, the emission control equipment ceases operation but the SCR and CO catalysts remain at elevated temperatures and controls emissions for a portion of the shutdown.

The emission rates for startup and shutdown events for the combined-cycle turbines are summarized in **Air Quality Table 20**. The emission rates for warm and hot startup events are equivalent therefore the categories are combined.

Air Quality Table 20
Combined-Cycle Startup and Shutdown Emission Rates Per Turbine

Combined-Cycle Event Description[a]	Event Duration	Emissions (lbs/event) and (lbs/hour)				
		NOx	**CO**	**VOC**	**SOx**	**PM10/2.5**
Cold Startup (lbs/event) Cold Startup (lbs/hour)	60 (min)	61.0 61.0	325 325	36.0 36.0	< 4.86 < 4.86	< 8.5 < 8.5
Warm/Hot Startup (lbs/event) Warm/Hot Startup (lbs/hour)	30 (min)	17.0 25.2	137 142	25.0 27.9	- < 4.86	- < 8.5
Shutdown (lbs/event) Shutdown (lbs/hour)	30 (min)	10.0 18.2	133 138	32.0 34.9	- < 4.86	- < 8.5

Source: CH2 2016s, SCAQMD 2016b and staff analysis.
[a] Staff is recommending the definitions be updated in the FSA

Normal or steady-state operations describe operation for the AEC CCGT when the CTGS, HRSGs, SCR/Co catalysts and STG are functioning as designed. During steady-state operations the emissions are controlled to BACT levels. NOx is controlled to 2.0 ppmvd, CO to 2.0 ppmvd, and VOC to 2.0 ppmvd at 15 percent oxygen. Emission rates for criteria pollutants vary depending on the operational profile of the equipment. The applicant provided estimated emission rates for 11 cases of turbine operation over various loads, and temperatures in the SAFC. An additional 3 cases were provided to the SCAQMD and are included in the SCAQMD Preliminary Determination of Compliance (PDOC). This information was used to assess maximum emissions using worst-case assumptions. The maximum hourly emission rates for steady-state operations for the AEC CCGT not including startup or shutdown emissions are based on Case 1 conditions and are included in **Air Quality Table 21**.

Air Quality Table 21
Maximum Combined-Cycle Hourly Steady-State Emission Rates

Combined-Cycle	Maximum Hourly Steady-State Emission Rates[a]					
	NOx	**CO**	**VOC**	**SOx[b]**	**PM10/2.5**	**NH_3**
Controlled (ppmvd)	2 (1-hour)	2 (1-hour)	2 (1-hour)	N/A	N/A	5
Emission Rates (lb/hr)	16.5	10.0	5.75	4.86	8.5	15.3

Source: Source: CH2 2016s
Note: [a] Based on ambient temperature of 28°F and excluded start-up and shutdown
[b] Based upon 0.75 gr/100 scf; worst case, short-term sulfur content of natural gas.

The expected maximum daily, monthly, and annual emissions for the AEC CCGT were determined factoring in potential startup and shutdown events with steady-state operation. The operating profiles for determining the emission rates and emissions from these operating periods are discussed above. **Air Quality Table 22** lists the combined warm and hot startup operating events proposed in the SAFC due to the identical emission rates and durations proposed for these events.

Air Quality Table 22
Combined-Cycle Operating Profile

Combined-Cycle Operating Parameters	Events	Hours
Daily		
Cold Startup	2	2
Warm/Hot Startup	0	0
Shutdown	2	1
Steady-State	--	21
Total Daily	--	24
Monthly		
Cold Startup	15	15
Warm/Hot Startup	47	23.5
Shutdown	62	31
Steady-State	--	674.5
Total Monthly	--	744
Annual		
Cold Startup	80	80
Warm/Hot Startup	420	210
Shutdown	500	250
Steady-State		4,100
Total Annually		4,640

Source: CH2 2016s, SCAQMD 2016b and staff analysis.

The expected natural gas use and emissions for the AEC CCGT are included below in the Total Facility subsection. For the analysis, commissioning is expected to take a full six months and normal or steady state operation will begin with no overlap with daily or monthly emission estimates.

Simple-Cycle Turbines

The AEC SCGT has one startup scenario and a more simplistic shutdown sequence. The Air Quality Conditions of Certification includes the proposed parameters for the AEC SCGT startup and shutdown events. The emission rates for startup and shutdown events for the simple turbines are summarized in **Air Quality Table 23.**

Air Quality Table 23
Simple Startup and Shutdown Emission Rates Per Turbine

Simple Event Description	Event Duration	Emissions (lbs/event) and (lbs/hour)				
		NOx	CO	VOC	SOx	PM10/2.5
Startup (lbs/event) Startup (lbs/hour)	30 (min)	16.6 20.7	15.4 19.4	2.80 3.95	0.82 < 1.62	3.12 < 6.23
Shutdown (lbs/event) Shutdown (lbs/hour)	13 (min)/ 0.22 (hr)	3.12 9.56	28.1 34.4	3.06 4.86	0.35 < 1.62	1.35 < 6.23

Source: CH2 2016s, SCAQMD 2016b and staff analysis.

Normal or steady-state operations describe operation for the AEC SCGT when the CTGS and SCR/CO catalysts are functioning. NOx is controlled to 2.5 ppmvd, CO to 4.0 ppmvd, and VOC to 2.0 ppmvd at 15 percent oxygen. Emission rates for criteria pollutants vary depending on the operational profile of the equipment. The applicant provided estimated emission rates for 11 cases of turbine operation over various loads, and temperatures in the SAFC. An additional 3 cases were provided to the SCAQMD and are included in the SCAQMD PDOC. This information was used to assess maximum emissions using worst-case assumptions. The maximum hourly emission rates for steady-state operations for the AEC SCGT not including startup or shutdown emissions are based on Case 1 and are included in **Air Quality Table 24**.

Air Quality Table 24
Maximum Simple-Cycle Hourly Steady-State Emission Rates

Simple-Cycle	Maximum Hourly Steady-State Emission Rates[a]					
	NOx	CO	VOC	SOx[b]	PM10/2.5	NH_3
Controlled (ppmvd)	2.5 (1-hour)	4 (1-hour)	2 (1-hour)	N/A	N/A	5
Emission Rates (lb/hr)	8.23	8.01	2.30	1.62	6.23	6.09

Source: CH2 2016s.
Note: [a] Based on ambient temperature of 28°F and excluded start-up and shutdown
[b] Based upon 0.75 gr/100 scf; worst case, short-term sulfur content of natural gas.

The expected maximum daily, monthly, and annual emissions for the AEC SCGT were determined factoring in potential startup and shutdown events with steady-state operation. The operating profiles for determining the emission rates and emissions from these operating periods are included in **Air Quality Table 25**.

Air Quality Table 25
Simple-Cycle Operating Profile

Simple-Cycle Operating Parameters	Events	Hours
Daily		
Startup	2	1
Shutdown	2	0.4[a]
Steady-State	--	22.6
Total Daily	--	24
Monthly		
Startup	62	31
Shutdown	62	13.4
Steady-State	--	700
Total Monthly	--	744
Annual		
Startup	500	250
Shutdown	500	108
Steady-State	--	2,000
Total Annually	--	2,358

Source: CH2 2016s, SCAQMD 2016b and staff analysis.
Note: [a] Calculated: 2 events * 13 min / 60 min/hr
[b] Calculated: 62 events * 13 min / 60 min/hr

The expected natural gas use and emissions for the AEC SCGT are included below in the Total Facility subsection.

Auxiliary Boiler

Startup events for auxiliary boiler include three classifications: cold, warm and hot. The Air Quality Conditions of Certification includes proposed definitions for these classifications. The events are currently described as follows:

- **Cold Start Event:** The auxiliary boiler is at ambient temperature at the time of startup. These conditions are expected to occur if the equipment has been non-operational for 48 hours. It can take up to 170 minutes from fuel initiation for the equipment to reach a base load operating rate.
- **Warm Start Event:** The auxiliary boiler has been non-operational between 10 and 48 hours. It can take up to 85 minutes from fuel initiation for the equipment to reach a base load operating rate.
- **Hot Start Event:** The auxiliary boiler has been non-operational up to10 hours. It can take up to 25 minutes from fuel initiation for the equipment to reach a base load operating rate.

A shutdown for the auxiliary boiler is almost instantaneous and therefore a shutdown scenario for the boiler does not need to be developed. The auxiliary boiler emission rates for startup events are summarized in **Air Quality Table 26**.

Air Quality Table 26
Auxiliary Boiler Startup Emission Rates

Auxiliary Boiler Event Description	Event Duration	Emissions (lbs/event) and (lbs/hour)				
		NOx	CO	VOC	SOx	PM10/2.5
Cold Startup (lbs/event) Cold Startup (lbs/hour)	170 min	4.22 1.49	4.34 1.53	4.69 1.65	0.24 <0.048	0.84 <0.3
Warm Startup (lbs/event) Warm Startup (lbs/hour)	85 min	2.11 1.49	2.17 1.53	2.34 1.65	0.12 <0.048	0.42 <0.3
Hot Startup (lbs/event) Hot Startup (lbs/hour)	25 min	0.62 0.87	0.64 2.29	0.69 0.69	0.035 <0.048	0.12 <0.3

Source: CH2 2016s, SCAQMD 2016b and staff analysis.

Normal or steady-state operation emission factors for auxiliary boilers are not as heavily influenced by external parameters such as weather as compared to the AEC CCGT and SCGT. The original auxiliary boiler operational emission rates proposed were based on the maximum heat input rating of 70.8 MMBtu/hr. In emails dated 1/7/2016 and 4/6/2016, AES requests to SCAQMD to permit the boiler at a reduced operating emission rate. Per an email dated 4/6/2016, AES requested a monthly heat input limit. The SCAQMD calculated the hourly emissions rate based on the boiler at 21.23 MMBtu/hr corresponding to operation at approximately 30 percent load (modeling was performed at maximum impacts). The revised SAFC submitted to the Energy Commission on 4/12/2016 included hourly emission rates based on the maximum hourly heat input of 70.8 MMBtu/hr. **Air Quality Table 27** includes the proposed auxiliary boiler parameters.

Air Quality Table 27
Maximum Auxiliary Boiler Hourly Steady-State Emission Rates

Auxiliary-Boiler	Maximum Hourly Steady-State Emission Rates				
	NOx	CO	VOC	SOx[a]	PM10/2.5
Controlled	5 ppmv	50 ppmv	0.0052 lb/MMBtu	0.0020 lb/MMBtu	0.0072 lb/MMBtu
AEC Emission Rates (lb/hr)	0.42	2.83	0.47	0.14	0.51
SCAQMD Emission Rate (lb/hr)	0.13	0.80	0.11	0.042	0.15

Source: CH2 2016s and staff analysis.
Note: [a] Based upon 0.75 gr/100 scf; worst case, short-term sulfur content of natural gas.

The proposed maximum daily, monthly, and annual emissions for the auxiliary boiler were determined factoring in potential startup and shutdown events with steady-state operation. Proposed daily, monthly and annual emissions are calculated based off of the proposed monthly operating profile included in **Air Quality Table 28**. The daily emissions were calculated by dividing the proposed monthly emissions by an assumed thirty days per month and the annual emissions are based of the monthly multiplied by an assumed 12 months per year.

Air Quality Table 28
Auxiliary Boiler Operating Profile

Auxiliary Boiler Operating Parameters	Events	Hours
Monthly		
Cold Startup	2	2.83
Warm Startup	4	1.42
Hot Startup	4	0.42
Steady-State	--	730.98
Total Monthly[c]	--	744

Source: CH2 2016s, SCAQMD 2016b and staff analysis.
[c] Total monthly hours is the total of the events times the expected duration hours

The expected natural gas use and emissions for the auxiliary boiler are included below in the Total Facility subsection.

Oil/Water Separators

Two 5,000 gallon oil/water separators would be utilized to collect equipment wash water and rainfall. The wash water and rainfall would be contaminated with lubricating oils and grease from the equipment which could be a source of VOCs. An emission factor of 0.000018 pound of VOC per 1000 gallons of wastewater was derived by the SCAQMD based on the U.S. EPA Compilation of Air Pollutant Emission Factors Section 5.1, Table 5.1-3 Fugitive Emission Factors for Petroleum Refineries adjusted according to the vapor pressure of the turbine lubricant**.** The oil/water separators associated with the AEC CCGT and AEC SCGT would collect from a total containment area of 106,000 square feet and 16,177 square feet respectively. An annual average precipitation in Long Beach of 13 inches was used as the worst case maximum monthly precipitation to determine the maximum monthly volume of waste water. The calculated oil/water separator emissions are summarized in **Air Quality Table 29**.

Air Quality Table 29
Oil/Water Separator Emissions

Equipment and Duration	Oil/Water Separator	
	Maximum Volume (gallons)	**VOC (pounds)**
AEC CCGT Separator 30-day average	26,958	0.0005
AEC CCGT Separator Monthly	808,737.6	0.015
AEC CCGT Separator Annual	9,704,851	0.18
AEC SCGT Separator 30-day average	4,114	0.00007
AEC SCGT Separator Monthly	123,424	0.0022
AEC SCGT Separator Annual	1,481,088	0.0264
Total	------	0.2064

Source: SCAQMD 2016b and staff analysis.

Total Facility

Air Quality Table 30 presents the expected maximum fuel use for normal operation (excluding commissioning), for each combustion emissions source and the expected facility total based on manufacturer's equipment data and the operating profiles presented in each equipment section. Case 1 conditions are used to determine the expected hourly, daily and monthly fuel usage. Case 4 (65.3 degrees Fahrenheit, maximum load, inlet air cooling) conditions are used to determine the expected annual fuel usage. Case 4 is used for annual calculations because the parameters are based on a temperature considered more representative of annual conditions expected at the AEC site.

Air Quality Table 30
Estimated AEC Equipment Fuel Use

Equipment	Hourly Usage	Daily Usage	Monthly Usage	Annual Usage
AEC CCGT (MMBtu per unit)[a]	2,275	54,604	1,692,600	10,440,000
AEC CCGT (mmscf/hr per unit)[b]	2.2	52	1,612	9,943
AEC CCGT (total MMBtu)[c]	4,550	109,208	3,385,200	20,875,372
AEC SCGT (MMBtu per unit)[a]	879	21,096	653,976	2,065,608
AEC SCGT (mmscf/hr per unit)[b]	0.8	20	622.83	1,967
AEC SCGT (total MMBtu)[d]	3,516	84,276	2,615,904	8,262,432
Auxiliary Boiler (MMBtu)[e]	70.8	535	16,057	189,120
Facility Total	8,137	194,019	6,017,161	29,326,924

Source: CH2 2016s, SCAQMD 2016b and staff analysis.
Note:[a] Hourly, daily and monthly usage based upon Case 1 conditions. Annual usage based on Case 4 conditions.
[b] Based on fuel BTU content of 1050 MMBtu/mmscf
[c] Based on two CCGTs
[d] Based on four SCGTs
[e] Hourly and daily based on maximum heat input. Monthly and annual based on reduced load corresponding to approximately 21.23 MMBtu/hr

Air Quality Table 31 includes estimated operational emissions for routine operation for the proposed AEC. The emissions are calculated based on the equipment emission rates and operating profiles for each emission unit.

AIR QUALITY Table 31
Estimated AEC Operational Emissions

Project Component	Total Emissions				
	NOx	CO	VOC	SOx[a]	PM10/2.5
	Maximum Daily Operations (lbs/day)				
AEC CCGT	488.50	1,126.00	256.75	116.64	204.00
AEC SCGT	225.11	267.71	63.61	38.89	149.49
Auxiliary Boiler[a]	10.88	69.62	12.17	3.54	12.46
Auxiliary Boiler[b] (30-day)	3.81	20.16	3.4	1.06	3.78
Equipment Total[a]	1,888	3,392	780	392	1,018
Equipment Total[b]	1,881	3,343	771	390	1,010
	Maximum Monthly Operations (lbs/month)				
AEC CCGT	13,463.25	26,305.00	7577.38	3,615.84	6,324.00
AEC SCGT	6,983.64	8,304.0	1,973.32	1,206.55	4,638.14
Auxiliary Boiler[a]	114.39	604.70	101.91	31.8	113.49
Auxiliary Boiler[b]	326.37	2,088.59	365.06	106.18	373.90
AEC CCGT Separator	----	----	0.015	----	----
AEC SCGT Separator	----	----	0.0022		----
Equipment Total[a]	54,975	86,431	23,150	12,090	31,314
Equipment Total[b]	55,187	87,915	23,413	12,164	31,574
	Maximum Monthly Operation (tons/year)				
Equipment Total[a]	27.49	43.22	11.57	6.04	15.66
Equipment Total[b]	27.59	43.96	11.71	6.08	15.79
	Maximum Annual Operation (lbs/year)				
AEC CCGT	83,850	190,753	52,668	7,435	39,440
AEC SCGT	26,260	37,710	7,510	1,275	14,695
Auxiliary Boiler	1,350.8	7,256	1.223	382	1,362
AEC CCGT Separator	----	----	0.18	----	----
AEC SCGT Separator	----	----	0.0264		----
	Maximum Annual Operation (tons/year)				
AEC CCGT	41.93	95.38	26.33	3.72	19.72
AEC SCGT	13.13	18.86	3.76	7.35	0.64
Auxiliary Boiler	0.68	3.63	0.61	0.19	0.68
AEC CCGT Separator	----	----	0.00009	----	----
AEC SCGT Separator	----	----	0.000013		----
	Maximum Combined Equipment Annual Operation (tons/year)				
AEC CCGTs (total)	83.68	190.76	52.66	7.44	39.44
AEC SCGTs (total)	52.52	75.42	15.02	2.55	29.39
Auxiliary Boiler	0.68	3.63	0.61	0.19	0.68
Oil/Water Separators	----	----	0.000103	----	----
Total Facility	137	270	68	10	70

Source: CH2 2016s, SCAQMD 2016b and staff analysis.

Notes: [a] Emissions Includes two CCGTS and four SCGTs. Based on maximum auxiliary boiler heat input.
[b] Emissions Includes two CCGTS and four SCGTs. Based on auxiliary boiler reduced heat input used by SCAQMD

The maximum commissioning year emissions are included in **Air Quality Table 32.** Maximum commissioning year emissions calculated by adding the total emissions from commissioning to the remaining maximum normal operating emissions for the remaining timeframe. For example, the commissioning of the AEC CCGT is expected to take 6 months. The commissioning year emissions would include emissions from the commissioning period and 6 months of routing operation emissions. Maximum commissioning year emissions are used to determine the first year RECLAIM requirements. Since the auxiliary boiler would have a minimal commissioning period, maximum annual emissions are used for the auxiliary boiler commissioning year emissions.

AIR QUALITY Table 32
Maximum Annual Emissions, Commissioning Year

	Commissioning Year Emissions (lbs/year)				
Project Component	**NOx**	**CO**	**VOC**	**SOx**	**PM10/2.5**
AEC CCGT	108,377	259,158	60,146	46,410	26,536
AEC SCGT	68,575	100,131	18,596	43,487	11,312
Auxiliary Boiler	1,351	7,256	1.223	382	1,362

Source: SCAQMD 2016b

Ammonia Emissions

Ammonia (NH_3) is injected into the flue gas stream as part of the SCR system that controls NOx emissions. In the presence of the catalyst, the ammonia and NOx react to form harmless elemental nitrogen and water vapor. However, not all of the ammonia reacts with the flue gases to reduce NOx; a portion of the ammonia passes through the SCR and is emitted unaltered from the stacks. These ammonia emissions are known as ammonia slip.

Per BACT, SCAQMD requires a maximum ammonia slip rate of 5 ppmvd at 15 percent oxygen for the proposed turbines and 5 ppmvd at 3 percent oxygen for the auxiliary boiler. The expected ammonia emissions from the SCR/CO oxidation catalyst systems are included in **Air Quality Table 33.** For the AEC CCGT and AEC SCGT, Case 1 was used in conjunction with the 5 ppm NH_3 BACT limit to calculate a maximum hourly ammonia emission rate. The annual emission rate is based off of Case 4 and the AEC CCGT operating profile in **Air Quality Table** 22. The maximum hourly emission rate for the auxiliary boiler assumed the boiler operated at maximum heat input. The auxiliary boiler annual and annual hourly rate assumes the load reduction used by the SCAQMD.

Air Quality Table 33
Estimated AEC Equipment Ammonia Emissions

Equipment	Maximum Hourly Rate (lbs/hr)	Annual Hourly Rate (lbs/hr)	Maximum Annual (lbs/year)	Maximum Annual (ton/year)
AEC CCGT[a]	15.7	15.1	70,004	35.0
AEC SCGT[a]	6.09	6.07	14,313	7.16
Auxiliary Boiler[b]	0.16	0.05	423	0.22
Total Equipment[c]	---	----	197,683	98.86

Source: SCAQMD 2016b and staff analysis.
Note: [a] Maximum hourly is based on Case 1, Max hourly based on Case 4
[b] Max hourly is based on maximum heat input. Annual hourly is based on reduced load.
[C] Total Equipment consists of two CCGTs, four SCGTs and one auxiliary boiler

The project owner expects the ammonia slip rate from the SCRs of the of the GE 7FA.05 turbines, the GE LMS-100PB turbines, and the auxiliary boiler would not exceed the 5 ppmvd limit. Energy Commission staff notes that control systems can be operated and maintained to routinely achieve less than 5 ppmvd, as established in the Guidance for Power Plant Siting (ARB 1999). The SCAQMD PDOC includes proposed permit conditions establishing a 5 ppmvd emissions limit for ammonia on the proposed turbines and the auxiliary boiler. These conditions would be incorporated into the conditions of certification.

The proposed AEC includes two 40,000 gallon storage tanks. No ammonia emissions are expected from the tanks because the filling losses will be controlled by a vapor return line and the breathing losses by a 50 psig pressure valve.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Potential impacts from the AEC result from the proposed construction, initial commissioning, and normal operation phases, and cumulative effects. Cumulative impacts analysis assesses the impacts that result from the proposed project's incremental effect viewed over time, together with other closely related past, present, and reasonably foreseeable future projects whose impacts may compound or increase the incremental effect of the proposed project. (Pub. Resources Code § 21083; Cal. Code Regs., tit. 14, §§ 15064(h), 15065I, 15130, and 15355). Additionally, cumulative impacts are assessed in terms of conformance with the District's attainment or maintenance plans.

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

Staff characterizes air quality impacts as follows: All project emissions of nonattainment criteria pollutants and their precursors (NOx, VOC, PM10, PM2.5, and SOx) are considered significant and must be mitigated. For short-term construction activities that essentially cease before operation of the power plant, our assessment is qualitative and mitigation consists of controlling construction equipment tailpipe emissions and fugitive dust emissions to the maximum extent feasible. For operating emissions, mitigation includes both the Best Available Control Technology (BACT) and emission reduction credits (ERC) or other valid emission reductions to mitigate emissions of both nonattainment criteria pollutants and their precursors.

The ambient air quality standards used by staff as the basis for characterizing project impacts are health-based standards established by the ARB and U.S. EPA. They are set at levels that contain a margin of safety to adequately protect the health of all people, including those most sensitive to adverse air quality impacts such as the elderly, persons with existing illnesses, children, and infants.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Ambient air quality impacts occur when project emissions cause the ambient concentration of a pollutant to increase. The proposed project emits pollutants on a mass basis. Project-related emissions are the actual mass of emitted pollutants, which are dispersed in the atmosphere before reaching the ground. Impacts refer to the concentration of any pollutant that reaches the ground level. An impact analysis includes quantifying the emissions released from the proposed equipment and the use of an atmospheric dispersion model to determine the probable impact at ground level. The analysis focuses on the predicted change to the ground level impact due to the additional emissions from the proposed project.

Air dispersion models provide a means of predicting the location and ground level magnitude of the impacts of a new emissions source. These models consist of several complex series of mathematical equations, which are repeatedly calculated by a computer for many ambient conditions to provide theoretical maximum offsite pollutant concentrations for short-term (one-hour, three-hour, eight-hour, and 24-hour) and annual periods. The model results are generally described as maximum concentrations, often described as a unit of mass per volume of air, such as micrograms per cubic meter ($\mu g/m^3$).

The project owner conducted air dispersion modeling based on guidance presented in the *Guideline on Air Quality Models* (40 CFR Part 51, Appendix W) and the American Meteorological Society/Environmental Protection Agency Regulatory Model known as AERMOD (version 15181). The U.S. EPA designates AERMOD as a “preferred” model for refined modeling in all types of terrain. AERMOD considers emissions in the context of various ambient meteorological conditions, local terrain and nearby structures that could affect air flow.

The inputs for the air dispersion models include stack information (exhaust flow rate, temperature, and stack dimensions), specific turbine emission data and meteorological data, such as wind speed and atmospheric conditions, and site elevation. For the proposed AEC, the meteorological data collected at the North Long Beach site was selected for the modeling because the station is the closest to the proposed site, there is no complex terrain between the station and the proposed site, and the land uses surrounding the monitoring site and AEC are similar. Specifically both are surrounded by a mix of low, medium and high intensity land use and have open water within 10 miles to the south-southwest.

North Long Beach station meteorological data was compiled by the SCAQMD for the dispersion modeling analysis. The compiled data includes years 2006 -2009 and 2011. Data from 2010 was not recommended by the SCAMQD due to incompleteness. In addition 2012 data was not recommended due to suspicious wind speed. The complied data was provided by the SCAQMD to the project owner to be processed through AERMET.

U.S. EPA approved NO_2 to NOx conversion ratios of 0.80 and 0.75 are assumed for evaluating 1-hour and annual NO_2 impacts from the project respectively. The base modeling receptor grid for AERMOD modeled impacts consists of receptors placed at the project's property boundary and Cartesian-grid receptors that are placed beyond the Project's site boundary at spacing that increases with distance from the origin. An additional receptor was placed at the charter school located at the proposed AEC site.

Project-related modeled concentrations are added to the highest background concentrations to determine the total impact of the project. This is a conservative approach because it assumes the highest project impacts occur concurrently with the worst case background concentrations. Staff revised the background concentrations provided by the project owner where necessary to reflect the most recent worst case background values. The background values used by staff are the values in **Air Quality Table 12**. Staff combined the project owner modeled impacts with the appropriate background concentrations, and compares the results with the ambient air quality standards for each respective air contaminant to determine whether the project's emission impacts would cause a new exceedance of the ambient air quality standards or would contribute to an existing exceedance.

CONSTRUCTION IMPACTS

The AEC short-term construction ambient air quality impacts were estimated by the project owner. The maximum construction emission estimates are associated with the construction of Power Block 1, or the AEC CCGT. This activity is expected to last approximately 34 months and will occur while the existing AGS is in operation. In order to accurately capture the impacts of the construction while the existing AGS boilers are in operation, overlap scenarios were developed and modeled. The modeled overlap scenario including AEC CCGT is described as follows:

- **Overlap Scenario 1**: AEC CCGT construction with simultaneous operation of the existing AGS Units 1-6.

The construction of the two power blocks will occur at different time periods. The construction of the SGCT is expected to occur between May 2020 and August 2021. During this time period the AEC CCGT is expected to be in operation. AEC developed a second overlap scenario capture the impacts of the operation of the AEC CCGT while the AEC SCGT is undergoing construction. In addition, AEC included the potential overlap of the operation of the existing AGS boilers 3, 4 and 6. AGS boilers 1, 2 and 5 will be retired once the AEC CCGT commences operation and are therefore not included. In addition, according to the current schedule, existing AGS Units 3, 4 and 6 are scheduled for retirement prior to the expected completion of the AEC SCGT.

- **Overlap Scenario 2**: AEC SCGT construction with the simultaneous operation of the AEC CCGT and existing AGS Units 3, 4 and 6

The modeled impacts from these overlap scenarios are included in the Overlap Impacts Analysis section and included in the Operation Impacts and Mitigation section after Visibility Impacts. In addition the construction mitigation discussion will be included following the overlap impacts discussion.

OPERATION IMPACTS AND MITIGATION

The following section discusses the project's direct and cumulative ambient air quality impacts, as estimated by the project owner and subsequently evaluated by staff. The facility owner performed a number of direct impact modeling analyses for routine operations including start up and shutdown scenarios, shoreline fumigation and inversion break-up, commissioning activities, and whole facility overlap scenarios.

Routine Operation Impacts

Emissions and operating parameters exhibit variation with ambient temperature and operating load. To determine the worst case air quality impacts a dispersion modeling analysis was conducted at three load scenarios and at three different temperature. The load scenarios are minimum (45 percent for AEC CCGT and 50 percent for AEC SCGT), average (75 percent) and full load (100 percent) and ambient temperatures are 28, 65.3 and 107 degrees Fahrenheit. Source parameters were provided by the manufacturer for the different scenarios.

The modeling assessment for the AEC CCGT included the following assumptions and conditions for normal operation and startup/shutdown scenarios:

- The maximum 1-hour impacts assumed that both GE Frame 7FA.05 units were in start-up mode.
- The 3-hour SO_2 impacts assumed both GE Frame 7FA.05 units were in continuous average load operation.
- The 1-, 3-, and 24-hour SO_2 emission rates were based off a fuel sulfur concentration of 0.75 grain of sulfur per 100 dscf of natural gas.
- The 8-hour CO emission rates were based on two cold starts, two shutdowns and the balance in steady-state operation.
- .The 24-hour PM10 and PM2.5 emission rates used 8.5 pounds per hour for each modeling scenario.
- The annual emission rates were based on 4,100 hours of steady-state operation, 80 cold startups 88 warm startups and 332 hot startups and 500 shutdowns.
- The stack heights would all be 42.7 meters with 6.10 meter diameters.

Air Quality Table 34 includes the AEC CCGT operating assumptions used in the modeling analysis.

Air Quality Table 34
Modeled Scenarios for the Combined-Cycle Gas Turbines

Pollutant	Averaging Period	Operating Case Scenario	Operating Load	Emission Rate (lbs/hr)
NO_2	1 hour	Case 3	Minimum	61
	1 hour NAAQS	Case 3	Minimum	61
	Annual	Case 7	Minimum	6.24
CO	1 hour	Case 3	Minimum	325
	8 hour	Case 3	Minimum	118
PM10	24 hour	Case 7	Minimum	8.5
	Annual	Case 7	Minimum	4.5
PM2.5	24 hour	Case 7	Minimum	8.5
	Annual	Case 7	Minimum	4.5
SO_2	1 hour	Case 2	Average	3.84
	1 hour NAAQS	Case 6	Average	3.72
	3 hour NAAQS	Case 6	Average	3.72
	24 hour	Case 6	Average	3.72

Source: CH2 2016s, Table 5.1 -31,

The modeling assessment for the AEC SCGT included the following assumptions and conditions for normal operation and startup/shutdown scenarios:

- The maximum 1-hour impacts assumed that all four GE LMS-100PB were in start-up mode.
- The 1-, 3-, and 24-hour SO_2 emission rates were based off a fuel sulfur concentration of 0.75 grain of sulfur per 100 dscf of natural gas.
- The 8-hour CO emission rates were based on two starts, two shutdowns and the balance in steady-state operation.
- .The 24-hour PM10 and PM2.5 emission rates used 6.23 pounds per hour for each modeling scenario.
- The annual emission rates were based on 2,000 hours of steady-state operation, 500 startups and 500 shutdowns.
- The stack heights would all be 24.4 meters with 4.11 meter diameters.

Air Quality Table 35 includes the AEC SCGT operating assumptions used in the modeling analysis.

Air Quality Table 35
Modeled Scenarios for the Simple-Cycle Gas Turbines

Pollutant	Averaging Period	Operating Case Scenario	Operating Load	Emission Rate (lbs/hr)
NO_2	1 hour	Case 3	Minimum	21.2
	1 hour NAAQS	Case 3	Minimum	21.2
	Annual	Case 7	Minimum	2.29
CO	1 hour	Case 3	Minimum	44.9
	8 hour	Case 3	Minimum	15
PM10	24 hour	Case 7	Minimum	6.23
	Annual	Case 7	Minimum	1.68
PM2.5	24 hour	Case 7	Minimum	6.23
	Annual	Case 7	Minimum	1.68
SO_2	1 hour	Case 1	Maximum	1.62
	1 hour NAAQS	Case 5	Maximum	1.61
	3 hour NAAQS	Case 5	Maximum	1.61
	24 hour	Case 5	Maximum	1.61

Source: CH2 2016s, Table 5.1 -31,

The modeling assessment for the auxiliary boiler included the following assumptions and conditions for normal operation and startup/shutdown scenarios:

- The maximum 1- and 3-hour impacts were based on the maximum hourly firing rates, excluding startup and shutdown.
- The 1-, 3-, and 24-hour SO_2 emission rates were based off a fuel sulfur concentration of 0.75 grain of sulfur per 100 dscf of natural gas.
- The 8-hour CO emission rates were based on one cold startup and the balance in steady-state operation.
- The 24-hour emission rates were based on 30-day average monthly emissions rates including a heat input of 16,055 MMBtu, 2 cold startups, 4 warm startups and 4 hot startups.
- The annual emission rates were based on a heat input of 189,155 MMBtu, 24 cold startups, 48 warm startups and 48 hot startups.
- The stack height would be 24.4 meters and the exhaust temperature would be 318 degrees Fahrenheit.

Air Quality Table 36 includes the auxiliary boiler emission rates used for the modeling analysis.

Air Quality Table 36
Modeled Emission Rates for the Auxiliary Boilers

Pollutant	Averaging Period	Emission Rate (lbs/hr)
NO_2	1 hour	0.42
	1 hour NAAQS	0.42
	Annual	0.15
CO	1 hour	2.83
	8 hour	2.37
PM10	24 hour	0.16
	Annual	0.15
PM2.5	24 hour	0.16
	Annual	0.15
SO_2	1 hour	0.14
	1 hour NAAQS	0.14
	3 hour NAAQS	0.14
	24 hour	0.046

Source: CH2 2016s, Table 5.1 -31

Air Quality Table 37 summarizes the predicted maximum concentrations for criteria pollutants and the corresponding averaging period. The table includes background values and compares the total impact to the limiting AAQS. The values shown in bold indicated an exceedance of an air quality standard.

Air Quality Table 37
Proposed AEC Routine Operations Impacts

Pollutant	Averaging Period	Project Impact ($\mu g/m^3$)	Background ($\mu g/m^3$)[a]	Total Impact ($\mu g/m^3$)	Limiting Standard ($\mu g/m^3$)	Percent of Standard
NO_2	1 hour	31.3	256	287	339	85%
	1 hour NAAQS	22.6	146	169	188	90%
	Annual	0.20	48	48	57	84%
PM10	24 hour	1.71	**59**	**61**	50	**121%**
	Annual	0.19	**27.3**	**27.49**	20	**137%**
PM2.5	24 hour	1.25	27.2	28.45	35	81%
	Annual	0.19	10.97	11.16	12	93%
CO	1 hour	186	3,665	3851	23,000	17%
	8 hour	44.3	2,978	3022	10,000	30%
SO_2	1 hour	2.12	58	60	655	9%
	1 hour NAAQS	1.59	31	32	196	16%
	3 hour NAAQS	1.69	58	60	1,300	5%
	24 hour	0.53	11	11	105	11%

Source: CH2 2016s Table 5.1 -38 and staff analysis.
[a] Background values are adjusted as presented in **Air Quality Table 12**

Air Quality Table 37 demonstrates that the project would not cause a significant impact except for 24-hour and annual PM10 emissions. Routine Operation Impacts could contribute to existing violations of annual PM10 ambient air quality standards. The impacts of PM2.5 are close to the most stringent standards due to the existing high background concentrations, but the routine project impacts would not create new violations.

The direct impacts of CO and SO_2 would not be significant because routine operation of the project would neither cause nor contribute to a violation of these standards. Mitigation for emissions of PM10, PM2.5, SOx, NOx, and VOC would be appropriate for reducing impacts to PM10, PM2.5, and ozone.

Fumigation Impacts Fumigation Modeling Impact Analysis

There is the potential that higher short-term concentrations of pollutants may occur during fumigation conditions. During the early morning hours before sunrise, the air is usually very stable. During such stable meteorological conditions, emissions from elevated stacks rise through this stable layer and are dispersed. When the sun first rises, the air at ground level is heated, resulting in a vertical (both rising and sinking air) mixing of air for a few hundred feet or so. Emissions from a stack that enter this vertically mixed layer of air would also be vertically mixed, bringing some of those emissions down to the ground level. Later in the day, as the sun continues to heat the ground, this vertical mixing layer becomes higher and higher, and the emissions plume becomes better dispersed. The early morning pollution event, called fumigation, usually lasts approximately 30 to 90 minutes.

Fumigation conditions are short-duration events and are generally only compared to one-hour standards. Two types of fumigation are analyzed using the SCREEN3 model: inversion breakup and shoreline. Inversion breakup fumigation occurs under low-wind conditions when a rising morning mixing height caps a stack (i.e., is at or right above the stack height) limiting plume rise and mixing, which fumigates the air below. Shoreline fumigation occurs near a large water body shoreline when both a roughness boundary and more dominant thermal boundary cause turbulent dispersion to be much more enhanced near the ground, fumigating air below.

The project owner completed a fumigation analysis using the U.S. EPA AERSCREEN (Version 15181) model. The analysis considered operating scenarios and loads included in the Routine Operation Analysis previously discussed using regulatory default mixing heights.

The SAFC analysis assumed all emission sources were located 2,960 meters from the shoreline. The combined-cycle and simple-cycle turbine stacks are expected to be located more than 3,000 meters away from the shoreline. The auxiliary boiler however is expected to be located 2,960 meters away from the shoreline. Fumigation events are short term meteorological events. Therefore, only short term averaging periods are considered. Federal NO_2 and SO_2 standards are not evaluated because of the long term averaging periods associated with those standards. Total project impacts were determined by adding the modeled impacts from the combined-cycle turbines, simple-cycle turbines and the auxiliary boiler.

The revised analysis indicated the combustion sources were too far away from the shoreline to result in shoreline fumigation occurrences. Shoreline fumigation was not calculated by AERSCREEN because the plume height was below the thermal internal boundary layer height for the distance to the shoreline. The results of the revised inversion break-up impacts analysis combined with background concentrations are included in **Air Quality Table 38.**

Air Quality Table 38
Maximum Revised Inversion Break-Up Impacts, (μg/m^3)

Pollutant	Averaging Period	Project Impact (μg/m^3)	Background (μg/m^3) [a]	Total Impact (μg/m^3)	Limiting Standard (μg/m^3)	Percent of Standard
NO_2	1 hour[b]	69.4	256	325	339	96%
CO	1 hour	414	3,665	4079	23,000	18%
	8 hour	138	2,978	3116	10,000	31%
SO_2	1 hour	4.9	58	63	655	10%
	3 hour	4.9	58	63	1,300	5%

Source: SCAQMD 2016b Table 50A and staff analysis.
[a] Background values are adjusted, based on staff analysis as presented in **Air Quality Table 12**.
[b] Includes an ambient NO_2 to NOx conversion ratio of 0.80

The maximum inversion break-up impacts combined with background values are below the applicable AAQS and therefore no further analysis is necessary.

Commissioning-Phase Impacts

Plant commissioning impacts from the AEC CCGT and AEC SCGT would occur during two separate periods. Each commissioning event would only occur over a short-term period. A dispersion analysis was provided by AES for both the AEC CCGT and AEC SCGT commissioning events.

The commissioning period for the AEC CCGT is expected to last 6 months. Commissioning activities for the combined-cycle turbines are expected to occur over approximately 1,992 operating hours total for both combustion turbines (996 hours per combustion turbine). The AERMOD dispersion analysis for Power Block 1 assumed both turbines would be simultaneously commissioned. The maximum impact would occur if both turbines were undergoing commissioning activities with the highest unabated emissions. For the AEC CCGT this corresponds to CTG Testing (Full Speed No Load).

The short term concentrations impacts from the commissioning phase were combined with ambient background concentrations and compared to the short-term AAQS. Emission rates of PM10, PM2.5 and SO_2 are generally expected to be equal or lower than normal operating rates during the commissioning phase due to reduced commissioning loads however lower operating loads can result in slightly elevated impacts. Annual impacts were also evaluated for during the commissioning year using the six month commissioning emissions and six months of normal operation. All commissioning scenarios included impacts from the steady state operation of the auxiliary boiler.

The federal 1-hour NO_2 and SO_2 standards are expressed as a 3-year average of the 98^{th} and 99^{th} percentile of the daily maximum 1-hour concentration respectively. Since these are statistically based standards, it is not applicable to the short-duration commissioning phase. Staff does not expect significant impacts due to the very limited commissioning period compared to the 3-year averaging time used for these standards.

Air Quality Table 39 includes the results of the AEC CCGT commissioning phase impact analysis. The predicted impacts from the PM10 emissions, highlighted in bold font, are above the CAAQS. However the PM10 background concentrations are above the CAAQS without taking into account an incremental contribution from the proposed AEC. Therefore the commissioning of the GE 7FA.05 combined-cycle turbines would contribute to existing violations of annual PM10 ambient air quality standard. The impacts from PM2.5 and NO_2 are close to the most stringent standards due to the existing high background concentrations, but would not create new violations.

Air Quality Table 39
Proposed Combined-Cycle Commissioning Impacts, ($\mu g/m^3$)[a]

Pollutant	Averaging Period	Project Impact[a] ($\mu g/m^3$)	Background ($\mu g/m^3$)	Total[b] Impact ($\mu g/m^3$)	Limiting Standard ($\mu g/m^3$)	Percent of Standard
NO_2[c]	1 hour	67.6	256	323.6	339	95%
	Annual	0.26	48	48	57	85%
PM10	24 hour	1.62	**59**	**61**	50	**121%**
	Annual	0.21	**27.3**	**27.5**	20	**138%**
PM2.5	24 hour[d]	1.14	27.2	28.3	35	81%
	Annual	0.21	10.97	11.18	12	93%
CO	1 hour	1,231	3,665	4,896	23,000	21%
	8 hour	835	2,978	3,813	10,000	38%
SO_2	1 hour	2.24	58	60	655	9%
	3 hour	1.92	58	60	1,300	5%
	24 hour	0.55	11	12	105	11%

Source: CH2 2016s and staff analysis
Notes:
[a] Includes impacts from commissioning of two GE Frame 7FA.05 turbines and normal operation of the auxiliary boiler
[b] Modeled concentration plus background values adjusted by staff
[c] NO_2 determined with U.S. EPA Ambient Ratio Method (ARM) based on NO_2/NOx ratio of 0.80 and 0.75 for 1-hour and annual averaging times respectively.
[d] The 24-hour PM2.5 standards is based on 5-year average, high-8^{th}-high modeled concentration

The commissioning period for the AEC SCGT is expected to last 90 days. Commissioning activities for the simple-cycle turbines are expected to occur over approximately 1,120 operating hours total for all four combustion turbines (280 hours per combustion turbine). The AERMOD dispersion analysis for Power Block 2 assumed the four CTGs would be simultaneously commissioned while both combined-cycle CTGs were operated in cold start mode. The maximum impact would occur if both turbines were undergoing commissioning activities with the highest unabated emissions. For the AEC SCGT this corresponds to emissions tuning.

The short term concentrations impacts from the commissioning phase were combined with ambient background concentrations and compared to the short-term AAQS. Emission rates of PM10, PM2.5 and SO_2 are generally expected to be equal or lower than normal operating rates. Annual impacts were also evaluated for during the commissioning year using the 90 day commissioning emissions and normal operation emissions for remainder. All commissioning scenarios included impacts from the steady state operation of the auxiliary boiler.

The federal 1-hour NO_2 standard is expressed as a 3-year average of the 98th percentile of the daily maximum 1-hour concentration. Since this is a statistically based standard, it is not applicable to the short-duration commissioning phase. Staff does not expect it to have significant impact due to the very limited commissioning period compared to the 3-year averaging time used for the standard.

Air Quality Table 40 includes the results of the AEC SCGT commissioning phase impact analysis. The predicted impacts from the PM10 emissions, highlighted in bold font, are above the CAAQS. However the PM10 background concentrations are above the CAAQS without taking into account an incremental contribution from the proposed AEC. Therefore the commissioning of the GE LMS-100PB simple-cycle turbines would contribute to existing violations of annual PM10 ambient air quality standard. The impacts from PM2.5 and NO_2 are close to the most stringent standards due to the existing high background concentrations, but would not create new violations.

Air Quality Table 40
Proposed Simple-Cycle Commissioning Impacts, (μg/m^3)[a]

Pollutant	Averaging Period	Project Impact[a] (μg/m^3)	Background (μg/m^3)	Total[b] Impact (μg/m^3)	Limiting Standard (μg/m^3)	Percent of Standard
NO_2[c]	1 hour	61.9	256	317.9	339	94%
	Annual	0.20	48	48	57	85%
PM10	24 hour	1.71	**59**	**61**	50	**121%**
	Annual	0.20	**27.3**	**27.5**	20	**138%**
PM2.5	24 hour[d]	1.25	27.2	28.5	35	81%
	Annual	0.20	10.97	11.17	12	93%
CO	1 hour	470	3,665	4,135	23,000	18%
	8 hour	240	2,978	3,218	10,000	32%
SO_2	1 hour	2.12	58	60	655	9%
	3 hour	1.69	58	60	1,300	5%
	24 hour	0.53	11	12	105	11%

Source: CH2 2016s and staff analysis
Notes:
[a] Includes impacts from commissioning of two GE Frame 7FA.05 turbines and normal operation of the auxiliary boiler
[b] Modeled concentration plus background values adjusted by staff
[c] NO_2 determined with U.S. EPA Ambient Ratio Method (ARM) based on NO_2/NOx ratio of 0.80 and 0.75 for 1-hour and annual averaging times respectively.
[d] The 24-hour PM2.5 standards is based on 5-year average, high-8th-high modeled concentration

Chemically Reactive Pollutant Impacts

The project's gaseous emissions of NOx, SOx, VOC, and ammonia can contribute to the formation of secondary pollutants: ozone and PM10/PM2.5.

Ozone Impacts

There are air dispersion models that can be used to quantify ozone impacts, but they are used for regional planning efforts where hundreds or even thousands of sources are input into the modeling to determine ozone impacts. Currently, there are no regulatory agency models approved for assessing single-source ozone impacts although guidance documents are becoming available. However, because of the known relationship of NOx and VOC emissions to ozone formation, it can be said that the emissions of NOx and VOC from the AEC project do have the potential (if left unmitigated) to contribute to higher ozone levels in the region. These impacts would be cumulatively significant because they would contribute to ongoing violations of the state and federal ozone ambient air quality standards.

PM2.5 Impacts

Secondary particulate formation, which is assumed to be 100 percent PM2.5, is the process of conversion from gaseous reactants to particulate products. The process of gas-to-particulate conversion, which occurs downwind from the point of emission, is complex and depends on many factors, including local humidity and the presence of air pollutants. The basic process assumes that the SOx and NOx emissions are converted into sulfuric acid and nitric acid first and then react with ambient ammonia to form sulfate and nitrate. The sulfuric acid reacts with ammonia much faster than nitric acid and converts completely and irreversibly to particulate form. Nitric acid reacts with ammonia to form both a particulate and a gas phase of ammonium nitrate. The particulate phase will tend to fall out; however, the gas phase can revert back to ammonia and nitric acid. Thus, under the right conditions, ammonium nitrate and nitric acid establish a balance of concentrations in the ambient air. There are two conditions that are of interest, described as *ammonia rich* and *ammonia limited*. The term ammonia rich indicates that there is more than enough ammonia to react with all the sulfuric acid and to establish a balance of nitric acid-ammonium nitrate. Further ammonia emissions in this case would not necessarily lead to increases in ambient PM2.5 concentrations. In the case of an ammonia limited environment, there is insufficient ammonia to establish a balance and thus additional ammonia would tend to increase PM2.5 concentrations.

U.S. EPA issued guidance on May 20th, 2014 that requires secondary PM2.5 impacts be addressed for sources seeking PSD permits. This guidance provides several methods, or tiers, that can be used to analyze secondary PM2.5 impacts; including refined air dispersion modeling methods.

Ammonia (NH_3) is a particulate precursor but not a criteria pollutant because there is no ambient air quality standard for ammonia. Reactive with sulfur and nitrogen compounds, ammonia can be found from natural sources, agricultural sources, and as a byproduct of tailpipe controls on motor vehicles and stack controls on power plants.

Energy Commission staff recommends limiting ammonia slip emissions to the maximum extent feasible. This level of control is appropriate for avoiding unnecessary ammonia emissions, consistent with staff policy to reduce emissions of all nonattainment pollutant precursors to the lowest feasible levels.

Visibility Impacts

A visibility analysis for Class II areas within 50 km of the proposed AEC site was performed using VISCREEN per the procedures outlined in the Workbook for Plume Visual Impact Screening and Analysis (EPA 1992). VISCREEN calculates the potential impact of a plume of specified emissions for specific transport and dispersion conditions. Tier I and Tier II assessments were conducted using Class I criterion which is conservative for Class II areas.

Air Quality Table 41 summarizes the VISCREEN results for the Class II areas evaluated.

Air Quality Table 41
Maximum Revised Inversion Break-Up Impacts, (μg/m^3)

Class II Area	Minimum Distance	Maximum Distance	Variable	Sky	Terrain	Criteria
Crystal Cove State Park	69.4	35.5	Color Difference	1.009	1.893	2.0
			Contrast	0.012	0.016	0.05
Water Canyon/Chino Hills State Park	29.6	42.2	Color Difference	1.393	1.951	2.0
			Contrast	0.016	0.016	0.05
Kenneth Hahn State Park	34.6	37.3	Color Difference	0.815	1.594	2.0
			Contrast	0.01	0.014	0.05

CH2 2016s Table 5.1-42

As shown in **Air Quality Table 41**, the modeled results for sky and terrain are below the Class I area criterion for both color difference and contrast.

Overlap Impact Analysis

Construction activities associated with the AEC would overlap with operation of both the existing AGS boilers and the AEC CCGT. As discussed in the Construction Impacts section, two overlap scenarios were developed for modeling:

- Overlap Scenario 1: AEC CCGT construction with simultaneous operation of existing AGS Units 1-6; and
- Overlap Scenario 2: AEC SCGT construction with simultaneous operation of the AEC CCGT and existing Units 3, 4 and 6.

Air Quality Table 42 summarizes the results of the modeling analysis for the modeled Overlap Scenario 1. The maximum construction short-term and annual emissions rates presented in **Air Quality Table 31** were used in conjunction with the maximum rolling 24-month emissions from 2008 – 2012 from each AGS unit. Staff inquired in Data Request 123 why the most recent annual data from the AGS was not used for the overlap modeling and requested the annual AGS data in Data Request 122. AEC provided 2013 and 2014 data which had lower emission rates than those used for the overlap modeling. The total impact is the sum of the existing background condition plus the maximum impact predicted by the modeling analysis for Overlap Scenario 1. The values in **bold** in the Background and Total Impact columns of **Air Quality Table 42** represent the values that either equal or exceed the relevant ambient air quality standard.

Air Quality Table 42
Proposed Maximum Overlap Scenario 1 Impacts, (μg/m^3)[a]

Pollutant	Averaging Period	Project Impact[a] (μg/m^3)	Background (μg/m^3)	Total[b] Impact (μg/m^3)	Limiting Standard (μg/m^3)	Percent of Standard
NO_2[c]	1 hour	12.7	256	268	339	79%
	1 hour NAAQS[d]	12.5	146	159	188	85%
	Annual	1.87	48	49	57	87%
PM10	24 hour	7.31	**59**	66	50	133%
	Annual	2.08	**27.3**	29.4	20	147%
PM2.5	24 hour[d]	1.60	27.2	28.8	35	82%
	Annual	0.67	10.97	11.64	12	97%
CO	1 hour	277	3,665	3942	23,000	17%
	8 hour	183	2,978	3161	10,000	32%
SO_2	1 hour	1.59	58	60	655	9%
	1 hour NAAQS	1.24	31	32	196	16%
	3 hour NAAQS	1.24	58	59	1,300	5%
	24 hour	0.45	11	11	105	11%

Source: CH2 2016s Table 5.1-43 and staff analysis
Notes:
[a] Onsite construction only
[b] Modeled concentration plus background values adjusted by staff
[c] NO_2 determined with U.S. EPA Ambient Ratio Method (ARM) based on NO_2/NOx ratio of 0.80 and 0.75 for 1-hour and annual averaging times respectively.
[d] The 24-hour PM2.5 and federal 1-hour NO_2 standards are based on 3-year average of 98th percentile daily maximum values

Air Quality Table 43 summarizes the results of the modeling analysis for the modeled Overlap Scenario 2. The maximum SCGT construction short-term and annual emissions rates presented in **Air Quality Table 31** were used in conjunction with the maximum rolling 24-month emissions from 2008 – 2012 from AGS units 3, 4, and 6, and AEC CCGT operating scenarios resulting in maximum impacts. The total impact is the sum of the existing background condition plus the maximum impact predicted by the modeling analysis for Overlap Scenario 2. The values in **bold** in the Background and Total Impact columns of **Air Quality Table 43** represent the values that either equal or exceed the relevant ambient air quality standard.

Air Quality Table 43
Proposed Maximum Overlap Scenario 2 Impacts, (µg/m^3)

Pollutant	Averaging Period	Project Impact[a] (µg/m^3)	Background (µg/m^3)	Total[b] Impact (µg/m^3)	Limiting Standard (µg/m^3)	Percent of Standard
NO_2[c]	1 hour	12.7	256	268	339	79%
	1 hour NAAQS[d]	12.5	146	159	188	85%
	Annual	1.87	48	49	57	87%
PM10	24 hour	7.31	**59**	66	50	133%
	Annual	2.08	**27.3**	29.4	20	147%
PM2.5	24 hour[d]	1.60	27.2	28.8	35	82%
	Annual	0.67	10.97	11.64	12	97%
CO	1 hour	277	3,665	3942	23,000	17%
	8 hour	183	2,978	3161	10,000	32%
SO_2	1 hour	1.59	58	60	655	9%
	1 hour NAAQS	1.24	31	32	196	16%
	3 hour NAAQS	1.24	58	59	1,300	5%
	24 hour	0.45	11	11	105	11%

Source: CH2 2016s Table 5.1-44 and staff analysis
Notes:
[a] Onsite construction only
[b] Modeled concentration plus background values adjusted by staff
[c] NO_2 determined with U.S. EPA Ambient Ratio Method (ARM) based on NO_2/NOx ratio of 0.80 and 0.75 for 1-hour and annual averaging times respectively.
[d] The 24-hour PM2.5 and federal 1-hour NO_2 standards are based on 3-year average of 98th percentile daily maximum values

Air Quality Tables 42 and 43 demonstrate that the emissions from the entire facility during routine operations would not cause new exceedances of any state or federal air quality standard. The PM10 emissions from the entire facility would contribute to existing violations of ambient air quality standards due to the high background concentrations. The direct impacts of NO_2, CO and SO_2 would not be significant because construction of the proposed facility modifications would neither cause nor contribute to a violation of these standards. Mitigation for construction emissions of PM10, PM2.5, SOx, NOx, and VOC would be appropriate for reducing impacts to PM10, PM2.5, and ozone.

Construction Mitigation

The facility owner proposes the following mitigation measures to reduce the exhaust emissions from the diesel heavy equipment and fugitive dust emissions during the construction of the proposed project modifications:

- Watering unpaved roads three times per day.
- During construction, watering areas disturbed by grading and bulldozing activities every three hours.

- Limiting onsite vehicle speed to 10 miles per hour, or other speeds as approved by the Energy Commission Compliance Project Manager based on site conditions, and posting the approved speed limit.
- Sweeping onsite paved roads and entrance roads on an as-needed basis.
- Replacing ground cover in disturbed areas as soon as practical.
- Covering truck loads when hauling material that could be entrained during transit.
- Applying dust suppressants or covers to soil stockpiles and disturbed areas when inactive for more than 2 weeks.
- Use of Tier 4 final construction equipment, to the extent feasible.
- Maintaining all diesel-fueled equipment per manufacturer's recommendations to reduce tailpipe emissions.
- Limiting diesel heavy equipment idling to less than 5 minutes, to the extent practical.
- Using electric motors for construction equipment, to the extent feasible.

Adequacy of Proposed Construction Mitigation

Staff generally concurs with the facility owner's proposed mitigation measures, which mirror many of the staff's mitigation recommendations from previous siting cases. But staff has been proposing additional fugitive dust mitigation, such as requiring the use of soil binders or paving to reduce emissions on unpaved roads, considered necessary to reduce the high fugitive dust emission potential during construction. Staff incorporates off-road equipment mitigation measures beyond those proposed by the facility owner to fully implement current staff recommendations.

Project Owner's Proposed Mitigation for Operation

The project owner is proposing to mitigate the proposed project's NOx, VOC, SOx, and PM10 emissions through the use of BACT and emission reduction credits (ERCs). BACT includes limiting the ammonia slip emissions to 5 ppm. The equipment description, equipment operation, and emission control devices are provided in **Project Description and Proposed Emissions** (above).

Emission Controls

The project owner proposes the use of dry low NOx combustors with selective catalytic reduction (SCR) to control NOx emissions to 2.0 ppmvd (1-hour average) for the GE 7FA.05 combined-cycle turbines and 2.5 ppmvd (1-hour average) for the GE LMS-100PB simple-cycle turbines. The project owner proposes the use of flue gas recirculation and SCR to control NOx emissions of the auxiliary boiler to 5 ppmvd corrected to 3 percent oxygen. The BACT for CO emissions is best combustion design and the installation of an oxidation catalyst system to reduce CO to 2.0 ppmvd for the GE 7FA.05 combined-cycle turbines and 4 ppmvd (1-hour average) for the GE LMS-100PB simple-cycle turbines. The project owner proposes to use flue gas recirculation and good combustion design to control CO emissions of the auxiliary boiler to 50 ppmvd.

The project owner proposes best combustion design and the installation of an oxidation catalyst system to control VOC emissions to 2.0 ppmvd (1-hour average) for the GE 7FA.05 turbines and the GE LMS-100PB turbines as BACT for VOC emissions. The use of pipeline quality natural gas and good combustion design for VOC control is BACT for the auxiliary boiler. Using best combustion practices, pipeline-quality natural gas, and inlet air filtration to limit PM10/PM2.5 emissions to 8.5 pounds per hour for the GE 7FA.05 turbines, 6.23 pounds per hour for the GE LMS-100PB turbines, and 0.51 pounds per hour for the auxiliary boiler are consistent with BACT at other similar sources. Operating exclusively on low sulfur pipeline-quality natural gas with a maximum fuel sulfur content of 0.75 grains/100 scf is the BACT for SOx.

Emission Offsets

The applicant proposes to provide emission offsets for PM10, SO_2 and VOC emissions and RECLAIM Trading Credits (RTCs) for NOx emissions consistent with SCAQMD Rules 1303, Rule 1304(a)(2), 1304.1 and 2005. Under SCAQMD Rule 1304(a)(2), PM10, SO_2 and VOC offsets for AEC would be secured from the SCAQMD internal accounts for the combined-cycle and simple-cycle turbines.

The applicant is proposing to provide VOC and PM10 offsets for the auxiliary boiler at a 1.2-to-1 ratio, consistent with SCAQMD Rule 1303(b)(2). The applicant has secured 5 pounds of VOC and PM10 emission reduction credits to fully offset the auxiliary boiler.

The applicant calculated the expected NOx RECLAIM requirements for the commissioning and operation scenarios. The applicant's expected SCAQMD RECLAIM requirements are included in **Air Quality Table 44**. The applicant states they hold sufficient NOx RTC allocations for the operating and commissioning periods outlined in **Air Quality Table 44**.

Air Quality Table 44
Applicant Expected RECLAIM Trade Credit Requirements

Equipment	(lbs/year)
	NOx, RTCs[a]
AEC CCGT Commissioning and Operation	220,432
AEC CCGT Operation	165,238
AEC CCGT Operation and SCGT Commissioning and Operation	293,102
AEC CCGT and SCGT Operation	270,213

Source: CH2 2016s Table 5.1-46

Adequacy of Proposed Mitigation

Emission Controls

The SCAQMD completed a detailed BACT evaluation for the AEC. The SCAQMD BACT evaluation concurred with the proposed BACT limits outlined above. In addition, the SCAQMD evaluation includes commissioning, start up, and shutdown events.

During commissioning, it is not feasible to meet BACT limits for all periods of operation. The AEC CCGT, AEC SCGT and auxiliary boiler would use low-NOx combustors that may not be optimally tuned during commissioning. In addition, the emissions are only partially abated as the control systems are installed and tested in stages. The turbines and boiler are not expected to operate at a full load during commissioning. The SCAQMD is proposing to add limits to the commissioning period for the CTGS and auxiliary boiler. In addition, maximum operating hour limits when emission controls are not available will be included for the AEC CCGT and AEC SCGT.

During startup periods, it is also not feasible to meet BACT limits for all periods of operation. The AEC CCGT, AEC SCGT and auxiliary boiler emission control equipment are not fully effective. It takes time for the catalyst to reach the recommended operating temperature. The SCAQMD is proposing cold, warm and hot startup events for the AEC CCGT and limiting the duration, emissions and total number of each startup event. SCAQMD is proposing to limit emissions from startup events for the AEC CCGT by restricting the number of events, the duration, and emission from startup. The SCAQMD is proposing cold, warm and hot startup events for the boiler and placing restrictions on the number of events and corresponding emissions.

During shutdown periods, it is not feasible to meet BACT limits for all periods of operation for all equipment. For the AEC CCGT and AEC SCGT, the SCR used to control emissions ceases operations. However, the SCR and CO catalysts are still above ambient temperature and partially controlling emissions. The SCAQMD is proposing to limit shutdown events including the number of events, duration and corresponding emissions.

Staff concurs with the SCAQMD's determination that the project's proposed emission controls/emission levels for criteria pollutants and ammonia slip meets BACT requirements (see full BACT discussion in Compliance with LORS).

Staff agrees with the District proposed District Permit Conditions to be included in the Air Quality Conditions of Certification but recommends some additional clarifying language changes.

The proposed definitions for warm and hot startup periods are identical and therefore staff recommends having only one definition. This would provide the operator with more flexibility and would streamline monitoring requirements.

Emission Offsets

SCAMD Rule 1303(b)(2) requires that all increases in emissions be offset unless exempt from offset requirements pursuant to District Rule 1304. Since CO is an attainment pollutant and not a precursor to any nonattainment pollutant offset requirements for CO are not applicable. Staff concurs that CO mitigation in the form of emission offsets would not be required for the AEC since modeling demonstrated the proposed project would not cause or contribute to a violation of a CO ambient air quality standard.

District Rule 1304(a)(2) – Electric Utility Steam Boiler Replacement states that if electric utility steam boilers are replaced by combined-cycle gas turbine(s), or other advanced gas turbines (including intercooled turbines), the project would be exempt from emission offset requirements for non-RECLAIM pollutants unless there is a basin-wide electricity generation capacity increase on a per-utility basis. If there is an increase in basin-wide capacity, only the increased capacity must be offset via traditional offset rules and regulations. The language of this exemption allows for exemptions from offset and modeling normally required if the in-basin megawatt capacity of the utility receiving the facility's energy does not increase. The purpose was to facilitate the removal of older and less efficient boiler/steam turbine technology with cleaner gas turbine technology at the utilities. Since the advent of RECLAIM, the exemption was expanded to include modifications conducted for compliance with Regulation XX rules.

Per District Rule 1304, the project owner would be exempt from providing offset directly for the AEC combined-cycle and simple-cycle turbines. Instead, AEC would get the offsets from SCAQMD internal accounts. AES is proposing 1,094.7 MW of new generation for the two combined-cycle turbines (692.951 MW-gross total) and four simple-cycle turbines (401.751 MW-gross total) by retiring existing AGS Unit 1 (175 MW-gross), AGS Unit 2 (175 MW-gross), AGS Unit 3 (320 MW-gross), and AGS Unit 5 (480 MW-gross). AES has not identified plans for the surplus 55 MWs from the retirements of these four utility boilers. The generating capacity from AEC would be limited to 1094.7 MW by Condition of Certification **AQ-E11** (E448.1). In addition Condition of Certification **AQ-F5** (F53.1) would require a retirement plan and permanent shutdown of AGS Units 1, 2, 3 and 5. Condition of Certification **AQ-F5** would restrict the operation of Units 1, 2, and 5 within 90 days of the first fire of the combined-cycle turbines and Unit 3 within 90 days of the first fire of the simple-cycle turbines. Although these units are not under the jurisdiction of the California Energy Commission, these units would have to be retired to the satisfaction of the SCAQMD before it would allow construction of AEC to proceed.

The operating equipment besides the combined-cycle and simple-cycle turbines would not be eligible for the offset exemption. Therefore, the project owner would need to provide offsets for the auxiliary boiler and the oil/water separators. The amount of offsets required for each pollutant is determined using the 30-day emission averages. The 30-day average is based on the highest emissions for any month, including a month where commissioning takes place. The offset ratio for ERCs is 1.2-to-1. The SCAQMD calculated offset requirements are included in **Air Quality Table 45**. The oil/water separator has a minimal contribution to the total VOC pound per day and is therefore included for completeness with the auxiliary boiler.

The Energy Commission mitigation requirements under CEQA are different than the SCAQMD offset requirements. The Energy Commission normally recommends mitigation on least a one-to-one ratio applied to the annual emissions expected to occur. For comparison, **Air Quality Table 45** also includes the maximum annual emissions from the auxiliary boiler and the oil/water separator and the calculated annualized daily emissions.

Air Quality Table 45
Project Offset Requirements for Emission Reduction Credits

Component	VOC	SOx	PM10
Auxiliary Boiler and Oil/Water Separator 30-Day Emission Averages (lb/day)	3.4	1.06	3.78
SCAQMD Offset Ratio for ERCs	1.2	1.2	1.2
Total Calculated (lb/day)	4.08	1.27	4.54
SCAQMD Rounded Required Offset (lb/day)	4	1	5
Maximum Annual Auxiliary Boiler and Oil/Water Separator Emissions (lb/yr)	1,223	382	1,362
Annualized Auxiliary Boiler and Oil/Water Separator Emissions (lb/day)	3.35	0.2	0.7

Source: SCAQMD Table 62, staff analysis
Note: [a] First Year

Air Quality Table 45 demonstrates that mitigation for VOC, SOx and PM10 in the form of ERCs required by the SCAQMD would be acceptable to staff since the SCAQMD proposed mitigation is more conservative than a pounds per day annual average emission calculation.

The AEC would have VOC, SOx and PM10 emission offset requirements for the auxiliary boiler and oil/water separators according to District Rule 1303. The project owner will have to provide ERCs of 4 pounds per day for VOC, 1 pounds per day for SOx and 5 pounds per day for PM10 for the auxiliary boiler and oil/water separators. The applicant provided a summary of the Certificates of Proof for Registered Emission Reduction Credit for VOC and PM10 ERCs. AES provided 5 pounds per day of VOC offsets; however, due to project refinements only 4 pounds per day will be required. ERCs have not yet been provided for SOx. According to the PDOC, AES has agreed to provide 1 pound per day of SOx ERCs. The offset will have to be surrendered prior to project approval.

The facility is still required to hold NOx RECLAIM Trading Credits (RTCs) to cover the first compliance year per Rule 1304.1. **Air Quality Table 32** includes the commissioning year maximum annual emissions, which would be the first year RECLAIM requirements for AEC. The first year of operation for the AEC CCGT and auxiliary boiler is expected to occur in 2020. Therefore, the first year NOx requirement for the AEC will include only the combined-cycle turbines and auxiliary boiler 1st year requirements since the first year of operation for the SGCT is expected to occur in 2021. The NOx RTC holdings for 2020 and 2021 from the current RECLAIM Annual Emission Allocations are also included in **Air Quality Table 46**.

Air Quality Table 46
Project RECLAIM Trade Credit Requirements

Equipment	(lbs/year) NOx, RTCs[a]
Total AEC CCGT	216,754
Total AEC SCGT	274,300
Auxiliary Boiler	1,351
Required RECLAIM 1st Year - AEC CCGT and Auxiliary Boiler	218,105
NOx RTC Holding for 2020	432,413
Required RECLAIM 1st Year - AEC SCGTs	274,300
NOx RTC Holding for 2021	394,195

Source: SCAQMD 2016b Table 62, staff analysis
Note: [a] First Year

The NOx RTC holding for 2020 is greater than the 1st year RECLAIM NOx RTC requirements for the AEC CCGT and auxiliary boiler. In addition, the 2021 NOx RTC holding is greater than the 1st year RECLAIM NOx RTC for the AEC SCGT. Staff believes that the NOx and SOx RTCs are a valid mechanism to mitigate the NOx and SOx emissions due to the extensive monitoring and reporting requirement for the RECLAIM program.

District Rule 1304.1 – Electrical Generating Fee for Use of Offset Exemption requires electrical generating facilities using the specific offset exemption described in Rule 1304(a)(2) pay fees up to the full amount of offsets provided by the SCAQMD in accordance with Rule 1304. The project owner would be required to demonstrate compliance with the specific requirements of this rule prior to issuance of the Permits to Construct for the AEC. The PDOC noted that a payment option has been selected.

District Rule 1325 requires a major PM2.5 facility to offset PM2.5 emissions at the offset ratio of 1.1:1. A major polluting facility is defined in the rule as a facility with actual emissions, or a potential to emit of greater than 100 tons per year. The AGS has a potential to emit less than 100 tons per year and the AEC potential to emit would be 69.52 tons per year. The SCAQMD is proposing a permit that will limit facility PM2.5 to below 100 tons per year. Conditions of Certification **AQ-F1** will incorporate the facility limit.

Staff's evaluation of the adequacy of project mitigation was determined solely based on the merits of this case, including the SCAQMD offset requirements, the project's emission limits, the specific ERCs proposed, and ambient air quality considerations of the region, and does not in any way provide a precedence or obligation for the acceptance of offset proposals for any other current or future licensing cases.

Staff Proposed Mitigation

Additional measures recommended by staff would reduce construction-phase impacts to a less than significant level by further limiting construction emissions of particulate matter and combustion contaminants. Staff believes that the short-term and variable nature of construction activities warrants a qualitative approach to mitigation.

Construction emissions and the effectiveness of mitigation varies widely depending on variable levels of activity, the specific work taking place, the specific equipment, soil conditions, weather conditions, and other factors, making precise quantification of emissions and air quality impacts difficult. Despite this uncertainty, there are a number of feasible control measures that can and should be implemented to significantly reduce construction emissions. Staff has determined that the use of oxidizing soot filters is a viable emissions control technology for all heavy diesel-powered construction equipment that does not use an ARB-certified low emission diesel engine. In addition, staff proposes that prior to beginning construction the facility owner should provide an Air Quality Construction Mitigation Plan (AQCMP) that specifically identifies mitigation measures to limit air quality impacts during construction.

Staff proposes Conditions of Certification **AQ-SC1** through **AQ-SC5** to implement these requirements. These conditions update the facility owner's proposed mitigation to be consistent with the conditions of certification adopted in similar prior Energy Commission licensing cases. Compliance with these conditions is expected to greatly reduce or eliminate the potential for significant adverse air quality impacts during construction of the proposed AEC.

Staff is proposing Conditions of Certification **AQ-SC1** – **AQ-SC11.** Condition of Certification **AQ-SC1** requires an Air Quality Construction/Demolition Mitigation Manager to ensure compliance with the staff conditions for construction/demolition activities. Condition of Certification **AQ-SC2** would require a plan detailing the steps necessary to limit emissions from construction/demolition activities outlined in the Conditions of Certification. Condition of Certification **AQ-SC3** would require mitigation for fugitive dust control. The proposed mitigation is standard for Energy Commission projects and is similar to what was proposed by the applicant. Condition of Certification **AQ-SC4** would also require monthly reports to be submitted documenting compliance with the requirements. Condition of Certification **AQ-SC4** outlines monitoring requirements for dust from construction activities to ensure adequacy of the proposed mitigation. Condition of Certification **AQ-SC5** would require diesel-fueled engine control. Condition of Certification **AQ-SC5** would ensure that the cleanest engines available are used to protect public health and for consistency with the construction impact modeling. Condition of Certification **AQ-SC6** would require the project owner to provide copies to the Energy Commission Compliance Project Manager (CPM) of all air permits issued by the SCAQMD including any proposed modification. Condition of Certification **AQ-SC7** would require quarterly reports to ensure ongoing compliance during commissioning and routine operation. Condition of Certification **AQ-SC8** would require mitigation for the proposed operation of the auxiliary boiler and oil/water separators. Condition of Certification **AQ-SC8** would establish the quantity of offsets required and ensure agency consultation if substitutions are made to the mitigation. Condition of Certification **AQ-SC9** would require the boiler to complete commissioning activities prior to the commissioning of the AEC CCGT. This condition is needed since overlap was not included as a modeling scenario. Condition of Certification **AQ-SC10** would require the AEC CCGT to complete commissioning activities prior to the commissioning of the AEC SCGT since overlap in these activities was not included as a modeling scenario.

Staff is also proposing the addition of an administrative Air Quality Condition of Certification **AQ-SC11**. This condition would allow the CPM to make insignificant changes to the Air Quality Conditions of Certification when appropriate. Condition of Certification **AQ-SC11** establishes appropriate guidelines on what would be considered a significant change. This condition is compatible with many air district rules and regulations which already have established mechanisms approved by ARB and U.S. EPA to make minor changes that do not involve significant change to existing monitoring, reporting or recordkeeping requirement or require a case by case determination of any emission limitation. This would allow the CPM to approve administrative changes (such as typographical errors, facility name or owner) and other minor changes. The condition requires the project owner to apply for the change and the CPM to approve the change before the change would become effective.

In addition staff is proposing some minor changes to the SCAQMD conditions provided in the PDOC. Condition of Certification **AQ-D11** (D29.3) allows for alternative tests methods to be used for source testing if there is concurrence with the U.S. EPA, ARB and SCAQMD. Staff is proposing to add this same flexibility to Condition of Certification **AQ-D13** (D29.5).

Cumulative Impacts and Mitigation

"Cumulative impacts" are defined as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts" (CEQA Guidelines, §15355). Such impacts can be relatively minor and incremental yet still be significant because of the existing environmental background, particularly when considering other closely related past, present, and reasonably foreseeable future projects.

Criteria pollutants have impacts that are usually (though not always) cumulative by their nature. Rarely will a project itself cause a violation of a federal or state criteria pollutant standard. However, many new sources contribute to violations of criteria pollutant standards because of elevated background conditions. Air districts attempt to reduce background criteria pollutant levels by adopting attainment plans, which are multi-faceted programmatic approaches to attainment. Attainment plans typically include new source review requirements that provide offsets and use Best Available Control Technology, combined with more stringent emissions controls on existing sources.

The discussion of cumulative air quality impacts includes the following three analyses:

- a summary of projections for criteria pollutants by the air district and the air district's programmatic efforts to abate such pollution;
- an analysis of the project's "localized cumulative impacts" direct emissions locally when combined with other local major emission sources; and
- a discussion of greenhouse gas emissions and global climate change impacts (in **AIR QUALITY APPENDIX AIR-1**).

Summary of Projections

The SCAQMD is the agency with principal responsibility for analyzing and addressing cumulative air quality impacts, including the impacts of ambient ozone and particulate matter. The SCAQMD has summarized the cumulative impact of ozone and particulate matter on the air basin from the broad variety of its sources. Analyses of these cumulative impacts, as well as the measures the SCAQMD proposes to reduce impacts to air quality and public health, are summarized in four publicly available documents that the SCAQMD has adopted. These adopted air quality plans are summarized below.

- **Final 2012 Air Quality Management Plan** (adopted 12/07/2012)

  Link: http://www.aqmd.gov/home/library/clean-air-plans/air-quality-mgt-plan/final-2012-air-quality-management-plan

- **Final 2007 Air Quality Management Plan** (adopted 06/01/2007)

  Link: http://www.aqmd.gov/home/library/clean-air-plans/air-quality-mgt-plan/2007-air-quality-management-plan

- **Final Socioeconomic Report for the Final 2012 AQMP** (adopted 12/07/2012)

  Link: http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2012-air-quality-management-plan/final-2012-aqmp-(february-2013)/final-socioeconomic-report-2012.pdf

- **State of California's SIP for the new federal PM2.5 and 8-hour ozone standards** (adopted July 21, 2011)

  Link: http://www.arb.ca.gov/planning/sip/2007sip/2007sip.htm

2012 Air Quality Management Plan

The following paragraphs are excerpted from the Executive Summary of the 2012 Air Quality Management Plan adopted by the SCAQMD December 7, 2012:

The SCAQMD adopted (December 7, 2012) the 2012 Air Quality Management Plan (AQMP) primarily in response to changes in the federal Clean Air Act (CAA). The CAA requires a 24-hour PM2.5 nonattainment area to prepare a State Implementation Plan (SIP) which must be submitted to U.S. EPA by December 14, 2012. The SIP must demonstrate attainment with the 24-hour PM2.5 standard by 2014, with the possibility of up to a five-year extension to 2019, if needed. U.S. EPA approval of any extension request is based on the lack of feasible control measures to move forward the attainment date by one year. The District's attainment demonstration shows that, with implementation of all feasible controls, the earliest possible attainment date is 2014, and thus no extension of the attainment date is needed. In addition, the U.S. EPA requires that transportation conformity budgets be established based on the most recent planning assumptions (i.e., within the last five years) and approved motor vehicle emission models. The Final Plan is based on the most recent assumptions provided by both ARB and Southern California Association of Governments (SCAG) for motor vehicle emissions and demographic updates and includes updated transportation conformity budgets.

The Final 2012 AQMP outlines a comprehensive control strategy that meets the requirement for expeditious progress towards attainment with the 24-hour PM2.5 NAAQS in 2014 with all feasible control measures. The Plan also includes specific measures to further implement the ozone strategy in the 2007 AQMP to assist attaining the 8-hour ozone standard by 2023. The control measures contained in the Final 2012 AQMP can be categorized as follows:

Basin-wide Short-term PM2.5 Measure. Measures that apply Basin-wide, have been determined to be feasible, will be implemented by the 2014 attainment date, and are required to be implemented under state and federal law. The main short-term measures are episodic, in that they only apply during high PM2.5 days and will only be implemented as needed to achieve the necessary air quality improvements.

Contingency Measures. Measures to be automatically implemented if the Basin fails to achieve the 24-hour PM2.5 standard by 2014.

8-hour Ozone Measures. Measures that provide for necessary actions to maintain progress towards meeting the 2023 8-hour ozone NAAQS, including regulatory measures, technology assessments, key investments, and incentives.

Transportation Control Measures. Measures generally designed to reduce vehicle miles travelled (VMT) as included in SCAG's 2012 Regional Transportation Plan.

Many of the control measures proposed are not regulatory in form, but instead focus on incentives, outreach, and education to bring about emissions reductions through voluntary participation and behavioral changes needed to complement regulations.

The Basin faces several ozone and PM attainment challenges, as strategies for significant emission reductions become harder to identify and the federal standards continue to become more stringent. California's Greenhouse Gas reductions targets under AB32 add new challenges and timelines that affect many of the same sources that emit criteria pollutants. In finding the most cost-effective and efficient path to meet multiple deadlines for multiple air quality and climate objectives, it is essential that an integrated planning approach is developed. Responsibilities for achieving these goals span all levels of government, and coordinated and consistent planning efforts among multiple government agencies are a key component of an integrated approach.

To this end, and concurrent with the development of the 2012 AQMP, the District, the Air Resources Board, and San Joaquin Valley Air Pollution Control District engaged in a joint effort to take a coordinated and integrated look at strategies needed to meet California's multiple air quality and climate goals, as well as its energy policies. California's success in reducing smog has largely relied on technology and fuel advances, and as health-based air quality standards are tightened, the introduction of cleaner technologies must keep pace. More broadly, a transition to zero- and near-zero emission technologies is necessary to meet 2023 and 2032 air quality standards and 2050 climate goals. Many of the same technologies will address air quality, climate and energy goals. As such, strategies developed for air quality and climate change planning *should be coordinated to make the most efficient use of limited resources and the time needed to develop cleaner technologies.*

2007 Air Quality Management Plan

The following paragraphs are excerpted from the Executive Summary of the 2007 AirQuality Management Plan adopted by the SCAQMD June 1, 2007:

The SCAQMD adopted (June 1, 2007) the 2007 Air Quality Management Plan (AQMP) primarily in response to changes in the federal Clean Air Act (CAA). The CAA requires an 8-hour ozone nonattainment area to prepare a SIP revision by June 2007 and a PM2.5 nonattainment area to submit by April 2008. The SCAQMD has decided that it is most prudent to prepare a single comprehensive and integrated SIP revision that satisfies both the ozone and PM2.5 requirements. Additionally, the U.S. EPA requires that transportation conformity budgets be established based on the most recent planning assumptions and approved motor vehicle emission model. The AQMP is based on assumptions provided by both the California Air Resources Board (ARB) and the Southern California Association of Governments (SCAG) reflecting their upcoming model (EMFAC) for motor vehicle emissions and demographic updates.

The Final 2007 AQMP relies on a comprehensive and integrated control approach to achieve the PM2.5 standard by 2015 through implementation of short-term and mid-term control measures and achieve the 8-hour ozone standard by 2024 based on implementation of additional long-term measures. In order to demonstrate attainment by the prescribed deadlines, emission reductions needed for attainment must be in place by 2014 and 2023 timeframe.

The AQMP control measures consist of four components: 1) the District's Stationary and Mobile Source Control Measures; 2) ARB's Proposed State Strategy; 3) District Staff's Proposed Policy Options to Supplement ARB's Control Strategy; and 4) Regional Transportation Strategy and Control Measures provided by SCAG.

In order to achieve necessary reductions for meeting air quality standards, all four agencies (i.e., SCAQMD, ARB, U.S. EPA, and SCAG) would have to aggressively develop and implement control strategies through their respective plans, regulations, and alternative approaches for pollution sources within their primary jurisdiction. Even though SCAG does not have direct authority over mobile source emissions, it will commit to the emission reductions associated with implementation of the 2004 Regional Transportation Plan and 2006 Regional Transportation Improvement Program which are imbedded in the emission projections. Similarly, the Ports of Los Angeles and Long Beach have authority they must utilize to assist in the implementation of various strategies if the region is to attain clean air by federal deadlines.

Although the SCAQMD has completely met its obligations under the 2003 AQMP and stationary sources subject to the District's jurisdiction account for only 12% of NOx and 37% of SOx emissions in the Basin in 2014, the Final 2007 AQMP contains several short-term and mid-term control measures aimed at achieving further NOx and SOx reductions (as well as VOC and PM2.5 reductions) from these already regulated sources. These strategies are based on facility modernization, energy conservation *measures and more stringent requirements for existing equipment (e.g., space heaters, ovens, dryers, furnaces).*

Clean air for this region requires ARB to aggressively pursue reductions and strategies for on-road and off-road mobile sources and consumer products. In addition, considering the significant contribution of federal sources such as marine vessels, locomotives, and aircraft in the Basin (i.e., 56% of SOx in 2014 and 37% of NOx in

2023), it is imperative that the U.S. EPA pursue and develop regulations for new and existing federal sources to ensure that these sources contribute their fair share of reductions toward attainment of the federal standards. Unfortunately, regulation of these emission sources has not kept pace with other source categories and as a result, these sources are projected to represent a significant and growing portion of emissions in the Basin. Without a collaborative and serious effort among all agencies, attainment of the federal standards would be seriously jeopardized.

Final Socioeconomic Report for the Final 2012 AQMP

The following are excerpted from the Final Socioeconomic Report for the Final 2012 AQMP adopted by the SCAQMD December 7, 2012:

The 2012 AQMP has been prepared to meet the challenge of achieving healthful air quality in the South Coast Air Basin (Basin) and the Coachella Valley. This report accompanies the 2012 AQMP and presents the potential socioeconomic impacts resulting from implementation of this Plan. The information contained herein is considered by the South Coast Air Quality Management District (District) Governing Board when taking action on the Plan.

The 2012 AQMP control strategy is comprised of a traditional command-and-control approach, voluntary/incentive programs, and advanced technologies. Short- and near-term control strategies are proposed and will be implemented by the District, local and regional governments (e.g., transportation control measures provided in the 2012 Regional Transportation Plan), and the California Air Resources Board (ARB). These strategies include basin-wide short-term PM2.5 measures, episodic control measures for high PM2.5 days, measures to partially implement the Section 182I(5) commitment in the 2007 ozone SIP toward meeting the 8-hour ozone standard by 2024, and transportation control measures (TCM) adopted by the Southern California Association of Governments (SCAG). Many of the measures require behavioral changes and voluntary participation through outreach, incentive, and education. Implementation of these control strategies has potential effects on the region's economy.

The District relies on a number of methods, tools, and data sources to assess the impact of proposed control strategies on the economy. The involved applications include: integration of air quality data and concentration-response relationships to estimate benefits of clean air; capital, operating and maintenance expenditures on control devices and emission reductions to assess the cost of the Plan; and REMI (Regional Economic Models, Inc.) model to assess potential employment and other socioeconomic impacts (e.g., population and competitiveness).

Over the years, there has been an overall trend of steady improvement in air quality in the Basin. Additional emission reductions are still needed in order to bring the Basin into compliance with the federal 24-hour PM2.5 standard. Complying with the air quality standard would allow the District to avoid potential sanctions that could increase offset ratios for major sources and result in suspension of highway transportation funding. The benefits of better air quality through implementation of the 2012 AQMP include reductions in morbidity and mortality, visibility improvements, reduced expenditures on refurbishing building surfaces, and reduced traffic congestion.

The Draft 2012 Plan is projected to comply with the federal PM2.5 standard with an average annual benefit of $10.7 billion between 2014 and 2035. The $10.7 billion includes approximately $7.7 billion for congestion relief for all TCMs in the 2012 RTP, $2.2 billion for averted illness and higher survival rates, $696 million for visibility improvements, and $14 million for reduced damage to materials.

The analysis contained herein estimates that the benefits for the Plan significantly outweigh the anticipated costs. The measurement of clean air benefits is performed indirectly since clean air is not a commodity purchased or sold in a market. This often results in incomplete and underestimated benefits. The benefits of clean air (based on the total emission reductions required for attainment) for which a monetary figure can be applied are estimated to be $10.7 billion (including congestion relief benefits for all the TCMs) as compared to the estimated costs of $448 million on an average annual basis. There are, however, many benefits which are still unaccounted for, such as reductions in chronic illness and lung function impairment in human beings, reduced damage to livestock and plant life, erosion of building materials, and the value of reduced vehicle hours traveled for personal trips.

The Plan is designed to bring northwest Riverside (the Mira Loma area), the only area in exceedance of the federal PM2.5 standard, into attainment. However, PM2.5 air quality benefits occur throughout the Basin. The San Fernando Valley, southern Los Angeles County, and the northwest Riverside County would experience the highest shares of air quality benefits. The western portions of Los Angeles and Orange Counties and the eastern and northern portions of San Bernardino County are projected to have the highest shares of health benefits.

Implementation of PM2.5 and ozone measures would impose costs on various communities. The sub-regions with the highest costs are the central, southeast, and San Fernando areas of Los Angeles County. These three areas are projected to have the highest cost shares from SCAG TCMs and relative higher cost shares from ozone measures.

All sub-regions are projected to have additional jobs created from cleaner air. The eastern, southern, and San Fernando sub-regions in Los Angeles County and Riverside County are projected to have more jobs created than other sub-regions resulting from clean air benefits. Implementation of quantified control measures would result in jobs forgone between 2013 and 2035. Orange County is projected to have the highest share of jobs forgone from implementation of control measures. This is because the majority of SCAG transportation control measures (TCM) in Orange County would be financed *by development fees, which would have a heavy burden on one single sector of the economy—the construction sector. For the entire Plan, all sub-regions would show positive job impacts as the four-county area becomes more competitive and attractive with the progress in clean air.*

Job gains from cleaner air would benefit all wage groups. Conversely, all five groups would experience jobs forgone from control measures. However, there is no significant difference in impacts expected for high- versus low-paying jobs. The same is observed for impacts on the price of consumption goods from one income group to another. These findings will be further evaluated during individual rule development.

State of California SIP for the new federal PM2.5 and 8-hour Ozone Standards (adopted July 21, 2011)

On April 28, 2011, the ARB considered revisions to the South Coast (and San Joaquin Valley) State Implementation Plans (SIPs) for PM2.5 that accounted for reductions of emissions that contribute to PM2.5 levels. The revisions were formally adopted by the ARB's Executive Officer on May 18, 2011, when Executive Order S-11- 010 was signed. The April 2011 PM2.5 SIP Revisions accounted for recent regulatory actions and recessionary impacts on emissions that occurred after the South Coast (and San Joaquin Valley) PM2.5 SIPs were adopted in 2007 and 2008. Those revisions accounted for the impact the recession has had on emissions and the benefits of ARB's in-use diesel truck and off-road equipment regulations. The revisions updated the PM2.5 SIP's reasonable further progress calculations, transportation conformity budgets, and ARB's rulemaking calendar.

Localized Cumulative Impacts

The proposed new facility and other reasonably foreseeable projects could cause impacts that would be locally combined and future projects would introduce stationary sources that are not included in the "background" conditions. Reasonably foreseeable future projects are those that are either currently under construction or in the process of being approved by a local air district or municipality. Projects that have not yet entered the approval process do not normally qualify as "foreseeable" since the detailed information needed to conduct this analysis is not available. Sources that are presently operational are included in the background concentrations. Background conditions also take into account the effects of non-stationary sources.

Projects with stationary sources located up to six miles from the proposed project site usually need to be considered in the cumulative analysis.

On October 23, 2015 the applicant requested from SCAQMD an updated list of projects that are within six miles of the AEC site, that are either currently in the permitting process, undergoing CEQA review, or recently received a Permit to Construct (PTC). The SCAQMD provided a list on February 16, 2016. The facility owner requested copies of permit applications and source test reports for 12 sources. Information responsive to this request has not been provided.

The applicant proposed the use of the list of sources previously submitted to the Energy Commission on October 22, 2014 as part of the original AFC analysis. Staff agreed to the use of the list of sources previously obtained for he PSA analysis, however staff requests a refined analysis using an updated list for the Final Staff Assessment.

The sources and assumptions included in the cumulative analysis include:

- PM2.5 emission rates were assumed to be equivalent to PM10 emission rates.

Alamitos Energy Center:

- Source emission rates were based on the proposed updates to the AEC's operating profile described in a letter to the SCAQMD dated March 17, 2016
- Source parameters and emission rates were selected according to the operating scenarios resulting in maximum predicted impacts.

U.S. Government, Veterans Affairs – addition of six emergency diesel-powered generators:

- Source emission rates were based on source data received from the SCAQMD on July 29, 2014 and September 24, 2014.
- Unknown source locations were assumed to be at the property centroid.
- Emergency sources are permitted for up to 50 hours per year of maintenance and testing. The simultaneous testing of all emergency internal combustion engines (ICEs) is not expected to occur within the same hour. Therefore, only a single emergency ICE with the highest hourly emission rates will be modeling.
- Emergency sources (like the ICEs) will not be modeled for the federal 1 hour NO_2 and SO_2 standards as these are statistical average standards that will not likely to be influenced by sources permitted to operate for up to 50 hours per year for testing and maintenance.
- The annual emissions from each of the six emergency diesel fueled ICEs were based on 50 hours of testing per year at the maximum hourly emission rate.

Trend Offset Printing Services, Inc. – modification of two VOC control afterburners:

- Source parameters, locations and emission rates were based on permittees source data received from the SCAQMD on August 8, 2014.
- The permit applications for the two regenerative thermal oxidizers are for a change in conditions only. Any increase in emissions could not be determined from the information provided so the sources were included in the analysis using the respective emission limits.

Los Angeles City, DWP Haynes Generating Station – addition of six LMS100 simple-cycle gas turbines and two emergency diesel-powered generators:

- Source parameters and source locations for the simple cycle gas turbines were based on Prevention of Significant Deterioration (PSD) cumulative source data provided by DWP on October 23, 2013.
- Sources identified as emergency diesel ICEs are permitted for up to 50 hours per year of maintenance and testing. The simultaneous testing of the ICEs is not expected to occur within the same hour. Therefore, only a single emergency ICE with the highest hourly emission rates will be modeling.
- Emergency sources (like the ICEs) will not be modeled for the federal 1- hour NO_2 and SO_2 standards as these are statistical average standards that will not likely to be influenced by sources permitted to operate for up to 50 hours per year for testing and maintenance.
- Emission rates for all sources, as well as source parameters for the two emergency diesel ICEs, were provided in the SCAQMD engineering evaluation dated November 23, 2010.
- Since precise source locations for the two emergency diesel ICEs were not available in the SCAQMD engineering evaluation, the analysis placed them in an area of the site that houses generators.

The cumulative air quality impacts analysis results are included in **Air Quality Table 47**. The modeled impacts are combined with background concentrations to determine the total predicted impacts. As noted by the applicant, the background concentrations are considered conservative because they do not take into consideration the removal of the AGS boiler units.

Air Quality Table 47
Proposed AEC Cumulative Impacts

Pollutant	Averaging Period	Cumulative Impacts (μg/m^3)	Background (μg/m^3)[a]	Total Impact (μg/m^3)	Limiting Standard (μg/m^3)	Percent of Standard
NO_2	1 hour	140	256	396	339	**117%**
	1 hour NAAQS	22.8	146	169	188	90%
	Annual	0.35	48	48	57	85%
PM10	24 hour	2.05	**59**	**61**	50	**122%**
	Annual	0.26	**27.3**	**27.6**	20	**138%**
PM2.5	24 hour	1.6	27.2	28.8	35	82%
	Annual	0.26	10.97	11.23	12	94%
CO	1 hour	187	3,665	3852	23,000	17%
	8 hour	44.7	2,978	3022.7	10,000	30%
SO_2	1 hour	2.11	58	60	655	9%
	1 hour NAAQS	1.6	31	33	196	17%
	3 hour NAAQS	1.71	58	60	1,300	5%
	24 hour	0.51	11	12	105	11%

Source: sCH2 2016t, Attachment DR133-3 Table 3, staff analysis
[a] Background values are adjusted as presented in **Air Quality Table 12**
[b] The total predicted concentrations for the federal 1-hour NO_2 standard and 24-hour PM2.5 standard are the 5-year average, high-8th- high modeled concentrations combined with the 3-year average, 98th percentile background concentrations.
[d] The total predicted concentration for the federal 1-hour SO_2 standard is the 5-year average, high-4th-high modeled concentration combined with the 3-year average, 99th percentile background concentration.

The background PM10 concentration in **Air Quality Table 47** exceed the AAQS without the addition of the cumulative sources. Therefore the particulate matter emissions from the AEC would be cumulatively considerable because they would contribute to existing violations of the PM10 ambient air quality standards. The project owner would mitigate emissions through the use of BACT, RTCs, emission offsets from the district's internal bank, and ERCs for the auxiliary boiler. Therefore, the cumulative operating impacts after mitigation are considered to be less than significant.

The NO_2 impacts indicate that the cumulative impact of AEC and other sources in the cumulative analysis as modeled would cause an exceedance of the state 1-hour NO_2 standard, based upon the very conservative nature of the analysis. The maximum 1-hour impact from AEC is 31.3 μg/m^3 as shown in **Air Quality Table 37**. However, this result is based upon preliminary information and will be refined for the FSA.

CO, SO_2 and PM2.5 emissions in the cumulative analysis are not expected to cause or contribute to the violation of any AAQS.

<u>Environmental Justice Impacts</u>

Staff has considered the minority population surrounding the site and reviewed **Socioeconomics Figure 1** (see the **Socioeconomics** and **Executive Summary** sections of this document for further discussion of environmental justice), which shows the minority population within portions of the 6 mile buffer zone is greater than 50 percent, thus qualifying as an environmental justice population.

The staff-proposed CEQA mitigation measures noted as conditions of certification would reduce the proposed facility modifications' direct and cumulative **Air Quality** impacts to a less than significant level, including impacts to the environmental justice population. Therefore, there are no **Air Quality** environmental justice issues related to the proposed facility modifications and no minority or low-income populations would be significantly or adversely impacted.

COMPLIANCE WITH LORS

The Preliminary Determination of Compliance (PDOC) for the AEC was docketed July 1, 2016. Compliance with all district Rules and Regulations was demonstrated to the district's satisfaction in the PDOC, and the PDOC conditions are included in the staff-proposed conditions of certification below.

FEDERAL

<u>Title 40 Code of Federal Regulations Subchapter C –Air Programs</u>

40 CFR Part 50 National Primary and Secondary Ambient Air Quality Standards

40 Code of Federal Regulations (CFR) Part 50 National Primary and Secondary Ambient Air Quality Standards codifies the NAAQS. The project owner conducted dispersion modeling to determine if the proposed project would exceed and AAQS. The modeling analysis demonstrated the AEC would not cause a violation for any of the criteria attainment pollutants during normal operations (including startup and shutdown periods). Nonattainment pollutant emissions will be mitigated consistent with SCAQMD's SIP approved NSR program.

40 CFR Part 51 Requirements for Preparation, Adoption, and Submittal of Implementation Plans

40 CFR Part 51 Requirements for Preparation Adoption and Submittal of Implementation Plans requires NSR permitting for new stationary sources. NSR applies to sources of designated nonattainment pollutants. The NSR permitting is addressed through SCAQMD Regulation XIII. A Permit to Construct and Permit to Operate will be obtained by the project owner satisfying the requirements.

40 CFR Part 52 Approval and Promulgation of Implementation Plans

40 CFR Part establishes procedures for allowing new sources of air pollution to be constructed or existing sources to be to be modified in areas classified as attainment. Prevention of Significant Deterioration (PSD) requirements apply on a pollutant specific

basis for major stationary sources. The AEC is considered one of 28 source categories that are subject to PSD requirements for attainment pollutants if facility annual emissions exceed 100 tons per year. The AEC would exceed the 100 tons per year threshold for NOx and CO and is subject to the PSD analysis requirements. AEC would also be a major stationary source of GHG (exceeding 100,000 tons per year) which requires a PSD analysis for GHGs. The facility owner submitted the PSD application to the SCAQMD. See SCAQMD Regulation XVII for additional analysis

<u>Title 40 Code of Federal Regulations Part 60 Standards of Performance for New Stationary Sources</u>

40 CFR Part 60 Subpart A –General Provisions

Any source subject to an applicable standard under 40 CFR Part 60 is also subject to the general provisions of Subpart A. Subpart A outlines general provisions for the proposed AEC including notification, work practice, monitoring and testing requirements.

40 CFR Part 60 Subpart Dc –Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units

This subpart affects steam generating units with heat input rates between 10 and 100 million British thermal units per hour (MMBtu/hr) installed after June 9, 1989. The auxiliary boiler is subject to this requirement. The auxiliary boiler would be fired exclusively on natural gas and therefore would only be required to maintain monthly fuel consumption records. The auxiliary boiler would also have to meet Rule 2012 requirements of recording monthly fuel usage using a non-resettable totalizing fuel meter. Rule 2012 requires the use of a CEMS.

40 CFR Part 60 Subpart KKKK –Standards of Performance for Stationary Combustion Turbines

This subpart establishes NOx and SO_2 emission limits for new combustion turbines. New combustion turbines with a rated heat input greater than 850 MMBtu/hr are required to meet NOx emission limits of 15 ppm at 15 percent oxygen. The fuel sulfur would be limited to 0.060 lbs SO_2 per MMBtu. Combustion turbines regulated under Subpart KKKK are exempt from Subpart GG.

The proposed AEC combined-cycle and simple-cycle turbines would meet the Subpart KKKK requirements with the use of dry-low NOx and SCR systems limiting NOx emissions to 2.0 ppm and 2.5 ppm. AEC would be limited to pipeline quality natural gas as fuel to meet SO_2 emission requirements. The AEC combined-cycle and simple-cycle turbines would monitor NOx emissions with a CEMS.

40 CFR Part 60 Subpart TTTT –Standards of Performance for Greenhouse Gas Emissions for Electrical Generating Units

On August 3, 2015, the U.S. EPA promulgated New Source Performance Standards Subpart TTTT-Standards of Performance for Greenhouse Gas Emissions for Electrical Generating Units (Title 40, Code of Federal Regulations, Part 60.5508) (Subpart TTTT). The notice was published in the Federal Register on October 23, 2015 and had an immediate effective date. Subpart TTTT-Standards of Performance for Greenhouse Gas Emissions for Electrical Generating Units sets standards to limit emissions of CO_2 from new, modified and reconstructed power plants. Subpart TTTT- requirements are set under the authority of the Clean Air Act section 111(b) and are applicable to new fossil fuel-fired power plants commencing construction after January 8, 2014. The AEC combined-cycle and simple turbines are subject to Subpart TTTT requirements.

Subpart TTTT has different requirements based on whether the emission unit is considered base load. According to Subpart TTTT, base load rating is defined as maximum amount of heat input that an electrical generating unit (EGU) can combust on a steady state basis at ISO conditions. Each EGU is subject to the standard if it burns more than 90% natural gas on a 12-month rolling basis and if the EGU supplies more than the design efficiency times the potential electric output as net-electric sales on a 3 year rolling average basis. An affected EGU supplying equal to or less than the design efficiency times the potential electric output as net electric sales on a 3 year rolling average basis is considered a non-base load unit and is subject to a heat input limit of 120 lbs CO_2/MMBtu. Each affected 'base load' EGU is subject to the gross energy output standard of 1,000 lbs of CO_2/MWh unless the Administrator approves the EGU being subject to a net energy output standard of 1,030 lbs CO_2/MWh.

If the combined-cycle block operates above the "design efficiency" of 56% (or 50%, whichever is less), the 1000 lb CO_2/MWh-gross standard is applicable. The applicant has provided thermal emissions calculations for 31.37% capacity factor. Since GHG efficiency increases with increased capacity factor, the 937.88 lb CO_2 /MWh-HHV-gross (with degradation) demonstrates that the combined-cycle block can meet the 1000 lb CO_2/MWh-gross standard.

Conditions of certification will be added to ensure compliance with Subpart TTTT. Condition of Certification **AQ-E6** (E193.11) provides the 1,000 pounds per gross megawatt-hours CO_2 emission limit (inclusive of degradation) shall only apply if a turbine supplies greater than 1,481,141 MWh-net electrical output to a utility distribution system on both a 12-operating-month and a 3-year rolling average basis. Compliance with the 1,000 pounds per gross megawatt-hours CO_2 emission limit (inclusive of degradation) is determined on a 12-operating month rolling average basis.

Condition of Certification **AQ-E7** (E193.12) provides the 120 pounds per MMBtu CO_2 emission limit shall only apply if a turbine supplies no more than 1,481,141 MWh-net electrical output to a utility distribution system on either a 12-operating-month or a 3-year rolling average basis. Compliance with the 120 pounds per MMBtu CO_2 emission limit is determined on a 12-operating month rolling average basis.

Condition of Certification **AQ-E7** (E193.14) limits the CO_2 emissions to 610,480 tons per year per turbine on a 12-month rolling average basis from the GHG emissions calculations above. In addition, the calendar annual average CO_2 emissions are limited to 937.88 pounds per gross MW-hour (inclusive of degradation) from the thermal efficiency calculations above.

The simple-cycle block would not be able to comply with the 1000 pounds per gross megawatt-hours CO_2 emission limit. Therefore the units would be restricted to operate below the base load threshold. Therefore the simple-cycle block must comply with Subpart TTTT emission limit of 50 kg CO_2 per GJ of heat input (120 lb CO_2/MMBtu). Compliance with this standard can be demonstrated by the exclusive use of natural gas as fuel.

Condition of Certification **AQ-E8** (E193.13) requires the 120 pounds per MMBtu CO_2 emission limit for non-base load turbines shall apply. Compliance with the 120 pounds per MMBtu CO_2 emission limit is determined on a 12-operating month rolling average basis.

Condition of Certification **AQ-E8** (E193.15) limits the CO_2 emissions to 120,765 tons per year per turbine on a 12-month rolling average basis from the GHG emissions calculations above. In addition, the calendar annual average CO_2 emissions are limited to 1,356.03 pounds per gross MW-hour (inclusive of degradation) from the thermal efficiency calculations above.

40 CFR 63, National Emission Standards for Hazardous Air Pollutants (NESHAPs).

The NESHAP regulations establish emission standards to limit emissions of HAPs from specific source categories. The PDOC shows that with the installation of the proposed new units, the facility total HAP emissions would be below the 25 tons per year total or 10 ton per HAP major source threshold. Therefore the facility would not be subject to the requirements of this subpart. In addition the facility is not proposing to permit any diesel fired emergency equipment and therefore would not be subject to Subpart ZZZZ requirements.

40 CFR Part 64 – Compliance Assurance Monitoring (CAM)

The CAM rule establishes monitoring requirements for emission control systems. The CAM rule applies to emission units with uncontrolled potential to emit levels greater than applicable major source thresholds. The rule is intended to provide “reasonable assurance” that the control systems are operating properly to maintain compliance with the emission limits.

The combined-cycle turbines NOx, CO, and VOC emissions are subject to BACT limits. Each turbine is controlled with an SCR and CO catalyst to meet BACT limits. For each turbine, the highest annual post-control NOx, CO, and VOC emissions are higher than the major source thresholds. Specifically, the NOx emissions are 54.19 tons per year (commissioning year), which is higher than the 10 tons per year major source threshold. The CO emissions are 129.58 tons per year (commissioning year), which is higher than the 50 tons per year threshold. The VOC emissions are 30.07 tons per year (commissioning year), which is higher than the 10 tons per year threshold. Thus, the CAM regulations are applicable to the combined-cycle turbines for NOx, CO, and VOC.

The simple-cycle turbines NOx, CO, and VOC emissions are subject to BACT limits. Each turbine is controlled with an SCR and CO catalyst to meet BACT limits. For each turbine, the highest annual post-control NOx and CO emissions are higher than the major source thresholds. Specifically, the NOx emissions are 34.29 tons per year (commissioning year), which is higher than the 10 tons per year major source threshold. The CO emissions are 50.7 tons per year (commissioning year), which is higher than the 50 tons per year threshold. The VOC emissions are 9.3 tons per year (commissioning year), which is lower than the 10 tons per year threshold. Thus, the CAM regulations are applicable to the simple-cycle turbines for NOx and CO.

For each turbine, a CEMS will be installed for NOx and for CO. The NOx and CO CEMS qualify as continuous compliance determination methods and provide an exemption from this subpart for NOx and CO.

This subpart applies to the VOC emissions because the VOC BACT limit is achieved with the assistance of the oxidation catalyst. The oxidation catalyst is primarily installed to control CO emissions, but also controls VOC emissions. The oxidation catalyst is located at the outlet of the turbine and designed to provide the required control efficiency at the expected turbine exhaust temperature range. There are no operational requirements for the CO catalyst. To assure that the catalyst is operating as designed, each turbine would be required to be source tested every three years for VOC pursuant to Condition **AQ-D11** (D29.3).

The auxiliary boiler NOx and CO emissions are subject to BACT limits. The boiler is controlled with an SCR to meet the BACT limit for NOx. The highest annual post-control NOx emission is lower than the major source threshold. Specifically, the NOx emissions are 0.68 tons per year, which is lower than the 10 tons per year major source threshold. The CO emissions are 3.63 tons per year are lower than the 50 tons per year threshold. Thus, the CAM regulations are not applicable to the auxiliary boiler.

40 CFR 70, Operating Permits Program

The Operating Permits Program requires the issuance of Title V permit identifying all applicable federal performance, operating, monitoring, recordkeeping and reporting requirements. The Title V requirements apply to facilities considered major sources having the potential to emit greater than10 tons per year NO_x or VOC, 100 tons per year of SO_2, 50 tons per year of CO, or 70 tons per year of PM_{10}, if the HAP PTE is greater or equal to 25 tons per year for combined HAPs and 10 tons per year for individual HAPs.

The AEC facility would exceed Title V thresholds and would be required to obtain a Title V permit. SCAQMD has received delegation authority for this program through SCAQMD Regulation XXX. The facility owner filed an application for an amendment to the existing facility Title V permit for AGS.

40 CFR 72, Acid Rain Program

The acid rain program establishes emission standards for SO_2 and NOx through the use of market incentives, monitoring and reporting requirements, and can require SO_2 allowances to be acquired in order to offset the annual SO_2 emissions.

The AEC would comply with the monitoring requirements of the acid rain provisions with the use of gas meters in conjunction with natural gas default sulfur data as allowed by the Acid Rain regulations (Appendix D to 40 CFR Part 75). If additional SO_2 credits are needed, the project owner would obtain the credits from the SO_2 trading market. Compliance with this rule is expected.

STATE

The project owner would demonstrate that the project would comply with Section 41700 of the California State Health and Safety Code, which restricts emissions that would cause nuisance or injury. Conditions required in the SCAQMD's preliminary determination of compliance and the Energy Commission's affirmative finding for the project would ensure compliance.

LOCAL

The project owner provided an air quality permit application to the SCAQMD and the district has issued a PDOC which states that the proposed facility modifications are expected to comply with all applicable District rules and regulations.

The District rules and regulations specify the emissions control and offset requirements for new sources such as the proposed AEC. BACT would be implemented, RECLAIM trading credits (RTCs) for NOx emissions would be provided, ERCs for the emissions of the auxiliary boiler and oil/water separator would be provided, and VOC, SO_2 and PM10 emissions from the proposed new gas turbines are exempt from the offset requirements according to district rules and regulations based on the permitted emission levels for the facility modifications. Compliance with the district's new source requirements would ensure that the AEC would be consistent with the strategies and future emissions anticipated under the district's air quality attainment and maintenance plans.

The SCAQMD prepared a PDOC, published on July 1, 2016. A public noticing period is required. The Final Determination of Compliance (FDOC) will be issued after the public comment period for the PDOC. The DOC evaluates compliance with the District's applicable rules and regulations, as summarized below.

<u>Regulation II – Permits</u>

Rule 205 – Expiration of Permit to Construct

This rule establishes that a SCAQMD permit to construct expires one year from the date of issuance unless a time extension has been approved in writing by the SCAQMD Executive Officer. Condition of Certification **AQ-E2** (E193.5) implements this rule.

In addition SCAQMD Rule 1714 incorporates provisions of 40 CFR Part 52.21 – Prevention of Significant Deterioration of Air Quality by reference. Part 52.21 includes provisions that can invalidate approval for construction if construction is not commenced within 18 months after the receipt of the approval. Extensions can be granted when justified. Condition of Certification **AQ-E2** (E193.6) implements this provision.

SCAQMD Rule 1713 invalidates permits to construct if construction has not commenced within 24 months after receipt of approval or if construction is discontinued for a period of 24 months. An extension can be granted if justified. Condition of Certification **AQ-E2** (E193.7) implements this condition.

The SCAQMD permit includes three provisions included in Condition of Certification **AQ-E2** (E193.5, E193.6 and E193.7). Condition of Certification **AQ-E2** would subsume these requirements.

Rule 212 – Standards for Approving Permits

The facility modifications are subject to Rule 212(c)(1), 212(c)(2) and Rule 212(c)(3) public notice requirements.

Rule 212(c)(1) requires public notice for any new or modified equipment that may emit air contaminants located within 1000 feet from the outer boundary of a school. The nearest K-12 school, Rosie the Riveter Charter High School is located 971 feet away from the closest proposed combined-cycle turbine.

In accordance with subdivision (d) of this rule, the facility owner will be required to distribute a public notice to each parent or legal guardian of children in any school within ¼ mile of the project facility and to each address within a radius of 1,000 feet from the outer property line. Kettering Elementary School is located within a ¼ mile of the proposed facility and therefore the public notice with also be required to be distributed to the parents and guardian of the students at that school.

Rule 212(c)(2) public notice is required for any new or modified facility which has onsite emission increases exceeding specified daily maximums. **Air Quality Table 48** includes the daily facility emissions and Rule 212(c)(2) thresholds.

Air Quality Table 48
Rule 212(c)(2) Applicability

AEC CCGT, AEC SCGT and Auxiliary Boiler	Emissions lbs/day					
	NOx	CO	VOC	SOx	PM10/2.5	Lead
AEC 30-day Averages	1,888	7,501	1,154	403	1,044	0
Rule 212(c)(2)	40	220	30	60	30	3
Exceed Daily Maximum	Yes	Yes	Yes	Yes	Yes	No

Source: SCAQMD 2016b Table 47

SCAQMD will prepare a public notice containing sufficient information to describe the project. The applicant will be required to distribute the public notice to each address within ¼ mile radius of the project. In addition, the public notice, project information and SCAQMD evaluation will be available for public inspection at the Bay Shore Neighborhood Library during the 30-day comment period. The public notice will also be published in the Press Telegram newspaper and be mailed to the AES, U.S. EPA Region 9, ARB, cities and counties where the project would be located, regional land use planning agency and state and federal land managers whose lands may be affected by the emissions from the proposed project.

The public notice will be combined with the Rule 3006 Title V public notice for a single public notice running concurrently for a single 30-day public comment period.

Rule 212(c)(3) requires public notice for new or modified equipment with emission increases of toxic contaminants that expose a person to a maximum individual cancer risk greater or equal to one in a million during a lifetime (70 year). Public notice will not be required since the maximum individual cancer risk from the stationary equipment would not expose a person to a maximum individual cancer risk greater than or equal to one in a million. Further analysis is in included in the Rule 1401 analysis and in the Public Health Section of this document.

Rule 218 – Continuous Emission Monitoring

The proposed combined-cycle and simple-cycle turbines would each be equipped with oxidation catalysts to control CO. Each turbine is required to be equipped with a CO CEMS to demonstrate compliance. The project owner will be required to submit an "Application for CEMS" for each proposed CO CEMS, retain records and follow reporting procedures once approval to operate the CO CEMS is granted. Compliance with this rule is expected.

<u>Regulation IV – Prohibitions</u>

Rule 401 – Visible Emissions

This rule prohibits the discharge of visible emissions which are as dark, or darker, than Ringelmann 1 for a period aggregating more than three minutes. The gas turbines and the auxiliary boiler would be fired exclusively with pipeline quality natural gas and subject to BACT requirements. Therefore, visible emissions are not expected from the turbines and auxiliary boiler and compliance with this rule is expected.

Rule 402 – Nuisance

This rule prohibits discharge of air contaminants or other materials in quantities that cause injury, detriment, nuisance, or annoyance to any considerable number of persons, or public, or have a natural tendency to cause injury or damage to business or property. Nuisance problems are not expected under normal operating conditions of the gas turbines, auxiliary boiler and other equipment. Compliance is anticipated.

Rule 403 – Fugitive Emissions

The provisions of this rule apply to any activity or man-made condition capable of generating fugitive dust. Prohibitions include fugitive dust that remains visible in the atmosphere beyond the property line of the emission source.

During the construction period, the project may be subject to requirements including the submittal of a fully executed Large Operation Notification (Form 403N) to the SCAQMD Compliance Department by an individual who has completed the SCAQMD fugitive Dust Control Class, and daily records that document the specific dust control actions taken.

The PDOC/FDOC is intended to evaluate the operating emissions, including fugitive emissions during the operation of a facility and the control of these emissions. The

PDOC/FDOC is not intended to evaluate fugitive emissions during the construction phase. During normal operations, fugitive dust is not expected from the gas turbines, auxiliary boiler, SCR oxidation catalysts, ammonia tanks and oil/water separators, therefore, compliance is anticipated.

Rule 407 – Liquid and Gaseous Air Contaminants

This rule limits SO_2 emissions to 500 ppm for equipment not subject to the gaseous fuel sulfur emission concentration limits of 431.1. It limits CO emissions to 2,000 ppm. Since the gas turbines will be subject to Rule 431.1 and are expected to comply with Rule 431.1, the sulfur limit does not apply. Compliance with the CO limit of this rule is expected since the AEC CCGT are subject to the BACT CO emission limit of no more than 2 ppmv and the AEC SCGT are subject to the BACT CO emission limit of no more 4 ppmv at 15 percent oxygen. The auxiliary boiler will comply with a CO emission limit of 50 ppmv. Compliance with CO will also be verified through the CEMS data for the gas turbines.

Rule 409 – Combustion Contaminants

This rule applies to the AEC CCGT, AEC SCGT and auxiliary boiler. This rule limits combustion generated PM emissions to 0.1 grains/dscf calculated to 12 percent CO_2.The PDOC demonstrated that the PM loading would be 0.007 grains/dscf for the AEC CCGT, and 0.01 grains/dscf for the AEC SCGT. The auxiliary boiler emissions rate during normal operation of 0.15 pounds per hour is significantly less than the turbines, therefore, compliance with the 0.1 grains/dscf calculated to 12 percent CO_2 is expected.

Rule 431.1 – Sulfur Content of Gaseous Fuels

This rule requires that the sulfur content as H_2S of the natural gas shall be less than 16 ppmv. The natural gas fuel that AEC would use is pipeline quality natural gas supplied from the Southern California Gas pipeline, which is limited to maximum fuel sulfur content of less than 0.75 grains of sulfur per 100 standard cubic feet. The commercial grade natural gas has an average H_2S content of 4 ppm. Compliance is expected.

Rule 475 – Electric Power Generating Equipment

This rule applies to power generating equipment greater than 10 MW installed after May 7, 1976. This rule limits combustion contaminants as PM to be either less than 11 lbs/hour, or less than 0.01 gr/dscf. For natural gas fired gas turbine engines almost all PM emissions are PM10 emissions. As calculated in the Rule 409 evaluation PM10 emissions are 0.003 gr/dscf for the combined-cycle turbines, and 0.008 gr/dscf for the simple-cycle turbines. Since they both are less than 0.01 gr/dscf, compliance is expected.

<u>Regulation XI – Source Specific Standards</u>

Rules 1134 – Emissions of NOx from Stationary Gas Turbine / 1135 – Emissions form NOx from Electric Power Generating Systems

These rules are superseded by NOx RECLAIM pursuant to Rule 2001, Table 1.

Rules 1146 – Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters as amended 11/1/13

NOx emissions are not subject to this rule because the rule is superseded by NOx RECLAIM pursuant to Rule 2001, Table 1. However, the CO emissions are still subject to this requirement. Rule 1146 establishes NOx and CO emissions and compliance requirements. The equipment BACT requirements are more stringent than the emissions requirements established through Rule 1146. Rule 1146 CO limit is 400 ppmv corrected to 3 percent oxygen, The BACT CO limit of 50 ppm would be required by Condition of Certification **AQ-A14** (A195.14), Condition of Certification **AQ-D13** (D29.5) would require initial source testing with set averaging periods and test methods, Conditions of Certification **AQ-D14** (D29.6) would require ongoing testing according to Rule 1146 frequency (currently every three years), and Condition of Certification **AQ-H1** (H23.7) would require compliance with all Rule 1146 requirements. RECLAIM supersedes Rule 1146 requirements. The boiler is a major NOx source and would be required to be equipped with a certified CEMS. Compliance with the CO requirements would be established through the applicable conditions of certification.

Regulation XIII – New Source Review

New emissions sources are subject to the requirements of New Source Review (NSR) as specified in Regulation XIII, which includes SCAQMD Rules 1300 through 1325. For RECLAIM facilities, this rule only applies to pollutants not addressed by Regulation XX RECLAIM. Therefore criteria pollutants PM10, SOx, VOC and CO are subject to Rules 1300 – 1325 and NOx is restricted through SCAQMD Rules 2000-2013. For clarity corresponding RECLAIM requirement analysis will be included in this section. The SCAQMD new source review rules are based on both NAAQS and CAAQS.

Rule 1303(a)(1) – BACT/LAER (PM10, SOx, VOC, CO)

Rule 2005I(1)(A) – BACT/LAER (NOx)

The use of BACT is requires for new or modified sources resulting in uncontrolled emission increases of 1 pound per day of any nonattainment air contaminant, ozone depleting compound, or ammonia. Precursors to nonattainment air contaminants are treated as nonattainment air contaminants as well. SCAQMD Rule 1303 requires BACT for NOx (non-RECLAIM), SOx, VOC, PM10 and ammonia. SCAQMD Rule 2005 requires BACT for RECLAIM NOx. In addition, the SCAQMD has determined that BACT is required for CO.

SCAQMD Rule 1303 requires that BACT for sources at major facilities be at least as stringent as Lowest Achievable Emissions Rate (LAER) defined in the federal Clean Air Act**. Air Quality Table 49** includes major facility thresholds and the AEC potential to emit.

Air Quality Table 49
Major Facility Applicability

	Emissions tons/year				
	NOx	**CO**	**VOC**	**SOx**	**PM10**
Major Facility Threshold	10	50	10	100	70
Proposed AEC	**636**	**21,872**	**454**	50	**627**
Exceed Threshold	Yes	Yes	Yes	No	Yes

Source: SCAQMD 2016b Table 47

AEC exceeds the major facility for NOx, CO, VOC and PM10. If the threshold for any one criteria pollutant is exceeded then the facility is considered a major polluting facility and is subject to LAER for all pollutants subject to NSR.

SCAQMD Rule 1302(h) defines BACT as "the most stringent emission limitation or control technique which:

(1) has been achieved in practice (AIP) for such category or class of source; or

(2) is contained in any state implementation plan (SIP) approved by the U.S. EPA for such category or class of source. A specific limitation or control technique shall not apply if the owner or operator of the proposed source demonstrates to the satisfaction of the Executive Officer or designee that such limitation or control technique is not presently achievable; or

(3) is any other emission limitation or control technique, found by the Executive officer or designee to be technologically feasible for such class or category of sources or for a specific source, and cost-effective as compared to measures as listed in the Air Quality Management Plan (AQMP) or rules adopted by the District Governing Board."

The first two requirements in the BACT definition are the federal requirements for LAER at major sources. The third part of the definition is unique to SCAQMD and some other areas in California, and allows for more stringent controls than LAER. For major polluting facilities, LAER is determined on a permit-by-permit basis.

A BACT analysis was performed for each type of equipment on a pollutant-by-pollutant basis. **Air Quality Table 50** includes BACT requirements for the AEC.

Air Quality Table 50
AEC BACT Requirements

Pollutant	Proposed BACT Emission Level	Proposed BACT System
Combined-Cycle Turbines		
NOx	2.0 ppm at 15 percent O_2	DLN Combustor with SCR
CO	2.0 ppm at 15 percent O_2	Oxidation Catalyst/GCPs
VOC[a]	2.0 ppm at 15 percent O_2	DLN Combustor Oxidation Catalyst
SOx	Sulfur content less than 1 grain per 100 scf	Pipeline Quality Natural Gas
PM10	Sulfur content less than 1 grain per 100 scf	Pipeline Quality Natural Gas /GCPs/inlet air filtration
NH_3	5.0 ppm at 15 percent O_2	NH_3 Reagent/SCR systems
Simple-Cycle Turbines		
NOx	2.5 ppm at 15 percent O_2	DLN Combustor with SCR
CO	4.0 ppm at 15 percent O_2	Oxidation Catalyst/GCPs
VOC	2.0 ppm at 15 percent O_2	DLN Combustor Oxidation Catalyst
SOx	Sulfur content less than 1 grain per 100 scf	Pipeline Quality Natural Gas
PM10	Sulfur content less than 1 grain per 100 scf	Pipeline Quality Natural Gas /GCPs/inlet air filtration
NH_3	5.0 ppm at 15 percent O_2	NH_3 Reagent/SCR systems
Auxiliary Boiler		
NOx	5.0 ppm	ULNB/FGR/GCPs/SCR
CO	50 ppm	Natural Gas/GCPs
VOC	None	Natural Gas/GCPs
PM10/SOx	Sulfur content less than 1 grain per 100 scf	Pipeline Quality Natural Gas
NH_3	5.0 ppm at 15 percent O_2	NH_3 Reagent/SCR systems
Ammonia Tanks		
NH_3	None	Use of a pressure vessel for storage and a vapor return line for transfer
Oil/Water Separator		
VOC	None	Fixed Covers

Source: CH2 2016s, SCAQMD 2016b and staff analysis
DLN = dry low NOx
ULNB = ultra-low NOx burner
FGR = Flue gas recirculation
GCPs= Good combustion practices
[a] The original application proposed 1 ppm for VOC. However it is not clear if the equipment could meet 1 ppm using SCAQMD approved test methods. Therefore, SCAQMD can only verify a BACT level of 2 ppm.

BACT requirements would be included in Air Quality Conditions of Certifications **AQ-A9**, **A12**, and **A15** for the AEC CCGT; **AQ-A10**, **A13**, and **A15** for the AEC SCGTs; **AQ-A11** and **A14** for the auxiliary boiler; **AQ-C6** and **E12** for the ammonia storage tanks; and **AQ-E13** for the oil/water separator.

During commissioning periods, startups, and shutdowns for the AEC CCGT, AEC SCGT and auxiliary boiler, it is not technically feasible for the turbines to meet BACT limits and the equipment is exempt from meeting BACT requirements during these periods. However, additional conditions of certification restrict emissions levels and operation during these periods to minimize emissions. The additional Conditions of certification include **AQ-E3**, **C1** and **C2** for the AEC CCGT; **AQ-E4**, **C3**, and **C4** for the AEC SCGT; and **AQ-E5** and **C5** for the auxiliary boiler.

Rule 1303(b)(1) Modeling

Rule 1303 requires that through modeling, the applicant must substantiate that the proposed facility would not cause a violation, or make significantly worse an existing violation of any AAQS at any receptor location. Rule 1303 requires modeling for NO_2 (non-RECLAIM), CO, PM10 and SO_2. Rule 2005I(1)(B) requires modeling for NO_2 for RECLAIM facilities.

Compliance determinations are different for attainment and nonattainment pollutants. For attainment pollutants, NO_2, CO, SO_2 and PM10 (federal), the peak impact plus the worst–case background concentrations shall not exceed the most stringent AAQS. For nonattainment pollutants, PM10 (state) and PM2.5, where the background concentrations exceed the AAQS, the modeled peak impacts shall not exceed Rule 1303 significant change thresholds.

SCAQMD Rule 1304(a) exempts specified sources replacing existing electric utility under specific circumstances from modeling requirements. The two combined-cycle and four simple turbines qualify for this exemption. The auxiliary boiler would not be exempt and therefore modeling is required. However, AEC performed a complete modeling analysis including the entire facility. SCAQMD reviewed the modeling to determine compliance with SCAQMD rules and regulations. SCAQMD reproduced the modeling analysis and used updated background concentrations from 2012 to 2014. The SCAQMD modeling review is included with the PDOC and is summarized below:

- The modeled impacts from the auxiliary boiler are below all Rule 1303 thresholds.
- The project's health risks are less than the Rule 1401 cancer and non-cancer permit limits of 10 in one million and hazard index of 1 (see the Public Health Section for more discussion)
- All equipment is subject to SCAQMD Rule 2005 review for NO_2. Modeled impacts are below all ambient air quality thresholds for NO_2.
- The project is subject to PSD regulations for NO_2, PM10 and greenhouse gases (GHG). CO is not subject to PSD however impacts were included in the analysis. The project's CO and PM10 impacts do not exceed the SIL. NO_2 impacts exceeded the 1-hour NO_2 SIL so a cumulative assessment was conducted. The cumulative impact analysis exceeded the 1-hour SIL. However, the projects contribution is less than the SIL and is not considered a significant source.
- The project's impacts on visibility and deposition did not exceed the screening threshold.

- The modeling analysis conforms to SCAQMD regulations.

Rule 1303(b)(2) – Offsets

Rule 1303(b)(2) requires offsets for a net emission increase of any nonattainment air contaminant (PM10, VOC and SOx) unless exempt from offset requirements pursuant to Rule 1304. CO is an attainment pollutant and not a precursor to any nonattainment pollutant, and is therefore not subject to the offset requirements.

Rule 1304(a)(2) – Electric Utility Steam Boiler Replacement provides a modeling and offset exemption for utility boiler repower projects. The exemption applies to the combined-cycle and simple-cycle turbines.

Offsets are required for each emission unit and are determined using the 30-day emission average. The 30-day average is based on the highest emissions for any month, including a commissioning month. The SCAQMD uses an offset ratio of 1.2 – 1 for emission reduction credits (ERCs). Project 30-day averages are included in **Air Quality Table 51.**

Air Quality Table 51
Project 30-Day Emission Averages

Equipment	30-Day Average (lbs/day)		
	VOC	SOx	PM10
Auxiliary Boiler	3.4	1.06	3.78
Oil/Water Separator, CCGTs	0.0005	--	--
Oil/Water Separator, SCGTs	0.000073	--	--
Total Project	3.40	1.06	3.78

Source: SCAQMD 2016b Table 62

Air Quality Table 52 summarizes the ERC and RTCs required per SCAQMD rules and regulations (RTC quantification in Proposed Emissions, Total Facility section) The total facility NOx RTC requirements In **Air Quality Table 52** are for the first operating year and are separated into two categories, since the first year operation for the SCGTs will be after the first year operation of the auxiliary boiler and combined-cycle turbines.

Air Quality Table 52
Project ERC and RTC Requirements

Equipment	(lbs/year)	(lbs/day)		
	NOx, RTCs[a]	VOC	SOx	PM10
AEC CCGT	108,377	--	--	--
AEC CCGT	108,377	--	--	--
AEC SCGT	68,575	--	--	--
AEC SCGT	68,575	--	--	--
AEC SCGT	68,575	--	--	--
AEC SCGT	68,575	--	--	--
Auxiliary Boiler	1,351	4	1	5
Oil/Water Separator, CCGTs	--	--	--	--
Oil/Water Separator, SCGTs	--	--	--	--
Total CCGTS and Auxiliary Boiler	218,105	4	1	5
Total SCGTS only	274,300	--	--	--

Source: SCAQMD 2016b Table 62, staff analysis
Note: [a] First Year

ERCs have been provided for the AEC for SCAQMD VOC, and PM10 offset requirements included in **Air Quality Table 52**. SOx offsets have not yet been provided for the project. Until the offsets are provided, the project will not meet the requirements of Rule 1303 and staff cannot find LORS compliance. Credits need to be enforceable, permanent, quantifiable, real and surplus. The source of mitigation needs to be identified to allow comment prior to project approval.

Rule 1303(b)(3) Sensitive Zone Requirements

Rule 2005 –Trading Zone Restrictions

These rules require credits to be obtained from the appropriate trading zone. The AEC would be located in zone 1. Therefore, ERCs and RTC used for SCAQMD rule compliance must be originated from zone 1 only.

Rule 1303(b)(4) Facility Compliance

The AEC would be required to comply with all applicable rules and regulation of the SCAQMD.

Rule 1303(b)(5) Major Polluting Facilities

Rule 2005 – Additional Federal Requirements for Major Stationary Sources

AEC is considered a major pollution source by the SCAQMD under Rule 1302, and subject to the following rules:

- **Rule 1303(b)(5)(A)/Rule 2005(g)(2) – Alternative Analysis**
- **Rule 1303(b)(5)(A)/Rule 2005(g)(2) – Compliance with CEQA**

Rules 1303 and 2005 specifies the alternative analysis requirements can be met through compliance with CEQA. The Energy Commission permitting process is a certified regulatory program under CEQA that meets the requirements.

Rule 1303(b)(5)(B) – Statewide Compliance

Rule 2005(g)(1) – Statewide Compliance

Rule 1303(b)(5)(B) requires a demonstration that all major stationary sources are owned or operated by such person in the state are subject to emission limitations and are in compliance or on a schedule for compliance with all applicable emission limitations and standards under the Clean Air Act. Rule 2005(g)(1) requires the applicant to certify that all other major stationary sources in the state which are controlled by the applicant are in compliance or on a schedule for compliance with all applicable federal emission limitations or standards. In a letter dated 10/23/15, Stephen O'Kane, Manager, AES Alamitos, LLC, certified that all major stationary sources that are owned or operated by AES in California are subject to emission limitations and are in compliance or on a schedule for compliance with all applicable emissions limitations and standards under the Clean Air Act.

Rule 1303(b)(5)(C) –Protection of Visibility

Rule 2005(g)(4)—Protection of Visibility

Rule 1303(b)(5)(C) and Rule 2005(g)(4) require a modeling analysis for plume visibility if the net emission increases from a new or modified sources exceed 15 tons per year of PM10 or 40 tons per year of NOx; and the location of the source, relative to the closest boundary of a specified Federal Class I area is within a specified distance. The applicant has identified the San Gabriel Wilderness, approximately 53 km from the AEC site, as the nearest Class I area. Since the AEC is not within 29 km, a visibility analysis is not required.

Rule 1304 – Exemptions

SCAQMD Rule 1304(a)(2) provides a modeling and offset exemption for utility boiler replacement projects. The exemption applies to the: "….replacement of electric utility steam boiler(s) with combined-cycle gas turbine(s), intercooled, chemically-recuperated gas turbines, other advanced gas turbine(s); solar, geothermal, or wind energy…..[t]he new equipment must have a maximum electrical power rating (in megawatts) that does not allow basinwide electricity generating capacity on a per-utility basis to increase. If there is an increase in basin-wide capacity, only the increased capacity must be offset." Offsets are still provided, but the exemption provides the offsets from the SCAQMD internal offset accounts.

Rule 1304(a)(2) provides an exemption for new qualifying equipment that have a maximum electrical rating (in megawatts) that is less than or equal to the maximum electrical rating (in megawatts) of the electric utility steam boiler(s) that the new equipment replaces. Both the new equipment and the existing electric utility boiler(s) must have the same owner and be located in the basin. The MW's for MW's used to calculate the AEC emission credits and offsets use the following AGS units: Utility Boiler No. 1 (175 MW-gross), No. 2 (175 MW-gross), Unit 5 (480 MW-gross), and No. 3

(320 MW-gross) at AGS, with the two combined-cycle turbines (692.951 MW-gross total) and four simple-cycle turbines (401.751 MW-gross total). AES has not identified plans for the surplus 55 MWs from the retirements of these four utility boilers. In addition, AES has not identified plans for the MWs from the retirement of Utility Boiler No. 4 (320 MW) and Utility Boiler No. 6 (480 MW).

Rule 1304.1 – Electrical Generating Fee for Use of Offset Exemption

This rule requires electrical generating facilities which use the specific offset exemption described in Rule 1304(a)(2) [Electric Utility Steam Boiler Replacement] to pay fees for up to the full amount of offsets provided by the SCAQMD. AEC has selected a payment option with the SCAQMD. The preliminary estimated annual payment would be required prior to the issuance of the Permits to Construct.

Rule 1313 - Permits to Operate

Rule 1313 Section (d) applies to the retirement plan for the existing AGS. Section (d) requires a maximum of 90 days may be allowed as a start-up period for simultaneous operation of the subject sources for replacement equipment. Condition of Certification **AQ-F5** (F52.1) limits simultaneous operation to 90 days, and sets forth a number of requirements for the retirement plan and the retirement of the AGS Boilers.

Rule 1313 Section (g) requires permits to have identified BACT conditions and monthly maximum emissions from the permitted source. The following conditions would have corresponding Conditions of Certification:

<u>Combined-Cycle Turbines</u>

- BACT–Conditions of Certification AQ-A9, AQ-A12 and AQ-A15 (A195.8, A195.9, and A195.10) set forth the BACT limits for NOx, CO, and VOC, respectively.
- Monthly Emissions– Conditions of Certification AQ-A1 (A63.2) sets forth the monthly limits for CO, VOC, PM10, and SOx. These limits indirectly limit NOx.

<u>Simple-Cycle Turbines</u>

- BACT– Conditions of Certification AQ-A10, AQ-A13 and AQ-A15 (A195.11, A195.12, and A195.10) set forth the BACT limits for NOx, CO, and VOC, respectively.
- Monthly Emissions– Conditions of Certification AQ-A2 (A63.3) sets forth the monthly limits for CO, VOC, PM10, and SOx. These limits indirectly limit NOx.

<u>Auxiliary Boiler</u>

- BACT– Conditions of Certification AQ-A11 and AQ-A14 (A195.13 and A195.14) set forth the BACT limits for NOx and CO, respectively.
- Monthly Emissions– Conditions of Certification AQ-A3 (A63.4) sets forth the monthly limits for CO, VOC, PM10, and SOx. These limits indirectly limit NOx.

Selective Catalytic Reduction

- BACT— Conditions of Certification AQ-A16 and AQ-A17 (A195.15 and A195.16) set forth the BACT limit for the combined- and simple-cycle turbine SCRs (NH3 at 15% O2) and auxiliary boiler SCR (NH3 at 3% O2), respectively.
- Monthly Emissions—Monthly emission limits are applicable to basic equipment, not control equipment.

Ammonia Tanks

- BACT— Conditions of Certification AQ-C6 (C157.1) requires the tanks to be equipped with a pressure relief valve set at 50 psig. Condition of Certification AQ-E12 (E144.1) requires the tanks to be vented, during filling, to the vessel from which it is being filled.
- Monthly Emissions—The pressure relief valves and vapor return lines result in no ammonia emissions emitted from the tanks under normal operations.

Oil/Water Separators

- BACT— Conditions of Certification AQ-E13 (E193.16) requires fixed covers for the tanks.
- Monthly Emissions—Throughput limits are not necessary because the 30-day averages for both tanks are no more than 0.0005 lb/day.

Rule 1325 – Federal PM2.5 New Source Review Program

This rule applies to major polluting facilities, major modifications to a major polluting facility, or any modifications to an existing facility that would constitute a major polluting facility in areas federally designated as federal nonattainment for PM2.5. This rule applies on a pollutant specific basis to emissions of PM2.5 and its precursors. For major modifications the source must be considered a major source, the modification results in a significant increase and the modification results in a significant net emissions increase.

A major polluting facility is defined as a facility with actual emissions, or a potential to emit of greater than 100 tons per year. The AEC would have a potential to emit over 100 tons per year for NOx, but below for SO_2 and PM2.5. In addition the net increase of NO_2 would be over 40 tons per year and is therefore considered significant. Therefore Rule 1325 is only applicable to NOx,

Conditions of certification would be included limiting the potential to emit for PM2.5 and SO_2 to 100 tons per year. Condition of Certification **AQ-F1** (F2.1) would limit the PM2.5 emissions for the facility to 100 tons per year. Conditions of Certifications **AQ-A1**, **A2**, and **A3** (A63.2, .3 and .4) limit annual emissions of SO_2 and PM10 from the combined-cycle and simple-cycle turbines and the auxiliary boiler.

The SCAQMD Rule 1325 PM2.5 threshold is pending change from 100 tons per year to 70 tons per year. The SCAQMD was reclassified as serious nonattainment for PM2.5 and federal regulations require a major source be classified as having the potential to emit of 70 tons per year for PM2.5.The new threshold does not apply until SCAQMD revises its PM2.5 NSR requirements.

Rule 1401 – New Source Review of Toxic Air Contaminants

Rule 2005(g)(4)—RECLAIM Rule 1401 Compliance

Rule 1401 specifies limits for maximum individual cancer risk (MICR), and acute and chronic hazard index from new permit units, relocations, or modifications to existing permits that emit toxic air contaminants (see Public Health Section for analysis).

Regulation XVII – Prevention of Significant Deterioration

The PSD program has been established to protect the deterioration of air quality in areas that already meet the primary NAAQS. The SCAQMD is partially delegated to issue initial PSD permits and for PSD permit modifications. AES has opted to apply for a PSD permit from the SCAQMD. The SCAB is in attainment for NO_2, SO_2, CO, and PM10 NAAQS. Therefore, the PSD regulation applies to NOx, SOx, CO, and PM10 emissions.

Rule 1701, 1702, 1706 – PSD Applicability

The SCAQMD is in attainment for the primary NAAQS for NOx, SOx, CO, and PM10. PSD applies to each regulated pollutant. **Air Quality Table 53** demonstrates PSD requirement applicability for each pollutant.

Air Quality Table 53
Prevention of Significant Deterioration Applicability

	CO	NOx	SO_2	PM10
AGS PTE (tons/year)	21,872	636	50	627
Major Source	Yes	Yes	Yes	Yes
AGS Actual Emissions -2013-2014 (tons/year)	288	47	5	11
AEC PTE (tons/year)	270	137	10	70
Significant Emission Increase	Yes	Yes	No	Yes
Net Emission Increase = AEC PTE – AGS Actual (tons/year)	- 18	90	6	59
Net Significant Increase	No	Yes	No	Yes
PSD Applicability	No	Yes	No	Yes

Source: SCAQMD 2016b Table 71, staff analysis

Although CO is not subject to PSD requirements is was included for completeness in the SCAQMD review.

Rule 1703 (a)(2) and (a)(3)(B) Analysis –Top Down BACT

BACT applies to each permit unit for each criteria air contaminant for which there is a net emission increase. U.S. EPA outlines the process used to perform the required case-by-case analysis. The process is referred to as a Top-Down analysis and includes the following steps.

- Step 1: Identify all available control technologies
- Step 2: Eliminated technically infeasible options
- Step 3: Rank remaining control technologies
- Step 4: Evaluate the most effective controls
- Step 5: Select the BACT

The top down BACT analysis is consistent with the proposed systems included in **Air Quality Table 50**.

Rule 1703 (a)(3)(A) Analysis – Certificate of Compliance

A certified letter of compliance was submitted by AES stating that all major stationary sources owned and operated by AES in California subject to emission limitations are in compliance or on schedule tor compliance with all applicable standards under the Clean Air Act.

Rule 1703 (a)(3)(F) Analysis – Copy of Application to EPA, Federal Land Manager, Forest Service

AES submitted permit applications to the SCAQMD for the AEC on 10/23/2015. The SCAQMD deemed the AEC permit applications complete on 1/14/2016. On 1/20/2016, SCAQMD mailed the original applications including the modeling CDs to affected agencies. On 4/1/2016 the SCAQMD mailed the revised applications and modeling CDs to the same agencies. A representative from the National Park Service indicated they agree with the proposed project BACT and do not anticipate the project to affect any areas managed by the National Park Service. The Forest Service has not submitted any comment on the project at this point.

Rule 1703 (a)(3)(D), (a)(3)(C), (a)(3)(C), Analysis – Air Impacts

An air impacts analysis including modeling was performed for CO, NO_2 and PM10. The following summarizes the Rule 1303, 2005, and 1703 modeling analysis:

1. Pre-construction monitoring is not required for the proposed AEC since the CO, NO_2 and PM10 impacts would not exceed the monitoring thresholds.

2. SCAQMD updated the background concentrations to include 2014 data.

3. Dispersion modeling demonstrated CO_2, NO_2 and PM10 will be incompliance with the primary NAAQS and CAAQS.

4. The maximum impacts for annual NO_2, 1-hr and 8-hr CO, and 24-hr PM10 are below the respective Class II significant impact levels (SILs).

5. The federal 1-hour NO_2 average impact for the proposed new units exceeds the Class II SIL of 7.52 $\mu g/m^3$. Therefore, a cumulative impact analysis of AEC and competing sources was required. The cumulative impact analysis demonstrated the

maximum contribution to the modeled exceedance was less than the 1-hr NO_2 SIL. Therefore the impacts are considered less than significant.

6. A Class 1 area impact analysis demonstrated that the AEC would not adversely affect air quality-related values and will not cause or contribute to an exceedance of the Class I SIL.

7. A Class 1 increment impact analysis evaluated potential impacts to nearby Class 1 areas. The nearest Class I area is approximately 53 kilometers away from the AEC site. Impacts at this distance are below the applicable SIL.

8. The AEC facility would be built on an existing power plant site to replace existing electrical generating equipment. The project is not expected to induce growth or result in impacts to soils and vegetation.

9. AES evaluated wet and dry nitrogen deposition from depositional nitrogen emissions from AEC using AERMOD. The annual deposition is considered to be less than critical loads.

10. Dispersion modeling for normal operation demonstrated compliance with secondary NAAQS.

11. The visibility analysis used VISCREEN Tier 1 modeling to demonstrate each Class II area did not exceed the criteria for color contrast or plume contrast.

Rule 1714 Prevention of Significant Deterioration for greenhouse Gases

Air Quality Appendix AQ-1 includes the GHG analysis for the proposed AEC.

<u>Regulation XX – Regional Clean Air Incentives Market (RECLAIM)</u>

Rule 2002 – Allocations for Oxides of Nitrogen (NOx) and Oxides of Sulfur (SOx)

This regulation establishes the applicable starting emission factor used for RECLAIM NOx until the CEMS is certified. The requirements are included in Conditions of Certification, AQ-A4, AQ-A5, AQ-A6, AQ-A7 and AQ-A8 (A99.1, A99.2, A99.3, A99.4 and A99.5)

Rule 2005 – New Source Review for RECLAIM

This regulation applies only to NOx emissions for this facility because the owner intends to obtain any needed SO_2 credits from the SO_2 trading market (PDOC page 28).

1. BACT

A top down BACT analysis was performed. As previously discussed, the proposed BACT is consistent with the SCAQMD BACT analysis.

2. Modeling

For existing RECLAIM facilities, the SCAQMD will not approve applications for amendments to add new emission equipment unless it is demonstrated the project would not result in a significant increase in the NO_2. Therefore modeling is required on a per permit unit basis. The revised application indicated the thresholds and standards are only applicable to the highest modeled concentrations corresponding to the combined-cycle turbine. **Air Quality Table 54** includes the modeled results for a single combined-cycle turbine.

Air Quality Table 54
Proposed AEC Routine Operations Impacts

Pollutant	Averaging Period	Project Impact ($\mu g/m^3$)	Background ($\mu g/m^3$)[a]	Total Impact ($\mu g/m^3$)	Limiting Standard ($\mu g/m^3$)	Percent of Standard
NO_2	1 hour	13.8	256	270	339	80%
	1 hour NAAQS	12.4	146	158	188	84%
	Annual	0.1	48	48.1	57	84%

Source: SCAQMD Table 88, staff analysis
[a] Background values are adjusted as presented in **Air Quality Table 12**

The total impacts demonstrate the proposed NOx emission sources will not cause a violation of the most stringent ambient air quality standards.

3. Additional Requirements

RECLAIM facilities are required to hold sufficient RECLAIM Trading Credits (RTCs) to offset the annual emission increase for the first year of operation. SCAQMD determined AEC would only have to hold offsets for the first year of operation for NOx-emitting equipment since RTC allocations would be less than the initial allocation when AES Corporation purchased the AGS.

Rule 2005(d) specifies the RECLAIM credit calculation shall be based on the potential to emit or on permit conditions limiting emissions. For the first year of operation RECLAIM allotments will be based the maximum commissioning year emissions.

RTCs Required to Be Held the First Year of Operation:

Combined-Cycle Turbines
Condition of Certification **AQ-I1** (I297.1 and I297.2) will require each turbine to hold 108,377 pounds of RTCs the first year.

Simple-Cycle Turbines
Condition of Certification **AQ-I2** (I297.3, I297.4, I297.5, and I297.6) will require each turbine to hold 68,575 pounds of RTCs the first year.

Auxiliary Boiler
Condition of Certification **AQ-I3** (I297.7) will require auxiliary boiler to hold 1,351 pounds of RTCs the first year from the annual emissions calculations.

Current RECLAIM Annual Emission Allocations indicates the current RTC holdings exceed the first year of operation requirement. For subsequent years, Rule 2004(b)(1) specifies actual NOx emissions will determine the number of RTCs required.

4. Additional Requirements

Trading zone restrictions and additional federal requirements are discussed in Rule 1303(b)(3) and (b)(5). Public notice requirements are included in Rule 212 analysis and Rule 1401 compliance is included in the Rule 1401 analysis.

Rule 2012 – Monitoring Recording and Record Keeping for RECLAIM

The combined-cycle turbines, simple-cycle turbines and auxiliary boiler would be classified as major sources of NOx for RECLAIM purposes. The AEC would be required to use non-resettable fuel meters to record fuel usage and a NOx CEMS. The AEC would be required to install, operate, and maintain all recording systems within 12months after initial startup. CEMS equipment is proposed for the combined-cycle turbines, simple-cycle turbines and auxiliary boiler. Conditions of certification would require the CEMS would to be installed within 12 months from the date of installation of the turbines. Thus, the operation of the new turbines would be in compliance with Rule 2012.

Regulation XXX – Title V Operating Permit

The AEC is considered as a significant permit revision to the RECLAIM/Title V permit for the AGS facility. A proposed Title V permit incorporating permit revisions will be submitted to U.S EPA for a 45-day review. All public participation procedures are required be followed prior to the issuance of the permit.

The public notice is required to include the following:

1. The identity and location of the affected facility;

2. The name and mailing address of the facility's contact person;

3. The identity and address of the SCAQMD as the permitting authority processing the permit;

4. The activity or activities involved in the permit action;

5. The emissions change involved in any permit revision;

6. The name, address, and telephone number of a person whom interested persons may contact to review additional information including copies of the proposed permit, the application, all relevant supporting materials, including compliance documents as defined in paragraph(b)(5) of Rule 3000, and all other materials available to the Executive Officer that are relevant to the permit decision;

7. A brief description of the public comment procedures provided; and

8. The time and place of any proposed permit hearing that may be held or a statement of the procedures to request a proposed permit hearing if one has not already been requested.

The Title V public notice will be combined with the Rule 210 noticing. The public notice periods for both are anticipated to run concurrently.

CONCLUSIONS

Staff offers the following conclusions regarding the SAFC to construct the AEC combined-cycle and simple-cycle units. Staff recommends the adoption of Air Quality Conditions of Certification included in the following section.

- Construction impacts would contribute to violations of the ozone, PM10, and PM2.5 ambient air quality standards. Staff recommends Conditions of Certification **AQ-SC1** to **AQ-SC5** to mitigate the construction-phase impacts of the proposed facility modifications to a less than significant level.
- Operation of the proposed facility modifications would comply with applicable SCAQMD rules and regulations, including New Source Review, BACT requirements, and offset requirements. Staff recommends the inclusion of the district's PDOC conditions as Conditions of Certification**.**
- The proposed facility would neither cause new violations of any CO, NO_2, or SO_2 ambient air quality standard nor contribute to existing violations for these pollutants. Therefore, the direct CO, NO_2, and SO_2 impacts of the proposed facility modifications are less than significant.
- The NOx and VOC emissions from the proposed facility modifications would contribute to existing violations of state and federal ozone ambient air quality standards. RTCs, VOC offsets from the district's internal bank, and VOC offsets acquired by the project owner would be used to mitigate the ozone impact to a less than a significant level.
- The PM10 and PM2.5 emissions and the PM10/PM2.5 precursor emissions from the proposed facility modifications would contribute to the existing violations of PM10 and PM2.5 ambient air quality standards. The SCAQMD would offset the PM10 emissions from its internal bank to mitigate the PM10/PM2.5 impacts of the combustion gas turbines to a less than significant level. The offsets would be in sufficient quantities to satisfy Energy Commission staff's recommendation that all nonattainment pollutant and precursor emissions be offset at least one-to-one.
- The SOx emissions from the proposed facility are considered precursor emissions to PM10/PM2.5 and could contribute to the existing violations of PM10/PM2.5 ambient air quality standards. SOx offsets from the district's internal bank, and SOx offsets acquired by the project owner would be used to mitigate the PM10/PM2.5 impacts to a less than a significant level.
- Staff proposes Condition of Certification (**AQ-SC8**) to ensure that the emissions of the auxiliary boiler and oil/water separators would be mitigated with the quantity of

SCAQMD offsets recommended by staff and to ensure agency consultation if substitutions are made to the credits.

- Implementation of the conditions of certification and the air quality conditions and practices described in the analysis would reduce potential adverse impacts to insignificant levels and ensure that the project's emissions are mitigated to less than significant.
- With the adoption of the attached conditions of certification, the AEC would comply with all applicable laws, ordinances, regulations, and standards related to air quality as described in pertinent portions of this analysis.

PROPOSED CONDITIONS OF CERTIFICATION

The Air Quality Conditions of Certification are divided into two sections; staff recommended Conditions of Certification and the SCAQMD Preliminary Determination of Compliance Conditions. Staff conditions are additional conditions of certification recommended to provide CEQA mitigation for the project. The proposed staff recommended conditions of certification are identified as the **AQ-SCx** series of conditions.

The SCAQMD has a unique system of structuring and numbering permit conditions. In order for the reader to avoid confusion between the SCAQMD numbering and Energy Commission numbering, **Air Quality Table 55** cross references the conditions in the SCAQMD permit to the conditions in the license as proposed.

Air Quality Table 55
SCAQMD Permit Conditions with Corresponding Energy Commission Conditions of Certification

SCAQMD Permit Conditions	Energy Commission Condition of Certification	Condition Description
Facility Conditions		
F2.1	AQ-F1	Annual emission limit for PM2.5. Includes equation and emission factors. Semi-annual Title V report shall include monthly compliance demonstrations.
F9.1	AQ-F2	Exhaust opacity limits.
F18.1	AQ-F3	Acid Rain SO_2 allocations for existing boilers.
F24.1	AQ-F4	Accidental release prevention requirements. (existing)
F52.1	AQ-F5	Requires a retirement plan for the permanent shutdown of the existing boilers #1, 2, 3 and 5.
F52.2	AQ-F6	Provides specifications for SF6 circuit breakers including a maximum leakage rate 0f 0.5 percent by weight. Requires circuit breakers to include a 10% by weight leak detections system. Leakage shall be calculated on an annual basis.
Combined-cycle Gas Turbine Generators		

SCAQMD Permit Conditions	Energy Commission Condition of Certification	Condition Description
A63.2	AQ-A1	Monthly and annual contaminant emission limits (CO, VOC, PM10, & SOx).Includes emissions calculations equations and emission factors for commissioning and normal operation.
A99.1	AQ-A4	Establishes a NOx emission factor (16.66 lbs/mmscf) during the commissioning period for RECLAIM reporting. Records of natural gas are required for compliance.
A99.2	AQ-A5	Establishes a NOx emission factor (8.35 lbs/mmscf) during the interim period after commissioning but prior to CEMS certification. Records of natural gas are required for compliance.
A195.8	AQ-A9	NOx emission limit of 2.0 ppmv @ 15% O_2 averaged over 1-hour. Does not apply during commissioning startup, and shut down periods.
A195.9	AQ-A12	CO emission limit of 2.0 ppm @ 15% O_2 averaged over 1-hour. Does not apply during commissioning startup, and shut down periods.
A195.10	AQ-A15	VOC emission limit of 2.0 ppm @ 15% O_2 averaged over 1-hour. Does not apply during commissioning startup, and shut down periods.
A327.1	AQ-A18	Relief from emission limits, under Rule 475; project may violate either the mass emission limit or concentration emission limit, but not both at the same time.
B61.1	AQ-B1	Annual H_2S concentration limit of 0.25 grains/100 scf for natural gas.
C1.3	AQ-C1	Limits start-ups to 2 per day, 62 total per month (15 cold, 12 warm, 35 hot), and annually (80 cold, 88 warm and 332 hot). Defines cold, warm and hot starts and establishes duration and emission limits.
C1.4	AQ-C2	Limits shutdowns to 62 total per month and 500 annually. Limits shutdown events to 30 minutes and establishes emission limits.
D29.2	AQ-D10	Requires initial source tests for NOx, CO, SOx, VOC, PM10, PM2.5 and NH_3. Establishes testing methods and protocol requirements.
D29.3	AQ-D11	Requires source tests for specific pollutants (SOx, VOC, and PM/PM10) once every three years. Establishes testing method and reporting requirements.
D82.1	AQ-D15	Requires the installation of CEMS for CO emissions.
D82.2	AQ-D16	Requires the installation of CEMS for NOx emissions.
E193.4	AQ-E1	Requires that the turbines are constructed, operated and maintained according to the mitigation measures stipulated in the Commission Decision.
E193.5	AQ-E2	The Permit to Construct expires one year from the date of issuance unless extended.
E193.6	AQ-E2	The Permit to Construct is invalid if construction does not commence within 18 months after the issuance date.
E193.7	AQ-E2	The Permit to Construct is invalid if construction does not

SCAQMD Permit Conditions	Energy Commission Condition of Certification	Condition Description
		commence within 24 months after the issuance date.
E193.8	AQ-E3	Limits commissioning to 996 hours for each turbine from the date of initial start-up. Only 216 of the 996 hours can be without emission control. The equipment shall only operate when vented to the CO oxidation catalyst and SCR system after commissioning.
E193.11	AQ-E6	Requires compliance with 40 CFR 60 Subpart TTTT. Establishes a 1000 lb/MWhr (gross) CO_2 emission limit if the turbine supplies more than 1,481,141 MWh-net electrical output for distribution on a 12 operating month and 3yr average.
E193.12	AQ-E7	Requires compliance with 40 CFR 60 Subpart TTTT. Limits CO_2 emissions to 120 lbs/MMBtu if the turbine supplies less than 1,481,141 MWh-net electrical output for distribution on a 12 operating month and 3yr average.
E193.14	AQ-E9	Limits CO_2 emissions to 610,480 tons per year. Establishes a CO_2 emission rate of 937.88 lbs/gross megawatt hour on an annual basis. Includes emission equation and emission factor.
E448.1	AQ-E11	Limits total electric output from all the generators to 1094.7 MW-gross at 59 deg F. Establishes electrical output monitoring requirements.
I297.1, I297.2	AQ-I1	Prohibited from operation unless the project owner hold sufficient RTCs for the CTGs.
K40.4	AQ-K1	Source test reporting requirements.
Simple-Cycle Turbines		
A63.3	AQ-A2	Monthly and annual contaminant emission limits (CO, VOC, PM10, & SOx).Includes emissions calculations equations and emission factors for commissioning and normal operation.
A99.3	AQ- A6	Establishes a NOx emission factor (25.24 lbs/mmscf) during the commissioning period for RECLAIM reporting. Records of natural gas are required for compliance.
A99.4	AQ- A7	Establishes a NOx emission factor (11.21 lbs/mmscf) during the interim period after commissioning but prior to CEMS certification. Records of natural gas are required for compliance.
A195.11	AQ- A10	NOx emission limit of 2.5 ppm @ 15% O_2 averaged over 1-hour. Does not apply during commissioning startup, and shut down periods.
A195.12	AQ- A13	CO emission limit of 4.0 ppm @ 15% O_2 averaged over 1-hour. Does not apply during commissioning startup, and shut down periods.
A195.10	AQ- A15	VOC emission limit of 2.0 ppm @ 15% O_2 averaged over 1-hour. Does not apply during commissioning startup, and shut down periods.
A327.1	AQ- A18	Relief from emission limits, under Rule 475; project may violate either the mass emission limit or concentration emission limit, but not both at the same time.

SCAQMD Permit Conditions	Energy Commission Condition of Certification	Condition Description
B61.1	AQ-B1	Annual H_2S concentration limit of 0.25 grains/100 scf for natural gas.
C1.5	AQ-C3	Limits start-ups to 2 per day, 62 total per month, and 500 annually. Establishes duration and emission limits.
C1.6	AQ- C4	Limits shutdowns to 62 total per month and 500 annually. Limits shutdown events to 12 minutes and establishes emission limits.
D29.2	AQ-D10	Requires initial source tests for NOx, CO, SOx, VOC, PM10, PM2.5 and NH_3. Establishes testing methods and protocol requirements.
D29.3	AQ-D11	Requires source tests for specific pollutants (SOx, VOC, and PM/PM10) once every three years. Establishes testing method and reporting requirements.
D82.1	AQ-D15	Requires the installation of CEMS for CO emissions.
D82.2	AQ-D16	Requires the installation of CEMS for NOx emissions.
E193.4	AQ-E1	Requires that the turbines are constructed, operated and maintained according to the mitigation measures stipulated in the Commission Decision.
E193.5	AQ-E2	The Permit to Construct expires one year from the date of issuance unless extended.
E193.6	AQ-E2	The Permit to Construct is invalid if construction does not commence within 18 months after the issuance date.
E193.7	AQ-E2	The Permit to Construct is invalid if construction does not commence within 24 months after the issuance date.
E193.9	AQ-E4	Limits commissioning to 280 hours for each turbine from the date of initial start-up. Only 4 of the 280 hours can be without emission control. The equipment shall only operate when vented to the CO oxidation catalyst and SCR system after commissioning.
E193.13	AQ- E8	Requires compliance with 40 CFR 60 Subpart TTTT. Limits CO_2 emissions to 120 lbs/MMBtu..
E193.15	AQ- E10	Limits CO_2 emissions to 120,765 tons per year. Establishes a CO_2 emission limit of 1,356.03 lbs/gross megawatt hour on an annual basis. Includes emission equation and emission factor.
E448.1	AQ- E11	Limits total electric output from all the generators to 1094.7 MW-gross at 59 deg F. Establishes electrical output monitoring requirements.
I297.3-6	AQ-I2	Prohibited from operation unless the project owner hold sufficient RTCs for the simple turbines..
K40.4	AQ-K1	Source test reporting requirements.
Auxiliary Boiler		
A63.4	AQ-A3	Monthly and annual contaminant emission limits (CO, VOC, PM10, & SOx).Includes emissions calculations equations and emission factors for commissioning and normal operation.
A99.5	AQ-A8	Establishes a NOx emission factor (38.46 lbs/mmscf) during the

SCAQMD Permit Conditions	Energy Commission Condition of Certification	Condition Description
		commissioning period for RECLAIM reporting. Records of natural gas are required for compliance.
A195.13	AQ-A11	NOx emission limit of 5 ppm @ 3% O_2 averaged over 1-hour. Does not apply during commissioning startup, and shut down periods.
A195.14	AQ-A14	CO emission limit of 50 ppm @ 15% O_2 averaged over 1-hour. Does not apply during commissioning startup, and shut down periods.
C1.7	AQ-C5	Limits start-ups to 1 per day, 10 total per month (2 cold, 4 warm, 4 hot), and annually (24 cold, 48 warm and 48 hot). Defines cold, warm and hot starts and establishes duration and emission limits.
D29.5	AQ-D13	Requires initial source tests for NOx, CO, SOx, VOC, PM10, PM2.5 and NH_3. Establishes testing methods and protocol requirements.
D29.6	AQ-D14	Requires source test for CO at full load according to testing frequency requirements in Rule 1146. Establishes testing method and reporting requirements.
D82.3	AQ-D17	Requires the installation of CEMS for NOx emissions and establishes requirements for CEMS plan.
E193.4	AQ-E1	Requires that the equipment is constructed, operated and maintained according to the mitigation measures stipulated in the Commission Decision.
E193.10	AQ-E5	Limits commissioning to 30 hours from the date of initial start-up. The equipment shall only operate when vented to the SCR system after commissioning.
H23.7	AQ-H1	Establishes CO requirements according to Rule 1146.
I297.7	AQ-I3	Prohibited from operation unless the project owner hold sufficient RTCs for the boiler.
K40.5	AQ-K2	Source test reporting requirements.
SCR/CO Catalyst for Combined-cycle		
A195.15	AQ-A16	Establishes the 5 ppm ammonia slip limit. Requires a NOx analyzer.
D12.9	AQ-D1	Requires a flow meter for the ammonia injection and maintain continuous record. Requires ammonia injection between 42 and 242 pounds per hour.
D12.10	AQ-D2	Requires a temperature gauge at the SCR inlet and maintain continuous record. Requires temperature be maintained between 570 and 692 deg F.
D12.11	AQ-D3	Requires a pressure gauge to measure the differential pressure across the SCR grid and maintain continuous record. Limits the pressure differential to 1.6 inches water column.
D29.4	AQ-D12	Requires initial, quarterly for the first year, and then annual source tests for NH_3. Establishes testing methods and protocol requirements.
E193.4	AQ-E1	Requires that the equipment is constructed, operated and maintained according to the mitigation measures stipulated in the Commission Decision.

SCAQMD Permit Conditions	Energy Commission Condition of Certification	Condition Description
SCR/CO Catalyst for Simple		
A195.15	AQ-A16	Establishes the 5 ppm ammonia slip limit. Requires a NOx analyzer.
D12.12	AQ-D4	Requires a flow meter for the ammonia injection and maintain continuous record. Requires ammonia injection between 110 and 180 pounds per hour.
D12.13	AQ-D5	Requires a temperature gauge at the SCR inlet and maintain continuous record. Requires temperature be maintained between 500 and 870 deg F.
D12.11	AQ-D6	Requires a pressure gauge to measure the differential pressure across the SCR grid and maintain continuous record. Limits the pressure differential to 3.0 inches water column.
D29.4	AQ-D12	Requires initial, quarterly for the first year, and then annual source tests for NH_3. Establishes testing methods and protocol requirements.
E193.4	AQ-E1	Requires that the equipment is constructed, operated and maintained according to the mitigation measures stipulated in the Commission Decision.
SCR for the Auxiliary Boiler		
A195.16	AQ-A17	Establishes the 5 ppm ammonia slip limit. Requires a NOx analyzer.
D12.15	AQ-D7	Requires a flow meter for the ammonia injection and maintain continuous record. Requires ammonia injection between 0.3 and 1.1 pounds per hour.
D12.16	AQ-D8	Requires a temperature gauge at the SCR inlet and maintain continuous record. Requires temperature be maintained between 415 and 628 deg F.
D12.17	AQ-D9	Requires a pressure gauge to measure the differential pressure across the SCR grid and maintain continuous record. Limits the pressure differential to 2.0 inches water column.
D29.4	AQ-D12	Requires initial, quarterly for the first year, and then annual source tests for NH_3. Establishes testing methods and protocol requirements.
E193.4	AQ-E1	Requires that the equipment is constructed, operated and maintained according to the mitigation measures stipulated in the Commission Decision.
Ammonia Storage Tanks		
C157.1	AQ-C6	Requires the installation of a pressure relief valve maintained at 50 psig.
E144.1	AQ-E12	Requires venting of the storage tank during filling only to the vessel from which it is being filled.
E193.4	AQ-E1	Requires that the ammonia storage tank be operated according to the mitigation measures stipulated in the Commission Decision.
Oil Water Separator		

SCAQMD Permit Conditions	Energy Commission Condition of Certification	Condition Description
E193.16	AQ-E13	Requires that the oil water separator be equipped with a fixed cover to minimize VOC emissions.
E193.4	AQ-E1	Requires that the oil water separator be operated according to the mitigation measures stipulated in the Commission Decision.

STAFF RECOMMENDED CONDITIONS

AQ-SC1 Air Quality Construction/Demolition Mitigation Manager (AQCMM): The project owner shall designate and retain an on-site AQCMM who shall be responsible for directing and documenting compliance with **AQ-SC3**, **AQ-SC4,** and **AQ-SC5** for the entire project site and linear facility construction/demolition. The on-site AQCMM may delegate responsibilities to one or more AQCMM Delegates. The AQCMM and AQCMM Delegates shall have full access to all areas of construction on the project site and linear facilities, and shall have the authority to stop any or all construction/demolition activities as warranted by applicable construction/demolition mitigation conditions. The AQCMM and AQCMM Delegates may have other responsibilities in addition to those described in this condition. The AQCMM shall not be terminated without written consent of the Compliance Project Manager (CPM).

Verification: At least 60 days prior to the start of ground disturbance, the project owner shall submit to the CPM for approval, the name, resume, qualifications, and contact information for the on-site AQCMM and all AQCMM Delegates. The AQCMM and all Delegates must be approved by the CPM before the start of ground disturbance.

AQ-SC2 Air Quality Construction/Demolition Mitigation Plan (AQCMP): The project owner shall provide an AQCMP, for approval, which details the steps that will be taken and the reporting requirements necessary to ensure compliance with AQ-SC3, AQ-SC4, and AQ-SC5.

Verification: At least 60 days prior to the start of any ground disturbance, the project owner shall submit the AQCMP to the CPM and the South Coast Air Quality Management District (District). The District will notify the project owner of any necessary modifications to the plan within 30 days from the date of receipt. The AQCP must be approved by the CPM before the start of ground disturbance.

AQ-SC3 Construction Fugitive Dust Control: The AQCMM shall submit documentation to the CPM in each Monthly Compliance Report (MCR) that demonstrates compliance with the following mitigation measures for the purposes of minimizing fugitive dust emissions created from construction activities and preventing all fugitive dust plumes from leaving the project site and linear facility routes. Any deviation from the following mitigation measures shall require prior CPM notification and approval.

A. All unpaved roads and disturbed areas in the project and linear construction sites shall be watered as frequently as necessary to comply with the dust mitigation objectives of Condition of Certification **AQ-SC4**. The frequency of watering can be reduced or eliminated during periods of precipitation.

B. No vehicle shall exceed 10 miles per hour on unpaved areas within the construction site, with the exception that vehicles may travel up to 25 miles per hour on stabilized unpaved roads as long as such speeds do not create visible dust emissions.

C. Visible speed limit signs shall be posted at the construction site entrances.

D. All construction equipment vehicle tires shall be inspected and washed as necessary to be cleaned free of dirt prior to entering paved roadways.

E. Gravel ramps of at least 20 feet in length must be provided at the tire washing/cleaning station.

F. All unpaved exits from the construction site shall be graveled or treated to prevent track-out to public roadways.

G. All construction vehicles shall enter the construction site through the treated entrance roadways, unless an alternative route has been submitted to and approved by the CPM.

H. Construction areas adjacent to any paved roadway shall be provided with sandbags or other similar measures as specified in the Storm Water Pollution Prevention Plan (SWPP) to prevent run-off to roadways.

I. All paved roads within the construction site shall be swept at least twice daily (or less during periods of precipitation) on days when construction activity occurs to prevent the accumulation of dirt and debris.

J. At least the first 500 feet of any paved public roadway exiting the construction site or exiting other unpaved roads en route from the construction site or construction staging areas shall be swept at least twice daily (or less during periods of precipitation) on days when construction activity occurs or on any other day when dirt or runoff resulting from the construction site activities is visible on the public roadways.

K. All soil storage piles and disturbed areas that remain inactive for longer than ten days shall be covered, or shall be treated with appropriate dust suppressant compounds.

L. All vehicles that are used to transport solid bulk material on public roadways and that have potential to cause visible emissions shall be covered, or the materials shall be sufficiently wetted and loaded onto the trucks in a manner to provide at least two feet of freeboard.

M. Wind erosion control techniques (such as windbreaks, water, chemical dust suppressants, and/or vegetation) shall be used on all construction areas that may be disturbed. Any windbreaks installed to comply with this condition shall remain in place until the soil is stabilized or permanently covered with vegetation.

N. Disturbed areas will be re-vegetated as soon as practical.

Verification: The AQCMM shall provide the CPM a Monthly Compliance Report (MCR) to include:

1. A summary of all actions taken to maintain compliance with this condition;

2. Copies of any complaints filed with the District in relation to project construction; and

3. Any other documentation deemed necessary by the CPM, District or AQCMM to verify compliance with this condition. Such information may be provided via electronic format or disk at the project owner's discretion.

AQ-SC4 Dust Plume Response Requirement: The AQCMM or Delegate shall monitor all construction activities for visible dust plumes. Observations of visible dust plumes that have the potential to be transported**:** (1) off the project site**,** (2) 200 feet beyond the centerline of the construction of linear facilities**,** or (3) within 100 feet upwind of any regularly occupied structures not owned by the project owner indicate that existing mitigation measures are not resulting in effective mitigation. The AQCMP shall include a section detailing how the additional mitigation measures will be accomplished within the time limits specified. The AQCMM or Delegate shall implement the following procedures for additional mitigation measures in the event that such visible dust plumes are observed:

Step 1: The AQCMM or Delegate shall direct more intensive application of the existing mitigation methods within 15 minutes of making such a determination.

Step 2: The AQCMM or Delegate shall direct implementation of additional methods of dust suppression if step 1 specified above fails to result in adequate mitigation within 30 minutes of the original determination.

Step 3: The AQCMM or Delegate shall direct a temporary shutdown of the activity causing the emissions if step 2, specified above, fails to result in effective mitigation within one hour of the original determination. The activity shall not restart until the AQCMM or Delegate is satisfied that appropriate additional mitigation or other site conditions have changed so that visual dust plumes will not result upon restarting the shutdown source. The owner/operator may appeal to the CPM any directive from the AQCMM or Delegate to shut down an activity, provided that the shutdown shall go into effect within one hour of the original determination, unless overruled by the CPM before that time.

<u>Verification:</u> The AQCMM shall provide the CPM a MCR to include:

1. A summary of all actions taken to maintain compliance with this condition;
2. Copies of any complaints filed with the District in relation to project construction; and
3. Any other documentation deemed necessary by the CPM or AQCMM to verify compliance with this condition. Such information may be provided via electronic format or disk at the project owner's discretion.

AQ-SC5 <u>Diesel-Fueled Engine Control</u>: The AQCMM shall submit to the CPM, in the MCR, a construction mitigation report that demonstrates compliance with the following mitigation measures for purposes of controlling diesel construction-related emissions. Any deviation from the following mitigation measures shall require prior CPM notification and approval.

A. All diesel-fueled engines used in the construction of the facility shall have clearly visible tags issued by the on-site AQCMM showing that the engine meets the conditions set forth herein.

B. All construction diesel engines with a rating of 50 hp or higher shall meet, at a minimum, the Tier 4 or 4i California Emission Standards for Off-Road Compression-Ignition Engines, as specified in California Code of Regulations, Title 13, section 2423(b)(1), unless a good faith effort to the satisfaction of the CPM that is certified by the on-site AQCMM demonstrates that such engine is not available for a particular item of equipment. This good faith effort shall be documented with signed written correspondence by the appropriate construction contractors along with documented correspondence with at least two construction equipment rental firms. In the event that a Tier 4 or 4i engine is not available for any off-road equipment larger than 50 hp, that equipment shall be equipped with a Tier 3 engine, or an engine that is equipped with retrofit controls to reduce exhaust emissions of nitrogen oxides (NOx) and diesel particulate matter (DPM) to no more than Tier 3 levels unless certified by engine manufacturers or the on-site AQCMM that the use of such devices is not practical for specific engine types. For purposes of this condition, the use of such devices is "not practical" for the following, as well as other, reasons.

   1. There is no available retrofit control device that has been verified by either the California Air Resources Board or U.S. Environmental Protection Agency to control the engine in question to Tier 3 equivalent emission levels and the highest level of available control using retrofit or Tier 2 engines is being used for the engine in question; or
   2. The construction equipment is intended to be on site for 10 working days or less.

3. The CPM may grant relief from this requirement if the AQCMM can demonstrate a good faith effort to comply with this requirement and that compliance is not practical.

C. The use of a retrofit control device may be terminated immediately, provided that the CPM is informed within 10 working days of the termination and that a replacement for the equipment item in question meeting the controls required in item “B” occurs within 10 days of termination of the use, if the equipment would be needed to continue working at this site for more than 15 days after the use of the retrofit control device is terminated, if one of the following conditions exists :

1. The use of the retrofit control device is excessively reducing the normal availability of the construction equipment due to increased down time for maintenance, and/or reduced power output due to an excessive increase in back pressure.

2. The retrofit control device is causing or is reasonably expected to cause engine damage.

3. The retrofit control device is causing or is reasonably expected to cause a substantial risk to workers or the public.

4. Any other seriously detrimental cause which has the approval of the CPM prior to implementation of the termination.

D. All heavy earth-moving equipment and heavy duty construction-related trucks with engines meeting the requirements of (B) above shall be properly maintained and the engines tuned to the engine manufacturer’s specifications.

E. All diesel heavy construction equipment shall not idle for more than five minutes. Vehicles that need to idle as part of their normal operation (such as concrete trucks) are exempted from this requirement.

F. Construction equipment will employ electric motors when feasible.

Verification*:* The AQCMM shall include in a table in the MCR the following to demonstrate control of diesel construction-related emissions:

1. A summary of all actions taken to maintain compliance with this condition,

2. A list of all heavy equipment used on site during that month, including the owner of that equipment and a letter from each owner indicating that equipment has been properly maintained, and

3. Any other documentation deemed necessary by the CPM and AQCMM to verify compliance with this condition. Such information may be provided via electronic format or disk at the project owner’s discretion.

AQ-SC6 The project owner shall provide the CPM copies of any District issued project air permit for the facility. The project owner shall submit to the CPM for review and approval any modification proposed by the project owner to any project air permit. The project owner shall submit to the CPM any modification to any permit proposed by the District or U.S. EPA, and any revised permit issued by the District or U.S. EPA, for the project.

Verification: The project owner shall submit any project air permit and any proposed air permit modification to the CPM within five working days of its submittal either by 1) the project owner to an agency, or 2) receipt of proposed modifications from an agency. The project owner shall submit all modified air permits to the CPM within 15 days of receipt.

AQ-SC7 The project owner shall submit to the CPM Quarterly Operation Reports, following the end of each calendar quarter that include operational and emissions information as necessary to demonstrate compliance with the Conditions of Certification herein. The Quarterly Operation Report will specifically state that the facility meets all applicable Conditions of Certification or note or highlight all incidences of noncompliance.

Verification: The project owner shall submit the Quarterly Operation Reports to the CPM and District, if requested by the District, no later than 30 days following the end of each calendar quarter.

AQ-SC8 The project owner shall provide mitigation in the form of offsets or emission reduction credits (ERCs) in the quantities of at least 4 lbs/day of VOC and 5 lbs/day of PM10 emissions for the auxiliary boiler and 1 lb/day of VOC emissions for the oil/water separators. The project owner shall demonstrate that the reductions are provided in the form required by the District.

The project owner shall provide an ERC list and surrender the ERCs as required by the District. The project owner shall request CPM approval for any substitutions, modifications, or additions to the ERCs.

The CPM, in consultation with the District, may approve any such change to the ERC list provided that the project remains in compliance with all applicable laws, ordinances, regulations, and standards, and that the requested change(s) will not cause the project to result in a significant environmental impact. The District must also confirm that each requested change is consistent with applicable federal and state laws and regulations.

Verification: The project owner shall submit any project air permit and any proposed air permit modification to the CPM within five working days of its submittal either by 1) the project owner to an agency, or 2) receipt of proposed modifications from an agency. The project owner shall submit all modified air permits to the CPM within 15 days of receipt.

AQ-SC9 The project owner shall complete the auxiliary boiler commissioning prior to the commissioning of the combined-cycle gas turbines (CCGT-1 and CCGT-2).

Verification: The project owner shall identify the start and conclusion of the work phases described above in the Monthly Compliance Reports and/or Quarterly Operational reports.

AQ-SC10 The project owner shall complete the combined-cycle turbine (CCGT-1 and CCGT-2) commissioning prior to the commissioning of the simple-cycle gas turbines (SCGT-1, SCGT-2, SCGT-3 and SCGT-4).

Verification: The project owner shall identify the start and conclusion of the work phases described above in the Monthly Compliance Reports and/or Quarterly Operational reports.

AQ-SC11 The project owner shall comply with all staff (AQ SC) and district (AQ) Conditions of Certification. The CPM, in consultation with the District, may approve any change to a Condition of Certification regarding air quality, as a staff approved modification, provided that: (1) the Project remains in compliance with all applicable laws, ordinances, regulations, and standards, (2) the requested change clearly will not cause the Project to result in a significant environmental impact, (3) no additional mitigation or offsets will be required as a result of the change, (4) no existing daily, quarterly, or annual permit limit will be exceeded as a result of the change, and (5) no increase in any daily, quarterly, or annual permit limit will be necessary as a result of the change.

Verification: The project owner shall submit a petition to amend for any proposed change to a condition of certification pursuant to this condition and shall provide the CPM with any additional information the CPM requests to substantiate the basis for approval.

DISTRICT'S PERMITTED EQUIPMENT AND CONDITIONS

Equipment

ID No.	Equipment Descriptions
AEC CCGT Power Block	
Combined-cycle Gas Turbine 1 (CCGT-1)	
D165	CCGT-1 General Electric Model 7FA.05, natural gas combined-cycle, 236.645 MW at 28 degrees Fahrenheit, with a Heat Recovery Steam Generator and 219.615 MW Steam Turbine Generator (common with HRSG CCGT-2)
C169	CCGT-1 CO Oxidation Catalyst
C170	CCGT-1 Selective Catalytic Reduction with aqueous ammonia
S172	CCGT-1 Turbine Stack, height of 140 feet and diameter of 20 feet
Combined-cycle Gas Turbine 2 (CCGT-1)	
D173	CCGT-2 General Electric Model 7FA.05, natural gas combined-cycle,, 236.645 MW at 28 degrees Fahrenheit, with a Heat Recovery Steam Generator and 219.615 MW Steam Turbine Generator (common with HRSG CCGT-1)
C177	CCGT-2 CO Oxidation Catalyst
C178	CCGT-2 Selective Catalytic Reduction with aqueous ammonia
S180	CCGT-2 Turbine Stack, height of 140 feet and diameter of 20 feet
Auxiliary Boiler	
D181	70.8 MMBtu/hr Babcock and Wilcox Model FM 103-88 natural gas boiler
C183	Auxiliary Boiler Selective Catalytic Reduction with aqueous ammonia
S211	Auxiliary Boiler Stack, height of 80 feet and diameter of 3 feet
AEC SCGT Power Block	
Simple Gas Turbine 1 (SCGT-1)	
D185	SCGT-1 General Electric Model LMS-100PB, natural gas simple-cycle, 100.438 MW at 59 degrees Fahrenheit
C187	SCGT-1 CO Oxidation Catalyst
C188	SCGT-1 Selective Catalytic Reduction with aqueous ammonia
S180	SCGT-1 Turbine Stack, height of 80 feet and diameter of 13.5 feet
Simple Gas Turbine 2 (SCGT-2)	
D191	SCGT-2 General Electric Model LMS-100PB, natural gas simple-cycle, 100.438 MW at 59 degrees Fahrenheit
C193	SCGT-2 CO Oxidation Catalyst
C194	SCGT-2 Selective Catalytic Reduction with aqueous ammonia
S196	SCGT-2 Turbine Stack, height of 80 feet and diameter of 13.5 feet
Simple Gas Turbine 3 (SCGT-3)	
D197	SCGT-3 General Electric Model LMS-100PB, natural gas simple-cycle, 100.438 MW at 59 degrees Fahrenheit
C199	SCGT-3 CO Oxidation Catalyst
C200	SCGT-3 Selective Catalytic Reduction with aqueous ammonia
S202	SCGT-3 Turbine Stack, height of 80 feet and diameter of 13.5 feet
Simple Gas Turbine 4 (SCGT-4)	
D203	SCGT-1 General Electric Model LMS-100PB, natural gas simple-cycle, 100.438 MW at 59 degrees Fahrenheit
C205	SCGT-1 CO Oxidation Catalyst
C206	SCGT-1 Selective Catalytic Reduction with aqueous ammonia
S208	SCGT-1 Turbine Stack, height of 80 feet and diameter of 13.5 feet
Supporting Equipment	

Oil/Water Separation	
D209	OWS-1 Storage Tank, 5,000 gallon serving CCGT
D210	OWS-2 Storage Tank, 5,000 gallon serving SCGT
Inorganic Chemical Storage	
D163	Tank-1 Storage Tank 40,000 gallons serving the CCGT
D164	Tank-2 Storage Tank 40,000 gallons serving the SCGT

Conditions

The following SCAQMD conditions (AQ-1 to AQ-4) apply to each unit of equipment and the AEC facility as a whole.

AQ-F1 The project owner shall limit emissions from this facility as follows:

CONTAMINANT	EMISSIONS LIMIT
PM 2.5	Less than 100 tons in any one year

The project owner shall not operate any of the Boilers Nos. 1, 2, 3, 4, 5, 6 (Devices D39, D42, D45, D48, D51, D3, respectively), Combined-Cycle Turbines Nos. CCGT-1 and CCGT-2 **(**Devices D165 and D173, respectively), Auxiliary Boiler (Device D181), or Simple-Cycle Turbines Nos. SCGT-1, SCGT-2, SCGT-3, and SCGT-4 (Devices D185, D191, D197, and D203 respectively) unless compliance with the annual emission limit for PM2.5 is demonstrated.

Compliance with the annual emission limit shall be based on a 12-month rolling average basis. The project owner shall calculate the PM2.5 emissions for the facility by summing the PM2.5 emissions for each of the sources by using the equation below.

Facility PM2.5, tons/year = (FF1*EF1 + FF2*EF2 + FF3*EF3 + FF4*EF4 + FF5*EF5 + FF6*EF6 + FF7*EF7 + FF8*EF8 + FF9*EF9 + FF10*EF10 + FF11*EF11+ FF12*EF12 + FF13*EF13)/2000

Equipment Monthly Fuel Usage (mmscf))	Emission Factor (lb/mmscf)
Existing Boilers	
FF1 = Boiler No. 1	EF1 = 1.19
FF2 = Boiler No. 2	EF2 = 1.19
FF3 = Boiler No. 3	EF3 = 1.19
FF4 = Boiler No. 4	EF4 = 1.19
FF5 = Boiler No. 5	EF5 = 1.19
FF6 = Boiler No. 6	EF6 = 1.19
Combined-Cycle Turbines	
FF7 = No. CCGT-1	EF7 = 3.92
FF8 = No. CCGT-2	EF8 = 3.92
Auxiliary Boiler	
FF9 = Auxiliary Boiler	EF9 = 7.42
Simple-Cycle Turbines	
FF10 = Turbine No. SCGT-1	EF10 = 7.44

FF11 = Turbine No. SCGT-1	EF11 = 7.44
FF12 = Turbine No. SCGT-1	EF12 = 7.44
FF13 = Turbine No. SCGT-1	EF13 = 7.44

Any changes to these emission factors must be approved in advance by the SCAQMD in writing and be based on unit specific source tests performed using SCAQMD-approved testing protocol.

AES Alamitos, LLC shall submit written reports of the monthly PM2.5 compliance demonstration required by this condition. The report submittal shall be included with the semi-annual Title V report as required under Rule 3004(a)(4)(f). Records of the monthly PM2.5 compliance demonstration shall be maintained on site for at least five years and made available upon SCAQMD request.

For the purpose of this condition, any one year shall be defined as a period of twelve (12) consecutive months determined on a rolling basis with a new 12-month period beginning on the first day of each calendar month.

[Rule 1325]

Verification: The project owner shall submit to the CPM the facility annual operating and emissions data demonstrating compliance with this condition as part of the fourth quarter Quarterly Operation Report (**AQ-SC7**).

AQ-F2 Except for open abrasive blasting operations, the project owner shall not discharge into the atmosphere from any single source of emissions whatsoever any air contaminant for a period or periods aggregating more than three minutes in any one hour which is:

a) As dark or darker in shade as that designated No. 1 on the Ringelmann Chart, as published by the United States Bureau of Mines; or

b) Of such opacity as to obscure an observer's view to a degree equal to or greater than does smoke described in subparagraph (a) of this condition.

[RULE 401]

Verification: The project owner shall make the site available for inspection by representatives of the District, California Air Resources Board (ARB), the United States Environmental Protection Agency (U.S. EPA) and the California Energy Commission (Energy Commission).

AQ-F3 Acid Rain SO_2 Allowance Allocations for affected units are as follows:

Device ID	Boiler ID	Contaminant	Tons in any year
39	Unit 1	SO_2	2,703
42	Unit 2	SO_2	17
45	Unit 3	SO_2	81
48	Unit 4	SO_2	541
51	Unit 5	SO_2	3,866
3	Unit 6	SO_2	936

a) The allowance allocations shall apply to calendar years 2010 and beyond.

b) The number of allowances allocated to Phase II affected units by U.S. EPA may change in a 1998 revision to 40 CFR73 Tables 2, 3 and 4. In addition, the number of allowances actually held by an affected source in a unit account may differ from the number allocated by U.S. EPA. Neither of the aforementioned conditions necessitate a revision to the unit SO_2 allowance allocation identified in this permit (see 40 CFR 72.84)

[40 CFR 73 Subpart B]

Verification: The project owner shall submit to the CPM the statement certifying compliance with this condition as part of the fourth quarter Quarterly Operation Report (**AQ-SC7**).

AQ-F4 Accidental release prevention requirements of Section 112I(7):

a) The project owner shall comply with the accidental release prevention requirements pursuant to 40 CFR Part 68 and shall submit to the Executive Officer, as a part of an annual compliance certification, a statement that certifies compliance with all of the requirements of 40 CFR Part 68, including the registration and submission of a risk management plan (RMP).

b) The project owner shall submit any additional relevant information requested by the Executive Officer or designated agency.

[RULE 40 CFR 68 – Accidental Release Prevention, 5-24-1996].

Note: This condition is applicable to the four existing ammonia tanks (Devices D19, D151, D152, and D153) in Section D, because they are permitted to contain 29% aqueous ammonia. This condition is not applicable to the two new ammonia tanks (Devices D163, D164) installed for the AEC project because they are permitted to contain 19% ammonia. Ongoing compliance with this condition will not be required after the four existing tanks are removed from the facility.

Verification: The project owner shall submit to the CPM the statement certifying compliance with this condition as part of the fourth quarter Quarterly Operation Report (**AQ-SC7**).

AQ-F5 The facility is subject to the applicable requirements of the following rules or regulations(s):

The facility shall submit a detailed retirement plan for the permanent shutdown of Boilers Nos. 1, 2, 5 and 3 (Devices D39, D42, D51, and D45, respectively), describing in detail the steps and schedule that will be taken to render Boilers Nos. 1, 2, 5, and 3 permanently inoperable.

The retirement plan shall be submitted to SCAQMD within 60 days after Permits to Construct for Combined-Cycle Turbines Nos. CCGT-1 and CCGT-2 **(**Devices D165 and D173, respectively), common Steam Turbine Generator, and Simple-Cycle Turbines Nos. SCGT-1, SCGT-2, SCGT-3, and SCGT-4 (Devices D185, D191, D197, and D203 respectively) are issued.

AES shall not commence any construction of the Alamitos Energy Project including Gas Turbines Nos. CCGT-1, CCGT-2, SCGT-1, SCGT-2, SCGT-3, and SCGT-4, unless the retirement plan is approved in writing by SCAQMD. If SCAQMD notifies AES that the plan is not approvable, AES shall submit a revised plan addressing SCAQMD's concerns within 30 days.

Within 30 calendar days of actual shutdown but no later than December 29, 2019, AES shall provide SCAQMD with a notarized statement that Boilers Nos. 1, 2, and 5 are permanently shut down and that any re-start or operation of the boilers shall require new Permits to Construct and be subject to all requirements of Nonattainment New Source Review and the Prevention Of Significant Deterioration Program.

AES shall notify SCAQMD 30 days prior to the implementation of the approved retirement plan for permanent shutdown of Boilers Nos. 1, 2, and 5, or advise SCAQMD as soon as practicable should AES undertake permanent shutdown prior to December 29, 2019.

AES shall cease operation of Boilers Nos. 1, 2, and 5 within 90 calendar days of the first fire of Gas Turbines No. CCGT-1 or CCGT-2, or by December 29, 2019 whichever is earlier.

Within 30 calendar days of actual shutdown but no later than December 31, 2020, AES shall provide SCAQMD with a notarized statement that Boiler No. 3 is permanently shut down and that any re-start or operation of the boiler shall require a new Permit to Construct and be subject to all requirements of Nonattainment New Source Review and the Prevention Of Significant Deterioration Program.

AES shall notify SCAQMD 30 days prior to the implementation of the approved retirement plan for permanent shutdown of Boiler No. 3, or advise SCAQMD as soon as practicable should AES undertake permanent shutdown prior to December 31, 2020.

AES shall cease operation of Boiler No. 3 within 90 calendar days of the first fire of Gas Turbines No. SCGT-1, SCGT-2, SCGT-3, or SCGT-4, or by December 31, 2020, whichever is earliest.

[RULE 1304(a)—Modeling and Offset Exemption; RULE 1313(d)]

Verification: The project owner shall submit the retirement plan, and any modifications to the plan, to the CPM for approval within five working days of submittal to the SCAQMD. The project owner shall submit the written proof of SCAQMD approval of the retirement plan or any modification to the retirement plan within five working days of obtaining SCAQMD written approval. The project owner shall submit to the CPM the notarized station that Boilers 1, 2, and 5 are permanently shut down within 30 days of actual shutdown but no later than December 29, 2019. The project owner shall submit to the CPM the notarized station that Boiler 3 is permanently shut down within 30 days of actual shutdown but no later than December 31, 2020.

AQ-F6 The project owner is subject to the applicable requirements of the following rules or regulations(s):

For all circuit breakers at the facility utilizing SF6, including the circuit breakers serving Combined-Cycle Turbines Nos. CCGT-1 and CCGT-2; common Steam Turbine Generator; and Simple-Cycle Turbines Nos. SCGT-1, SCGT-2, SCGT-3, and SCGT-4, the project owner shall install, operate, and maintain enclosed-pressure SF6 circuit breakers with a maximum annual leakage rate of 0.5 percent by weight. The circuit breakers shall be equipped with a 10 percent by weight leak detection system.

The leak detection system shall be calibrated in accordance with manufacturer's specifications. The manufacturer's specifications and records of all calibrations shall be maintained on site.

The total CO_2e emissions from all circuit breakers shall not exceed 74.55 tons per calendar year.

The project owner shall calculate the SF6 emissions due to leakage from the circuit breakers by using the mass balance in equation DD-1 at 40 CFR Part 98, Subpart DD, on an annual basis.

The project owner shall maintain records to demonstrate compliance with this condition and shall make such records available to the Executive Officer upon request. The records shall be maintained for a minimum of 5 years in a manner approved by SCAQMD.

[RULE 1714]

Verification: The project owner shall make the site available for inspection by representatives of the District, ARB, U.S. EPA and the Energy Commission.

Device Conditions

Emission Limits:

AQ-A1 The project owner shall limit emissions from this equipment as follows:

Contaminant	Range	Emissions Limit
Monthly Pounds in Any Calendar Month (lbs/month)		
CO	Less than or equal to	95,023 lbs/month
VOC	Less than or equal to	13,314 lbs/month
PM10	Less than or equal to	6,324 lbs/month
Sox	Less than or equal to	3,616 lbs/month
Annual Pounds in Any One Year (lbs/year)		
CO	Less than or equal to	190,753 (lbs./year)
VOC	Less than or equal to	52,668 (lbs./year)
PM10	Less than or equal to	39,440 (lbs./year)
Sox	Less than or equal to	7,435 (lbs./year)

For the purposes of this condition, the above emission limits shall be based on the emissions from a single turbine.

The turbine shall not commence with normal operation until the commissioning process has been completed. Normal operation commences when the turbine is able to supply electrical energy to the power grid as required under contract with the relevant entities. The SCAQMD shall be notified in writing once the commissioning process for each turbine is completed.

Normal operation may commence in the same calendar month as the completion of the commissioning process provided the turbine is in compliance with the above emission limits.

The project owner shall calculate the monthly emissions for CO, VOC, PM10, and SOx using the equation below.

Monthly Emissions, lb/month =

(Monthly fuel usage in million standard cubic feet per month (mmscf/month)) * (Emission factors indicated below)

The following emission factors shall be used to demonstrate compliance with the monthly emission limits.

For commissioning, the emission factors shall be as follows: CO, 61.18 lb/mmscf; VOC, 8.86 lb/mmscf; PM10, 5.11 lb/mmscf; and SOx, 2.92 lb/mmscf.

For normal operation, the emission factors shall be as follows: CO, 16.32 lb/mmscf; VOC, 4.70 lb/mmscf; PM10, 3.92 lb/mmscf; and SOx, 2.24 lb/mmscf.

For a month during which both commissioning and normal operation take place the monthly emissions shall be the sum of the commissioning emissions and the normal operation emissions.

Compliance with the annual emission limits shall be based on a 12-operating month-rolling-average basis, following completion of the commissioning period.

The emission factors for the monthly emission limits shall be the same as the emission factors used to demonstrate compliance with the annual emission limits, except the annual emission factor for SOx is 0.75 lb/mmscf.

The project owner shall maintain records to demonstrate compliance with this condition and shall make such records available to the Executive Officer upon request. The records shall be maintained for a minimum of 5 years in a manner approved by SCAQMD. The records shall include, but not be limited to, natural gas usage in a calendar month and automated monthly and annual calculated emissions.

[RULE 1303(a)(1)-BACT; RULE 1304.1, RULE 1703(a)(2) – PSD-BACT]
[Devices subject to this condition: D165, D173 (combined-cycle)]

Verification: The project owner shall provide emissions summary data in compliance with his condition as part of the Quarterly Operation reports (**AQ-SC7**).

AQ-A2 The project owner shall limit emissions from this equipment as follows:

Contaminant	Range	Emissions Limit
Monthly Pounds in Any Calendar Month (lbs/month)		
CO	Less than or equal to	8,594 lbs/month
VOC	Less than or equal to	1,973 lbs/month
PM10	Less than or equal to	4,638 lbs/month
SOx	Less than or equal to	1,207 lbs/month
Annual Pounds in Any One Year (lbs/year)		
CO	Less than or equal to	37,710 (lbs./year)
VOC	Less than or equal to	7,500 (lbs./year)
PM10	Less than or equal to	14,695 (lbs./year)
SOx	Less than or equal to	1,275 (lbs./year)

For the purposes of this condition, the above emission limits shall be based on the emissions from a single turbine.

The turbine shall not commence with normal operation until the commissioning process has been completed. Normal operation commences when the turbine is able to supply electrical energy to the power grid as required under contract with the relevant entities. The SCAQMD shall be notified in writing once the commissioning process for each turbine is completed.

Normal operation may commence in the same calendar month as the completion of the commissioning process provided the turbine is in compliance with the above emission limits.

The project owner shall calculate the monthly emissions for CO, VOC, PM10, and SOx using the equation below.

Monthly Emissions, lb/month =

(Monthly fuel usage in million standard cubic feet per month (mmscf/month)) * (Emission factors indicated below)

The following emission factors shall be used to demonstrate compliance with the monthly emission limits.

For commissioning, the emission factors shall be as follows: CO, 112.03 lb/mmscf; VOC, 3.69 lb/mmscf; PM10, 2.00 lb/mmscf; and SOx, 7.69 lb/mmscf.

For normal operation, the emission factors shall be as follows: CO, 13.33 lb/mmscf; VOC, 3.17 lb/mmscf; PM10, 7.44 lb/mmscf; and SOx, 1.94 lb/mmscf.

For a month during which both commissioning and normal operation take place the monthly emissions shall be the sum of the commissioning emissions and the normal operation emissions.

Compliance with the annual emission limits shall be based on a 12-operating month-rolling-average basis, following completion of the commissioning period.

The emission factors for the monthly emission limits shall be the same as the emission factors used to demonstrate compliance with the annual emission limits, except the annual emission factor for SOx is 0.65 lb/mmscf.

The project owner shall maintain records to demonstrate compliance with this condition and shall make such records available to the Executive Officer upon request. The records shall be maintained for a minimum of 5 years in a manner approved by SCAQMD. The records shall include, but not be limited to, natural gas usage in a calendar month and automated monthly and annual calculated emissions.

[RULE 1303(a)(1)-BACT; RULE 1304.1, RULE 1703(a)(2) – PSD-BACT]
[Devices subject to this condition: D185, D191, D197, D203 (simple-cycle)]

Verification: The project owner shall provide emissions summary data in compliance with his condition as part of the Quarterly Operation reports (**AQ-SC7**).

AQ-A3 The project owner shall limit emissions from this equipment as follows:

Contaminant	Range	Emissions Limit
Monthly Pounds in Any Calendar Month (lbs/month)		
CO	Less than or equal to	605 lbs/month
VOC	Less than or equal to	102 lbs/month
PM10	Less than or equal to	113.5 lbs/month
Sox	Less than or equal to	32 lbs/month

The project owner shall calculate the monthly emissions for CO, VOC, PM10, and SOx using the equation below.

Monthly Emissions, lb/month = (Monthly fuel usage in mmscf/month) * (Emission factors indicated below)

For commissioning and normal operation, the emission factors shall be as follows: CO, 39.55 lb/mmcf; VOC, 6.67 lb/mmcf; PM10, 7.42 lb/mmcf; and SOx, 2.08 lb/mmcf.

The project owner shall maintain records in a manner approved by the District to demonstrate compliance with this condition and the records shall be made available to District personnel upon request. The records shall include, but not be limited to, natural gas usage in a calendar month.

[RULE 1303(a)(1)-BACT, RULE 1303(b)(2)-Offset, RULE 1703(a)(2) – PSD-BACT]
[Devices subject to this condition: D181 (auxiliary boiler)]

Verification: The project owner shall provide emissions summary data in compliance with his condition as part of the Quarterly Operation reports (**AQ-SC7**).

AQ-A4 The project owner shall limit NOx emissions to 16.66 lbs/mmscf only during the turbine commissioning period to report RECLAIM emissions, not to exceed one year after the start of unit operations.

The project owner shall maintain records of natural gas usage for this period.

[RULE 2012]
[Devices subject to this condition: D165, D173 (combined-cycle)]

Verification: The project owner shall provide natural gas usage records for the turbines as part of the Quarterly Operation reports (**AQ-SC7**). The records shall identify the usage on a per turbine basis and clearly identify the corresponding commissioning project period.

AQ-A5 The project owner shall limit NOx emissions to 8.35 lbs/mmscf only during the interim period after commissioning but prior to CEMS certification to report RECLAIM emissions, not to exceed one year after start of unit operations.

The project owner shall maintain records of natural gas usage for this period.

[RULE 2012]
[Devices subject to this condition: D165, D173 (combined-cycle)]

Verification: The project owner shall provide natural gas usage records for the turbines as part of the Quarterly Operation reports (**AQ-SC7**). The records shall identify the usage on a per turbine basis and clearly identify the corresponding post-commissioning, pre-CEMS project period.

AQ-A6 The project owner shall limit NOx emissions to 25.24 lbs/mmscf only during the turbine commissioning period to report RECLAIM emissions, not to exceed one year after the start of unit operations.

The project owner shall maintain records of natural gas usage for this period.

[RULE 2012]
[Devices subject to this condition: D185, D191, D197, D203 (simple-cycle)]

Verification: The project owner shall provide natural gas usage records for the turbines as part of the Quarterly Operation reports (**AQ-SC7**). The records shall identify the usage on a per turbine basis and clearly identify the corresponding commissioning project period.

AQ-A7 The project owner shall limit NOx emissions to 11.21 lbs/mmscf only during the interim period after commissioning but prior to CEMS certification to report RECLAIM emissions, not to exceed one year after start of unit operations.

The project owner shall maintain records of natural gas usage for this period.

[RULE 2012]
[Devices subject to this condition: D185, D191, D197, D203 (simple-cycle)]

Verification: The project owner shall provide natural gas usage records for the turbines as part of the Quarterly Operation reports (**AQ-SC7**). The records shall identify the usage on a per turbine basis and clearly identify the corresponding commissioning project period.

AQ-A8 The project owner shall limit NOx emissions to 38.46 lbs/mmscf only during the interim period after commissioning but prior to CEMS certification to report RECLAIM emissions,, not to exceed one year after the start of unit operations.

The project owner shall maintain records of natural gas usage for this period.

[RULE 2012]
[Devices subject to this condition: D181 (auxiliary boiler)]

<u>Verification:</u> The project owner shall provide natural gas usage records for the turbines as part of the Quarterly Operation reports (**AQ-SC7**). The records shall identify the usage on a per turbine basis and clearly identify the corresponding commissioning project period.

AQ-A9 The project owner shall limit NOx emissions to 2.0 parts per million by volume (PPMV), averaged over 1 hour, dry basis at 15 percent oxygen. This limit shall not apply to turbine commissioning, startup, and shutdown periods.

[RULE 1703(a)(2) – PSD-BACT; RULE 2005]
[Devices subject to this condition: D165, D173 (combined-cycle)]

<u>Verification:</u> The project owner shall submit CEMS records demonstrating compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**).

AQ-A10 The project owner shall limit NOx emissions to 2.5 parts per million by volume (PPMV), averaged over 1 hour, dry basis at 15 percent oxygen. This limit shall not apply to turbine commissioning, startup, and shutdown periods.

[RULE 1703(a)(2) – PSD-BACT; RULE 2005]
[Devices subject to this condition: D185, D191, D197, D203 (simple-cycle)]

<u>Verification:</u> The project owner shall submit CEMS records demonstrating compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**).

AQ-A11 The project owner shall limit NOx emissions to 5 parts per million by volume (PPMV), averaged over 1 hour, dry basis at 3 percent oxygen. This limit shall not apply to boiler commissioning and startup periods.

[RULE 1703(a)(2) – PSD-BACT; RULE 2005]
[Devices subject to this condition: D181 (auxiliary boiler)]

<u>Verification:</u> The project owner shall submit CEMS records demonstrating compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**).

AQ-A12 The project owner shall limit CO emissions to 2.0 parts per million by volume (PPMV), averaged over 1 hour, dry basis at 15 percent oxygen. This limit shall not apply to turbine commissioning, startup, and shutdown periods.

[RULE 1303(a)(1)-BACT; RULE 1703(a)(2) – PSD-BACT]
[Devices subject to this condition: D165, D173 (combined-cycle)]

<u>Verification:</u> The project owner shall submit CEMS records demonstrating compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**).

AQ-A13 The project owner shall limit CO emissions to 2.5 parts per million by volume (PPMV), averaged over 1 hour, dry basis at 15 percent oxygen. This limit shall not apply to turbine commissioning, startup, and shutdown periods.

[RULE 1303(a)(1)-BACT; RULE 1703(a)(2) – PSD-BACT]
[Devices subject to this condition: D185, D191, D197, D203 (simple-cycle)]

Verification: The project owner shall submit CEMS records demonstrating compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**).

AQ-A14 The project owner shall limit CO emissions to 50 parts per million by volume (PPMV), averaged over 1 hour, dry basis at 3 percent oxygen. This limit shall not apply to boiler commissioning and startup.

[RULE 1303(a)(1)-BACT; RULE 1703(a)(2) – PSD-BACT]
[Devices subject to this condition: D181 (auxiliary boiler)]

Verification: The project owner shall submit CEMS records demonstrating compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**).

AQ-A15 The project owner shall limit VOC emissions to 2.0 parts per million by volume (PPMV), averaged over 1 hour, dry basis at 15 percent oxygen. This limit shall not apply to turbine commissioning, startup, and shutdown periods.

[RULE 1303(a)(1)-BACT; RULE 1703(a)(2) – PSD-BACT]
[Devices subject to this condition: D165, D173 (combined-cycle), D185, D191, D197, D203 (simple-cycle)]

Verification: The project owner shall submit records demonstrating compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**).

AQ-A16 The 5.0 PPMV NH3 emission limit is averaged over 1 hour, dry basis at 15 percent oxygen.

The project owner shall calculate and continuously record the NH3 slip concentration using the following equation:

NH_3 (ppmvd) = [a-b*(c*1.2)/1,000,000]*1,000,000/b, where:

a = NH3 injection rate (lb/hr)/17(lb/lb-mol)

b = dry exhaust gas flow rate (scf/hr)/385.3 scf/lb-mol)

c = change in measured NOx across the SCR (ppmvd at 15% O2)

The project owner shall install and maintain a NOx analyzer to measure the SCR inlet NOx ppmv accurate to within plus or minus 5 percent calibrated at least once every 12 months. The project owner shall use the method described above or another alternative method approved by the Executive Officer.

The ammonia slip calculation procedure shall be in effect no later than 90 days after initial startup of the turbine.

The ammonia slip calculation procedures described above shall not be used for compliance determination or emission information without corroborative data using an approved reference method for the determination of ammonia.

[RULE 1303(a)(1)-BACT]
[Devices subject to this condition: C170, C178 (combined-cycle), C188, C194, C200, C206 (simple-cycle)]

Verification: The project owner shall install, calibrate, maintain, and the monitoring system according to a District-approved monitoring plan. Prior to the installation the project owner shall submit a monitoring plan to the CPM for review and approval. The project owner shall include exceedances of the hourly ammonia slip limit and calibration reports as part of the Quarterly Operation Reports (**AQ-SC7**).

AQ-A17 The 5.0 PPMV NH3 emission limit is averaged over 1 hour, dry basis at 15 percent oxygen.

The project owner shall calculate and continuously record the NH3 slip concentration using the following equation:

NH_3 (ppmvd) = [a-b*(c*1.2)/1,000,000]*1,000,000/b, where:

a = NH3 injection rate (lb/hr)/17(lb/lb-mol)

b = dry exhaust gas flow rate (scf/hr)/385.3 scf/lb-mol)

c = change in measured NOx across the SCR (ppmvd at 15% O2)

The project owner shall install and maintain a NOx analyzer to measure the SCR inlet NOx ppmv accurate to within plus or minus 5 percent calibrated at least once every 12 months. The project owner shall use the method described above or another alternative method approved by the Executive Officer.

The ammonia slip calculation procedure shall be in effect no later than 90 days after initial startup of the turbine.

The ammonia slip calculation procedures described above shall not be used for compliance determination or emission information without corroborative data using an approved reference method for the determination of ammonia.

[RULE 1303(a)(1)-BACT]
[Devices subject to this condition: C183 (auxiliary boiler)]

Verification: The project owner shall install, calibrate, maintain, and the monitoring system according to a District-approved monitoring plan. Prior to the installation the project owner shall submit a monitoring plan to the CPM for review and approval. The project owner shall include exceedances of the hourly ammonia slip limit and calibration reports as part of the Quarterly Operation Reports (**AQ-SC7**).

AQ-A18 The project owner shall limit PM10 emissions to 0.01 grain per standard cubic feet (grains/scf) or 11 pounds per hour (lbs/hr). For the purpose of determining compliance with District Rule 475, combustion contaminant emissions may exceed the concentration limit or the mass emission limit listed, but not both limits at the same time.

[RULE 475]
[Devices subject to this condition: D165, D173 (combined-cycle), D185, D191, D197, D203 (simple-cycle)]

Verification: The project owner shall demonstrate compliance with this condition as part of the Quarterly Operation Reports (AQ-SC8). The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

B. Material/Fuel Type limits

AQ-B1 The project owner shall not use natural gas containing the following specified compounds:

Compound	Range	Emissions Limit
H_2S	Greater than	0.25 grain/100scf

This concentration limit is an annual average based on monthly samples of natural gas composition or gas supplier documentation. Gaseous fuel samples shall be tested using District Method 307-91 for total sulfur calculated as H_2S.

[RULE 1303(a)(1)-BACT]
[Devices subject to this condition: D165, D173 (combined-cycle), D185, D191, D197, D203 (simple-cycle)]

Verification: The project owner shall include documentation demonstrating compliance as part of the Quarterly Operation Reports (AQ-SC8). The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

C. Operating Parameters

AQ-C1 The project owner shall limit the number of start-ups to no more than 62 in any one calendar month.

The number of cold startups shall not exceed 15 in any calendar month, the number of warm startups shall not exceed 12 in any calendar month, and the number of hot startups shall not exceed 35 in any calendar month, with no more than 2 startups in any one day.

The number of cold startups shall not exceed 80 in any calendar year, the number of warm startups shall not exceed 88 in any calendar year, and the number of hot startups shall not exceed 332 in any calendar year.

For the purposes of this condition, a cold startup is defined as a startup which occurs after the combustion turbine has been shut down for 48 hours or more. A cold startup shall not exceed 60 minutes. The NOx emissions from a cold startup shall not exceed 61 lbs. The CO emissions from a cold startup shall not exceed 325 lbs. The VOC emissions from a cold startup shall not exceed 36 lbs.

For the purposes of this condition, a warm startup is defined as a startup which occurs after the combustion turbine has been shut down 10 hours or more but less than 48 hours. A warm startup shall not exceed 30 minutes. The NOx emissions from a warm startup shall not exceed 17 lbs. The CO emissions from a warm startup shall not exceed 137 lbs. The VOC emissions from a warm startup shall not exceed 25 lbs.

For the purposes of this condition, a hot startup is defined as a startup which occurs after the steam turbine has been shut down for less than 10 hours. A hot startup shall not exceed 30 minutes. The NOx emissions from a hot startup shall not exceed 17 lbs. The CO emissions from a hot startup shall not exceed 137 lbs. The VOC emissions from a hot startup shall not exceed 25 lbs.

The beginning of startup occurs at initial fire in the combustor and the end of startup occurs when the BACT levels are achieved. If during startup the process is aborted the process will count as one startup.

The project owner shall maintain records to demonstrate compliance with this condition and shall make such records available to the Executive Officer upon request. The records shall be maintained for a minimum of 5 years in a manner approved by SCAQMD.

[RULE 1303(a)(1)-BACT, RULE 1703(a)(2)-PSD-BACT, RULE 2005]
[Devices subject to this condition: D165, D173 (combined-cycle)]

Verification: The project owner shall demonstrate compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**). The project owner shall provide records including a table documenting the type of startup, duration and date of occurrence.

AQ-C2 The project owner shall limit the number of shutdowns to no more than 62 in any one calendar month.

The number of shutdowns shall not exceed 500 in any calendar year.

Each shutdown shall not exceed 30 minutes. The NOx emissions from a shutdown event shall not exceed 10 lbs. The CO emissions from a shutdown event shall not exceed 133 lbs. The VOC emissions from a shutdown event shall not exceed 32 lbs.

The project owner shall maintain records to demonstrate compliance with this condition and shall make such records available to the Executive Officer upon request. The records shall be maintained for a minimum of 5 years in a manner approved by SCAQMD.

[RULE 1303(a)(1)-BACT, RULE 1703(a)(2)-PSD-BACT, RULE 2005]
[Devices subject to this condition: D165, D173 (combined-cycle)]

Verification: The project owner shall demonstrate compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**). The project owner shall provide records including a table documenting each shutdown, and indicating the duration and date of occurrence.

AQ-C3 The project owner shall limit the number of start-ups to no more than 62 in any one calendar month.

The number of startups shall not exceed 2 startups in any one day. The number of startups shall not exceed 500 in any calendar year.

A startup shall not exceed 30 minutes. The NOx emissions from a startup shall not exceed 16.6 lbs. The CO emissions from a startup shall not exceed 15.4 lbs. The VOC emissions from a startup shall not exceed 2.80 lbs.

The beginning of startup occurs at initial fire in the combustor and the end of startup occurs when the BACT levels are achieved. If during startup the process is aborted the process will count as one startup.

The project owner shall maintain records to demonstrate compliance with this condition and shall make such records available to the Executive Officer upon request. The records shall be maintained for a minimum of 5 years in a manner approved by SCAQMD.

[RULE 1303(a)(1)-BACT, RULE 1703(a)(2)-PSD-BACT, RULE 2005]
[Devices subject to this condition: D185, D191, D197, D203 (simple-cycle)]

Verification: The project owner shall demonstrate compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**). The project owner shall provide records including a table documenting the type of startup, duration and date of occurrence.

AQ-C4 The project owner shall limit the number of shutdowns to no more than 62 in any one calendar month.

The number of shutdowns shall not exceed 500 in any calendar year.

Each shutdown shall not exceed 13 minutes. The NOx emissions from a shutdown event shall not exceed 3.12 lbs. The CO emissions from a shutdown event shall not exceed 28.1 lbs. The VOC emissions from a shutdown event shall not exceed 3.06 lbs.

The project owner shall maintain records to demonstrate compliance with this condition and shall make such records available to the Executive Officer upon request. The records shall be maintained for a minimum of 5 years in a manner approved by SCAQMD.

[RULE 1303(a)(1)-BACT, RULE 1703(a)(2)-PSD-BACT, RULE 2005]
[Devices subject to this condition: D185, D191, D197, D203 (simple-cycle)]

<u>Verification:</u> The project owner shall demonstrate compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**). The project owner shall provide records including a table documenting each shutdown, and indicating the duration and date of occurrence.

AQ-C5 The project owner shall limit the number of start-ups to no more than 10 in any one calendar month.

The number of cold startups shall not exceed 2 in any calendar month, the number of warm startups shall not exceed 4 in any calendar month, and the number of hot starts shall not exceed 4 in any calendar month, with no more than 1 startup in any one day.

The number of cold startups shall not exceed 24 in any calendar year, the number of warm startups shall not exceed 48 in any calendar year, and the number of hot startups shall not exceed 48 in any calendar year.

For the purposes of this condition, a cold startup is defined as a startup which occurs after the combustion turbine has been shut down for 48 hours or more. A cold startup shall not exceed 170 minutes. The NOx emissions from a cold startup shall not exceed 4.22 lbs.

For the purposes of this condition, a warm startup is defined as a startup which occurs after the combustion turbine has been shut down 10 hours or more but less than 48 hours. A warm startup shall not exceed 85 minutes. The NOx emissions from a warm startup shall not exceed 2.11 lbs.

For the purposes of this condition, a hot startup is defined as a startup which occurs after the steam turbine has been shut down for less than 10 hours. A hot startup shall not exceed 25 minutes. The NOx emissions from a hot startup shall not exceed 0.62 lbs.

The project owner shall maintain records in a manner approved by the District, to demonstrate compliance with this condition and the records shall be made available to District personnel upon request.

[RULE 1303(a)(1)-BACT, RULE 1703(a)(2)-PSD-BACT, RULE 2005]
[Devices subject to this condition: D181 (auxiliary boiler)]

<u>Verification:</u> The project owner shall demonstrate compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**). The project owner shall provide records including a table indicating documenting type of startup, duration and date of occurrence.

AQ-C6 The project owner shall install and maintain a pressure relief valve set at 50 psig.

[RULE 1303(a)(1)-BACT, RULE 1303(a)(1)-BACT]
[Devices subject to this condition: D163, D164 (ammonia tank)]

Verification: The project owner shall demonstrate compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**). The project owner shall provide records including a table indicating documenting type of startup, duration and date of occurrence.

D. Monitoring/Tesing Parameters

AQ-D1 The project owner shall install and maintain a flow meter to accurately indicate the flow rate of the total hourly throughput of injected ammonia (NH3).

The project owner shall also install and maintain a device to continuously record the parameter being measured. Continuously record shall be defined as measuring at least once every hour and shall be calculated based upon the average of the continuous monitoring for that hour.

The flow meter shall be accurate to within plus or minus 5 percent. It shall be calibrated once every 12 months.

The project owner shall maintain the ammonia injection rate between 44 and 242 pounds per hour, except during startups and shutdowns.

[RULE 1303(a)(1)-BACT, RULE 1703(a)(2)-PSD-BACT, RULE 2005]
[Devices subject to this condition: C170, C178 (combined-cycle)]

Verification: The project owner shall demonstrate compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**). The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-D2 The project owner shall install and maintain a temperature gauge to accurately indicate the temperature in the exhaust at the inlet to the SCR reactor

The project owner shall also install and maintain a device to continuously record the parameter being measured. Continuously record shall be defined as measuring at least once every hour and shall be calculated based upon the average of the continuous monitoring for that hour.

The temperature gauge shall be accurate to within plus or minus 5 percent. It shall be calibrated once every 12 months.

The exhaust temperature at the inlet of the SCR/CO catalyst shall be maintained between 570 degrees F and 692 degrees F, except during startups and shutdowns.

[RULE 1303(a)(1)-BACT, RULE 1703(a)(2)-PSD-BACT, RULE 2005]
[Devices subject to this condition: C170, C178 (combined-cycle)]

Verification: The project owner shall demonstrate compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**). The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-D3 The project owner shall install and maintain a pressure gauge to accurately indicate the differential pressure across the SCR catalyst bed in inches water column.

The project owner shall also install and maintain a device to continuously record the parameter being measured. Continuously record shall be defined as measuring at least once every month and shall be calculated based upon the average of the continuous monitoring for that month.

The pressure gauge shall be accurate to within plus or minus 5 percent. It shall be calibrated once every 12 months.

The pressure differential shall not exceed 1.6 inches water column.

[RULE 1303(a)(1)-BACT, RULE 1703(a)(2)-PSD-BACT, RULE 2005]
[Devices subject to this condition: C170, C178 (combined-cycle)]

Verification: The project owner shall demonstrate compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**). The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-D4 The project owner shall install and maintain a flow meter to accurately indicate the flow rate of the total hourly throughput of injected ammonia (NH3).

The project owner shall also install and maintain a device to continuously record the parameter being measured. Continuously record shall be defined as measuring at least once every hour and shall be calculated based upon the average of the continuous monitoring for that hour.

The flow meter shall be accurate to within plus or minus 5 percent. It shall be calibrated once every 12 months.

The project owner shall maintain the ammonia injection rate between 110 and 180 pounds per hour, except during startups and shutdowns.

[RULE 1303(a)(1)-BACT, RULE 1703(a)(2)-PSD-BACT, RULE 2005]

[Devices subject to this condition: C188, C194, C200, C206 (simple-cycle)]

Verification: The project owner shall demonstrate compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**). The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-D5 The project owner shall install and maintain a temperature gauge to accurately indicate the temperature in the exhaust at the inlet to the SCR reactor

The project owner shall also install and maintain a device to continuously record the parameter being measured. Continuously record shall be defined as measuring at least once every hour and shall be calculated based upon the average of the continuous monitoring for that hour.

The temperature gauge shall be accurate to within plus or minus 5 percent. It shall be calibrated once every 12 months.

The exhaust temperature at the inlet of the SCR/CO catalyst shall be maintained between 500 degrees F and 870 degrees F, except during startups and shutdowns.

[RULE 1303(a)(1)-BACT, RULE 1703(a)(2)-PSD-BACT, RULE 2005]
[Devices subject to this condition: C188, C194, C200, C206 (simple-cycle)]

Verification: The project owner shall demonstrate compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**). The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-D6 The project owner shall install and maintain a pressure gauge to accurately indicate the differential pressure across the SCR catalyst bed in inches water column.

The project owner shall also install and maintain a device to continuously record the parameter being measured. Continuously record shall be defined as measuring at least once every month and shall be calculated based upon the average of the continuous monitoring for that month.

The pressure gauge shall be accurate to within plus or minus 5 percent. It shall be calibrated once every 12 months.

The pressure differential shall not exceed 3.0 inches water column.

[RULE 1303(a)(1)-BACT, RULE 1703(a)(2)-PSD-BACT, RULE 2005]
[Devices subject to this condition: C188, C194, C200, C206 (simple-cycle)]

Verification: The project owner shall demonstrate compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**). The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-D7 The project owner shall install and maintain a flow meter to accurately indicate the flow rate of the total hourly throughput of injected ammonia (NH3).

The project owner shall also install and maintain a device to continuously record the parameter being measured. Continuously record shall be defined as measuring at least once every hour and shall be calculated based upon the average of the continuous monitoring for that hour.

The flow meter shall be accurate to within plus or minus 5 percent. It shall be calibrated once every 12 months.

The project owner shall maintain the ammonia injection rate between 0.3 and 1.1 pounds per hour.

[RULE 1303(a)(1)-BACT, RULE 1703(a)(2)-PSD-BACT, RULE 2005]
[Devices subject to this condition: C183 (auxiliary boiler)]

Verification: The project owner shall demonstrate compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**). The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-D8 The project owner shall install and maintain a temperature gauge to accurately indicate the temperature in the exhaust at the inlet to the SCR reactor

The project owner shall also install and maintain a device to continuously record the parameter being measured. Continuously record shall be defined as measuring at least once every hour and shall be calculated based upon the average of the continuous monitoring for that hour.

The temperature gauge shall be accurate to within plus or minus 5 percent. It shall be calibrated once every 12 months.

The exhaust temperature at the inlet of the SCR/CO catalyst shall be maintained between 415 degrees F and 628 degrees F, except during startups and shutdowns.

[RULE 1303(a)(1)-BACT, RULE 1703(a)(2)-PSD-BACT, RULE 2005]
[Devices subject to this condition: C183 (auxiliary boiler)]

Verification: The project owner shall demonstrate compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**). The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-D9 The project owner shall install and maintain a pressure gauge to accurately indicate the differential pressure across the SCR catalyst bed in inches water column.

The project owner shall also install and maintain a device to continuously record the parameter being measured. Continuously record shall be defined as measuring at least once every month and shall be calculated based upon the average of the continuous monitoring for that month.

The pressure gauge shall be accurate to within plus or minus 5 percent. It shall be calibrated once every 12 months.

The pressure differential shall not exceed 2.0 inches water column.

[RULE 1303(a)(1)-BACT, RULE 1703(a)(2)-PSD-BACT, RULE 2005]
[Devices subject to this condition: C183 (auxiliary boiler)]

Verification: The project owner shall demonstrate compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**). The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-D10 The project owner shall conduct source test(s) for the pollutant(s) identified below.

Pollutant(s) to be Tested	Required Test Method(s)	Averaging Time	Test Location
NOx emissions	District Method 100.1	1 hour	Outlet of the SCR serving this equipment
CO emissions	District Method 100.1	1 hour	Outlet of the SCR serving this equipment
SOx emissions	AQMD Laboratory Method 307-91	NA	Fuel Sample
VOC emissions	District Method 25.3	1 hour	Outlet of the SCR serving this equipment
PM10 emissions	EPA Method 201A / District Method 5.1	District-Approved Averaging Time	Outlet of the SCR serving this equipment
PM2.5 emissions	EPA Method 201A / 202	District-Approved Averaging Time	Outlet of the SCR serving this equipment
NH3 emissions	District Method 207.1 and 5.3 or EPA Method 17	1 hour	Outlet of the SCR serving this equipment

The test shall be conducted after District approval of the source test protocol, but no later than 180 days after initial start-up. The District shall be notified of the date and time of the test at least 10 days prior to the test.

The test shall be conducted to determine the oxygen levels in the exhaust. In addition, the tests shall measure the fuel flow rate (CFH), the flue gas flow rate, the combined-cycle turbine and steam turbine generating output in MW-gross and MW-net, and the simple-cycle turbine generating output in MW-gross and MW-net.

The test shall be conducted in accordance with a District approved source test protocol. The protocol shall be submitted to the SCAQMD engineer no later than 90 days before the proposed test date and shall be approved by the District before the test commences.

The test protocol shall include the proposed operating conditions of the turbine during the tests, the identity of the testing lab, a statement from the testing lab certifying that it meets the criteria of Rule 304, and a description of all sampling and analytical procedures.

The sampling time for PM and PM2.5 tests shall be 4 hours or longer as necessary to obtain a measureable amount of sample.

The tests shall be conducted when the combined-cycle turbine is operating at loads of 45, 75, and 100 percent of maximum load, and the simple-cycle turbine is operating at loads of 50, 75, and 100 percent of maximum load.

For natural gas fired turbines only, an alternative to AQMD Method 25.3 for the purpose of demonstrating compliance with BACT as determined by CARB and SCAQMD may be the following:

a) Triplicate stack gas samples extracted directly into Summa canisters, maintaining a final canister pressure between 400-500 mm Hg absolute,

b) Pressurization of the Summa canisters with zero gas analyzed/certified to less than 0.05 ppmv total hydrocarbons as carbon, and

c) Analysis of Summa canisters per unmodified EPA Method TO-12 (with pre-concentration) or the canister analysis portion of AQMD Method 25.3 with a minimum detection limit of 0.3 ppmv or less and reported to two significant figures. The temperature of the Summa canisters when extracting the samples for analysis shall not be below 70 F.

The use of this alternative method for VOC compliance determination does not mean that it is more accurate than unmodified AQMD Method 25.3, nor does it mean that it may be used in lieu of AQMD Method 25.3 without prior approval, except for the determination of compliance with the BACT level of

2.0 ppmv VOC calculated as carbon set by CARB for natural gas fired turbines.

For purposes of this condition, an alternative test method may be allowed for any of the above pollutants upon concurrence by EPA, CARB, and SCAQMD.

[RULE 1303(a)(1)-BACT, RULE 1703(a)(2)-PSD-BACT, RULE 2005]
[Devices subject to this condition: D165, D173 (combined-cycle), D185, D191, D197, D203 (simple-cycle)]

Verification: The project owner shall submit the proposed protocol for the initial source tests no later than 90 days prior to the proposed source test date to both the District and CPM for approval. The project owner shall notify the District and CPM no later than 10 days prior to the proposed initial source test of the date and time of the scheduled test.

AQ-D11 The project owner shall conduct source test(s) for the pollutant(s) identified below.

Pollutant(s) to be Tested	Required Test Method(s)	Averaging Time	Test Location
SOx emissions	AQMD Laboratory Method 307-91	NA	Fuel Sample
VOC emissions	District Method 25.3	1 hour	Outlet of the SCR serving this equipment
PM10 emissions	EPA Method 201A / District Method 5.1	District-Approved Averaging Time	Outlet of the SCR serving this equipment

The test(s) shall be conducted at least once every three years.

The test shall be conducted and the results submitted to the District within 60 days after the test date. The SCAQMD shall be notified of the date and time of the test at least 10 days prior to the test.

The test shall be conducted when this equipment is operating at 100 percent of maximum load.

For natural gas fired turbines only, an alternative to AQMD Method 25.3 for the purpose of demonstrating compliance with BACT as determined by CARB and SCAQMD may be the following:

a) Triplicate stack gas samples extracted directly into Summa canisters, maintaining a final canister pressure between 400-500 mm Hg absolute,

b) Pressurization of the Summa canisters with zero gas analyzed/certified to less than 0.05 ppmv total hydrocarbons as carbon, and

c) Analysis of Summa canisters per unmodified EPA Method TO-12 (with pre-concentration) or the canister analysis portion of AQMD Method 25.3

with a minimum detection limit of 0.3 ppmv or less and reported to two significant figures. The temperature of the Summa canisters when extracting the samples for analysis shall not be below 70 F.

The use of this alternative method for VOC compliance determination does not mean that it is more accurate than unmodified AQMD Method 25.3, nor does it mean that it may be used in lieu of AQMD Method 25.3 without prior approval, except for the determination of compliance with the BACT level of 2.0 ppmv VOC calculated as carbon set by CARB for natural gas fired turbines.

For purposes of this condition, an alternative test method may be allowed for any of the above pollutants upon concurrence by EPA, CARB, and SCAQMD.

The test shall be conducted to demonstrate compliance with the Rule 1303 concentration and/or monthly emissions limit.

[RULE 1303(a)(1)-BACT, RULE 1703(a)(2)-PSD-BACT]
[Devices subject to this condition: D165, D173 (combined-cycle), D185, D191, D197, D203 (simple-cycle)]

Verification: The project owner shall test according to the original protocol. If changes to the testing methods or testing conditions are proposed then the project owner shall submit a revised protocol for the source tests no later than 45 days prior to the proposed source test date to both the District and CPM for approval. The project owner shall submit the source test results no later than 60 days following the source test date to both the District and CPM. The project owner shall notify the District and CPM no later than 10 days prior to the proposed initial source test of the date and time of the scheduled test.

AQ-D12 The project owner shall conduct source test(s) for the pollutant(s) identified below.

Pollutant(s) to be Tested	Required Test Method(s)	Averaging Time	Test Location
NH_3 emissions	District Method 207.1 and 5.3 or EPA Method 17	1 hour	Outlet of the SCR serving this equipment

The test shall be conducted and the results submitted to the District within 60 days after the test date. The SCAQMD shall be notified of the date and time of the test at least 10 days prior to the test.

The test shall be conducted at least quarterly during the first twelve months of operation and at least annually thereafter. The NOx concentration, as determined by the certified CEMS, shall be simultaneously recorded during the ammonia slip test. If the CEMS is inoperable or not yet certified, a test shall be conducted to determine the NOx emissions using District Method 100.1 measured over a 60 minute averaging time period.

The test shall be conducted to demonstrate compliance with the Rule 1303 concentration limit.

[RULE 1303(a)(1)-BACT, RULE 1703(a)(2)-PSD-BACT]
[Devices subject to this condition: C170, C178 (combined-cycle), C188, C194, C200, C206 (simple-cycle), C183 (auxiliary boiler)]

<u>Verification:</u> The project owner shall test according to the original protocol. If changes to the testing methods or testing conditions are proposed then the project owner shall submit a revised protocol for the source tests no later than 45 days prior to the proposed source test date to both the District and CPM for approval. The project owner shall submit the source test results no later than 60 days following the source test date to both the District and CPM. The project owner shall notify the District and CPM no later than 10 days prior to the proposed initial source test of the date and time of the scheduled test.

AQ-D13 The project owner shall conduct source test(s) for the pollutant(s) identified below.

Pollutant(s) to be Tested	Required Test Method(s)	Averaging Time	Test Location
NOx emissions	District Method 100.1	1 hour	Outlet of the SCR serving this equipment
CO emissions	District Method 100.1	1 hour	Outlet of the SCR serving this equipment
SOx emissions	AQMD Laboratory Method 307-91	NA	Fuel Sample
VOC emissions	District Method 25.3	1 hour	Outlet of the SCR serving this equipment
PM10 emissions	EPA Method 201A / District Method 5.1	District-Approved Averaging Time	Outlet of the SCR serving this equipment
PM2.5 emissions	EPA Method 201A / 202	District-Approved Averaging Time	Outlet of the SCR serving this equipment
NH_3 emissions	District Method 207.1 and 5.3 or EPA Method 17	1 hour	Outlet of the SCR serving this equipment

The test shall be conducted after District approval of the source test protocol, but no later than 180 days after initial start-up. The District shall be notified of the date and time of the test at least 10 days prior to the test.

For each firing rate, the following operating data shall be included: (1) the exhaust flow rates, in actual cubic feet per minute (acfm), (2) the firing rates in Btu/hour, (3) the exhaust temperature, in degrees F, (4) the oxygen content of the exhaust gases, in percent, and (5) the fuel flow rate.

The test shall be conducted in accordance with a District approved source test protocol. The protocol shall be submitted to the SCAQMD engineer no later than 90 days before the proposed test date and shall be approved by the District before the test commences.

The test protocol shall include the identity of the testing lab, confirmation that the test lab is approved under the District Laboratory Approval Program for the required test method for the CO pollutant, a statement from the testing lab certifying that it meets the criteria of Rule 304 (no conflict of interest), and a description of all sampling and analytical procedures.

The sampling facilities shall comply with the District Guidelines for Construction of Sampling and Testing Facilities, pursuant to Rule 217.

The sampling time for the PM and PM2.5 tests shall be 1 hour or longer as necessary to obtain a measureable amount of sample.

The test shall be conducted when this equipment is operating at maximum, minimum, and normal operating rates.

For purposes of this condition, an alternative test method may be allowed for any of the above pollutants upon concurrence by EPA, ARB, and SCAQMD.

[RULE 1303(a)(1)-BACT, RULE 1703(a)(2)-PSD-BACT, RULE 2005]
[Devices subject to this condition: D181 (auxiliary boiler)]

Verification: The project owner shall submit the proposed protocol for the initial source tests no later than 90 days prior to the proposed source test date to both the District and CPM for approval. The project owner shall submit the source test results no later than 60 days following the source test date to both the District and CPM. The project owner shall notify the District and CPM no later than 10 days prior to the proposed initial source test of the date and time of the scheduled test.

AQ-D14 The project owner shall conduct source test(s) for the pollutant(s) identified below.

Pollutant(s) to be Tested	Required Test Method(s)	Averaging Time	Test Location
SOx emissions	AQMD Laboratory Method 307-91	NA	Fuel Sample
VOC emissions	District Method 25.3	1 hour	Outlet of the SCR serving this equipment
PM10 emissions	EPA Method 201A / District Method 5.1	District-Approved Averaging Time	Outlet of the SCR serving this equipment

The test(s) shall be conducted in accordance with the testing frequency requirements specified in Rule 1146.

The test shall be conducted and the results submitted to the District within 60 days after the test date. The SCAQMD shall be notified of the date and time of the test at least 10 days prior to the test.

The test shall be conducted when this equipment is operating at 100 percent of maximum load.

The test shall be conducted to demonstrate compliance with the Rule 1303 concentration and/or monthly emissions limit.

For purposes of this condition, an alternative test method may be allowed for any of the above pollutants upon concurrence by EPA, CARB, and SCAQMD.

[Rule 1146, RULE 1303(a)(1)-BACT, RULE 1303(b)(2)-Offset, RULE 1703(a)(2)-PSD-BACT]

[Devices subject to this condition: D181 (auxiliary boiler)]

Verification: The project owner shall test according to the original protocol. If changes to the testing methods or testing conditions are proposed then the project owner shall submit a revised protocol for the source tests no later than 45 days prior to the proposed source test date to both the District and CPM for approval. The project owner shall submit the source test results no later than 60 days following the source test date to both the District and CPM. The project owner shall notify the District and CPM no later than 10 days prior to the proposed initial source test of the date and time of the scheduled test.

AQ-D15 The project owner shall install and maintain a CEMS to measure the following parameters:

CO concentration in ppmv.

Concentrations shall be corrected to 15 percent oxygen on a dry basis.

The CEMS shall be installed and operated to measure CO concentrations over a 15 minute averaging time period.

The CEMS shall be installed and operating no later than 90 days after initial start-up of the turbine, and in accordance with an approved SCAQMD Rule 218 CEMS plan application. The project owner shall not install the CEMS prior to receiving initial approval from SCAQMD.

The CEMS will convert the actual CO concentrations to mass emission rates (lbs/hr) and record the hourly emission rates on a continuous basis.

CO Emission Rate, lbs/hr = K*Cco*Fd[20.9/(20.9% - %O_2 d)][(Qg * HHV)/10E+06], where:

1. K = 7.267 *10E-08 (lb/scf)/ppm

2. Cco = Average of four consecutive 15 min. average CO concentrations, ppm

3. Fd = 8710 dscf/MMBTU natural gas

4. $\%O_2$ d = Hourly average % by volume O_2 dry, corresponding to Cco

5. Qg = Fuel gas usage during the hour, scf/hr

6. HHV = Gross high heating value of fuel gas, BTU/scf

[RULE 1303(a)(1)-BACT; RULE 1703(a)(2) – PSD-BACT]
[Devices subject to this condition: D165, D173 (combined-cycle), D185, D191, D197, D203 (simple-cycle)]

Verification: The project owner shall submit the SCAQMD approved CEMS plan to the CPM within 90 days of SCAQMD approval. The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-D16 The project owner shall install and maintain a CEMS to measure the following parameters:

NOx concentration in ppmv.

Concentrations shall be corrected to 15 percent oxygen on a dry basis.

The CEMS shall be installed and operating no later than 90 days after initial start-up of the turbine, and in accordance with an approved SCAQMD REG XX CEMS plan application. The project owner shall not install the CEMS prior to receiving initial approval from SCAQMD.

Rule 2012 provisional RATA testing shall be completed and submitted to the SCAQMD within 90 days of the conclusion of the turbine commissioning period. During the interim period between the initial start-up and the provisional certification date of the CEMS, the project owner shall comply with the monitoring requirements of Rule 2012(h)(2) and 2012(h)(3).

[RULE 1703(a)(2) – PSD-BACT, RULE 2005, RULE 2012]

[Devices subject to this condition: D165, D173 (combined-cycle), D185, D191, D197, D203 (simple-cycle)]

Verification: The project owner shall submit the SCAQMD approved CEMS plan to the CPM within 90 days of SCAQMD approval. The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-D17 The project owner shall install and maintain a CEMS to measure the following parameters:

NOx concentration in ppmv.

Concentrations shall be corrected to 3 percent oxygen on a dry basis.

Concentrations shall be corrected to 3 percent oxygen on a dry basis.

The CEMS shall be installed and operating no later than 90 days after initial start-up of the auxiliary boiler, and in accordance with an approved SCAQMD REG XX CEMS plan application. The project owner shall not install the CEMS prior to receiving initial approval from SCAQMD.

Rule 2012 provisional RATA testing shall be completed and submitted to the SCAQMD within 90 days of the conclusion of the boiler commissioning period. During the interim period between the initial start-up and the provisional certification date of the CEMS, the project owner shall comply with the monitoring requirements of Rule 2012(h)(2) and 2012(h)(3).

[RULE 1703(a)(2) – PSD-BACT, RULE 2005, RULE 2012]

[Devices subject to this condition: D181 (auxiliary boiler)]

Verification: The project owner shall submit the SCAQMD approved CEMS plan to the CPM within 90 days of SCAQMD approval. The project owner shall make thesite available for inspection of records by representatives of the District, ARB, and the Energy Commission.

E. Equipment Operation/Construction Requirements

AQ-E1 The project owner shall upon completion of construction, operate and maintain this equipment according to the following requirements:

In accordance with all air quality mitigation measures stipulated in the final California Energy Commission decision for the 13-AFC-01 project.

[CA PRC CEQA]
[Devices subject to this condition: D163, D164, D165, C170, D173, C178, D181, C183, D185, C188, D191, C194, D197, C200, D203, C206, D209, D210]

Verification: The project owner shall make the site available for inspection by representatives of the District, ARB, U.S. EPA and the Energy Commission.

AQ-E2 The project owner shall construct this equipment according to the following requirements:

The Permit to Construct shall expire one year from the date of issuance unless an extension of time has been approved in writing by the Executive Officer.

(This condition duplicates the Rule 205 requirements in condition 1.b. in Section E: Administrative Conditions.)

[RULE 205]

[Devices subject to this condition: D165, D173 (combined-cycle), D185, D191, D197, D203 (simple-cycle)]

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Verification: The project owner shall make the site available for inspection by representatives of the District, ARB, U.S. EPA and the Energy Commission.

AQ-E3 The project owner shall operate and maintain this equipment according to the following requirements

Total commissioning hours shall not exceed 996 hours of fired operation for each turbine from the date of initial turbine start-up. Of the 996 hours, commissioning hours without control shall not exceed 216 hours.

Two turbines may be commissioned at the same time.

The project owner shall vent this equipment to the CO oxidation catalyst and SCR control system whenever the turbine is in operation after commissioning is completed.

The project owner shall maintain records to demonstrate compliance with this condition and shall make such records available to the Executive Officer upon request. The records shall be maintained for a minimum of 5 years in a manner approved by SCAQMD. The records shall include, but not be limited to, the total number of commissioning hours, number of commissioning hours without control, and natural gas fuel usage.

[RULE 1303(a)(1)-BACT, RULE 1703(a)(2)-PSD-BACT, RULE 2005]
[Devices subject to this condition: D165, D173 (combined-cycle)]

Verification: The project owner shall submit all records including the total number of commissioning hours, number of commissioning hours without control, and fuel usage per turbine to demonstrate compliance with this condition as part of the Quarterly Operational Report required in **AQ-SC7**. The project owner shall make the site available for inspection by representatives of the District, ARB, U.S. EPA and the Energy Commission.

AQ-E4 The project owner shall operate and maintain this equipment according to the following requirements

Total commissioning hours shall not exceed 280 hours of fired operation for each turbine from the date of initial turbine start-up. Of the 280 hours, commissioning hours without control shall not exceed 4 hours.

Four turbines may be commissioned at the same time.

The project owner shall vent this equipment to the CO oxidation catalyst and SCR control system whenever the turbine is in operation after commissioning is completed.

The project owner shall maintain records to demonstrate compliance with this condition and shall make such records available to the Executive Officer upon request. The records shall be maintained for a minimum of 5 years in a manner approved by SCAQMD. The records shall include, but not be limited to, the total number of commissioning hours, number of commissioning hours without control, and natural gas fuel usage.

[RULE 1303(a)(1)-BACT, RULE 1703(a)(2)-PSD-BACT, RULE 2005]
[Devices subject to this condition: D185, D191, D197, D203 (simple-cycle)]

Verification: The project owner shall submit all records including the total number of commissioning hours, number of commissioning hours without control, and fuel usage per turbine to demonstrate compliance with this condition as part of the Quarterly Operational Report required in **AQ-SC7**. The project owner shall make the site available for inspection by representatives of the District, ARB, U.S. EPA and the Energy Commission.

AQ-E5 The project owner shall operate and maintain this equipment according to the following requirements

Total commissioning hours shall not exceed 30 hours of fired operation for the auxiliary boiler from the date of initial boiler start-up.

The project owner shall vent this equipment to the SCR control system whenever the auxiliary boiler is in operation after commissioning is completed.

The project owner shall provide the SCAQMD with written notification of the initial startup date. The project owner shall maintain records in a manner approved by the District to demonstrate compliance with this condition and the records shall be made available to District personnel upon request. The records shall include, but not be limited to, the number of commissioning hours and natural gas fuel usage.

[RULE 1303(a)(1)-BACT, RULE 1703(a)(2)-PSD-BACT, RULE 2005]
[Devices subject to this condition: D181 (auxiliary boiler)]

Verification: The project owner shall submit all records including the total number of commissioning hours and fuel usage to demonstrate compliance with this condition as part of the Quarterly Operational Report required in **AQ-SC7**. The project owner shall make the site available for inspection by representatives of the District, ARB, U.S. EPA and the Energy Commission.

AQ-E6 The project owner shall upon completion of the construction, operate and maintain this equipment according to the following requirements:

The 1000 lbs per gross megawatt-hours CO_2 emission limit (inclusive of degradation) shall only apply if this turbine supplies greater than 1,481,141 MWh-net electrical output to a utility power distribution system on both a 12-operating-month and a 3-year rolling average basis.

Compliance with the 1000 lbs per gross megawatt-hours CO_2 emission limit (inclusive of degradation) shall be determined on a 12-operating-month rolling average basis.

This turbine shall be operated in compliance with all applicable requirements of 40 CFR 60 Subpart TTTT.

[40 CFR 60 Subpart TTTT]
[Devices subject to this condition: D165, D173]

<u>Verification:</u> The project owner shall submit to the CPM for approval all emissions and emission calculations to demonstrate compliance with this condition as part of the 4th quarter Quarterly Operational Report required in **AQ-SC7**.

AQ-E7 The project owner shall upon completion of the construction, operate and maintain this equipment according to the following requirements:

The 120 lbs/MMBtu CO_2 emission limit shall only apply if this turbine supplies no more than 1,481,141 MWh-net electrical output to a utility power distribution system on either a 12-operating-month or a 3-year rolling average basis.

Compliance with the 120 lbs/MMBtu CO_2 emission limit shall be determined on a 12-operating-month rolling average basis.

This turbine shall be operated in compliance with all applicable requirements of 40 CFR 60 Subpart TTTT.

[40 CFR 60 Subpart TTTT]
[Devices subject to this condition: D165, D173 (combined-cycle)]

<u>Verification:</u> The project owner shall submit to the CPM for approval all emissions and emission calculations to demonstrate compliance with this condition as part of the 4th quarter Quarterly Operational Report required in **AQ-SC7**.

AQ-E8 The project owner shall upon completion of the construction, operate and maintain this equipment according to the following requirements:

The 120 lbs/MMBtu CO_2 emission limit for non-base load turbines shall apply.

Compliance with the 120 lbs/MMBtu CO_2 emission limit shall be determined on a 12-operating-month rolling average basis.

This turbine shall be operated in compliance with all applicable requirements of 40 CFR 60 Subpart TTTT, including applicable requirements for recordkeeping and reporting.

[40 CFR 60 Subpart TTTT]

[Devices subject to this condition: D185, D191, D197, D203 (simple-cycle)]

Verification: The project owner shall submit to the CPM for approval all emissions and emission calculations to demonstrate compliance with this condition as part of the 4th quarter Quarterly Operational Report required in **AQ-SC7**.

AQ-E9 The project owner shall upon completion of the construction, operate and maintain this equipment according to the following requirements:

The project owner shall record the total net power generated in a calendar month in megawatt-hours.

The project owner shall calculate and record greenhouse gas emissions for each calendar month using the following formula:

GHG = 61.41 * FF

Where GHG is the greenhouse gas emissions in tons of CO_2 and FF is the monthly fuel usage in millions standard cubic feet.

The project owner shall calculate and record the CO_2 emissions in pounds per net megawatt-hour based on a 12-month rolling average. The CO_2 emissions from this equipment shall not exceed 610,480 tons per year per turbine on a 12-month rolling average basis. The calendar annual average CO_2 emissions shall not exceed 937.88 lbs per gross megawatt-hours (inclusive of equipment degradation).

The project owner shall maintain records to demonstrate compliance with this condition and shall make such records available to the Executive Officer upon request. The records shall be maintained for a minimum of 5 years in a manner approved by SCAQMD.

[RULE 1714]
[Devices subject to this condition: D165, D173 (combined-cycle)]

Verification: The project owner shall submit to the CPM for approval all emissions and emission calculations to demonstrate compliance with this condition as part of the 4th quarter Quarterly Operational Report required in **AQ-SC7**.

AQ-E10 The project owner shall upon completion of the construction, operate and maintain this equipment according to the following requirements:

The project owner shall record the total net power generated in a calendar month in megawatt-hours.

The project owner shall calculate and record greenhouse gas emissions for each calendar month using the following formula:

GHG = 61.41 * FF

Where GHG is the greenhouse gas emissions in tons of CO_2 and FF is the monthly fuel usage in millions standard cubic feet.

The project owner shall calculate and record the CO_2 emissions in pounds per net megawatt-hour based on a 12-month rolling average. The CO_2 emissions from this equipment shall not exceed 120,765 tons per year per turbine on a 12-month rolling average basis. The calendar annual average CO_2 emissions shall not exceed 1,356.03 lbs per gross megawatt-hours (inclusive of equipment degradation).

The project owner shall maintain records to demonstrate compliance with this condition and shall make such records available to the Executive Officer upon request. The records shall be maintained for a minimum of 5 years in a manner approved by SCAQMD.

[RULE 1714]
[Devices subject to this condition: D185, D191, D197, D203 (simple-cycle)]

Verification: The project owner shall submit to the CPM for approval all emissions and emission calculations to demonstrate compliance with this condition as part of the 4th quarter Quarterly Operational Report required in **AQ-SC7**.

AQ-E11 The project owner shall comply with the following requirements:

The total electrical output on a gross basis from Combined-Cycle Turbines Nos. CCGT-1 and CCGT-2 **(**Devices D165 and D173, respectively), common Steam Turbine Generator, and Simple-Cycle Turbines Nos. SCGT-1, SCGT-2, SCGT-3, and SCGT-4 (Device D185, D191, D197, and D203, respectively) shall not exceed 1094.7 MW-gross at 59 deg F.

The gross electrical output shall be measured at the single generator serving each of the combined-cycle turbines, the single generator serving the common steam turbine, and the single generator servicing each of the simple-cycle turbines. The monitoring equipment shall meet ANSI Standard No. C12 or equivalent, and have an accuracy of +/- 0.2 percent. The gross electrical output from the generators shall be recorded at the CEMS DAS over a 15-minute averaging time period.

The project owner shall record and maintain written records of the maximum amount of electricity produced from this equipment and shall make such records available to the Executive Officer upon request. The records shall be maintained for a minimum of 5 years in a manner approved by SCAQMD.

[RULE 1303(b)(2)-Offset, RULE 1303(b)(2)-Offset, RULE 2005]
[Devices subject to this condition: D165, D173 (combined-cycle), D185, D191, D197, D203 (simple-cycle)]

Verification: The project owner shall submit to the CPM for approval all emissions and emission calculations to demonstrate compliance with this condition as part of the 4th quarter Quarterly Operational Report required in **AQ-SC7**.

AQ-E12 The project owner shall vent this equipment, during filling, only to the vessel from which it is being filled.

[RULE 1303(a)(1)-BACT, RULE 1303(a)(1)-BACT]
[Devices subject to this condition: D163, D164 (ammonia tank)]

Verification: The project owner shall make the site available for inspection by representatives of the District, ARB, U.S. EPA and the Energy Commission.

AQ-E13 The project owner shall construct, operate, and main this equipment according to the following requirements:

The equipment shall be equipped with a fixed cover to minimize VOC emissions.

[Devices subject to this condition: D209, D210 (oil water separator)]

Verification: The project owner shall make the site available for inspection by representatives of the District, ARB, U.S. EPA and the Energy Commission.

K. Applicable Rules

AQ-H1 This equipment is subject to the applicable requirements of the following Rules or Regulations:

Contaminant	Rule	Rule/Subpart
H_2S	District Rule	1146

[RULE 1146]
[Devices subject to this condition: D181 (auxiliary boiler)]

Verification: The project owner shall make the site available for inspection by representatives of the District, ARB, U.S. EPA and the Energy Commission..

K. Administrative

AQ-I1 This equipment shall not be operated unless the facility holds 108,377 pounds of NOx RTCs in its allocation account to offset the annual emissions increase for the first year of operation. RTCs held to satisfy this condition may be transferred only after one year from the initial start of operation. If the hold amount is partially satisfied by holding RTCs that expire midway through the hold period, those RTCs may be transferred upon their respective expiration dates. This hold amount is in addition to any other amount of RTCs required to be held under other condition(s) stated in this permit.

[RULE 2005]
[Devices subject to this condition: D165, D173 (combined-cycle)]

Verification: The project owner shall submit to the CPM for approval all emissions and emission calculations to demonstrate compliance with this condition as part of the 4th quarter Quarterly Operational Report required in **AQ-SC7**.

AQ-I2 This equipment shall not be operated unless the facility holds 68,575 pounds of NOx RTCs in its allocation account to offset the annual emissions increase for the first year of operation. RTCs held to satisfy this condition may be transferred only after one year from the initial start of operation. If the hold amount is partially satisfied by holding RTCs that expire midway through the hold period, those RTCs may be transferred upon their respective expiration dates. This hold amount is in addition to any other amount of RTCs required to be held under other condition(s) stated in this permit.

[RULE 2005]
[Devices subject to this condition: D185, D191, D197, D203 (simple-cycle)]

<u>Verification:</u> The project owner shall submit to the CPM for approval all emissions and emission calculations to demonstrate compliance with this condition as part of the 4th quarter Quarterly Operational Report required in **AQ-SC7**.

AQ-I3 This equipment shall not be operated unless the facility holds 1,351 pounds of NOx RTCs in its allocation account to offset the annual emissions increase for the first year of operation. RTCs held to satisfy this condition may be transferred only after one year from the initial start of operation. If the hold amount is partially satisfied by holding RTCs that expire midway through the hold period, those RTCs may be transferred upon their respective expiration dates. This hold amount is in addition to any other amount of RTCs required to be held under other condition(s) stated in this permit.

[RULE 2005]
[Devices subject to this condition: D181 (auxiliary boiler)]

<u>Verification:</u> The project owner shall submit to the CPM for approval all emissions and emission calculations to demonstrate compliance with this condition as part of the 4th quarter Quarterly Operational Report required in **AQ-SC7**.

K. Record Keeping Reporting

AQ-K1 The project owner shall provide to the District a source test report in accordance with the following requirements:

Source test results shall be submitted to the District no later than 90 days after the source tests required by conditions D29.2 (**AQ-D10**), D29.3 (**AQ-D11**), and D29.4 (**AQ-D12**), are conducted.

Emission data shall be expressed in terms of concentration (ppmv), corrected to 15 percent oxygen (dry basis), mass rate (lbs/hr), lbs/MM cubic feet, and lbs/MMBtu. In addition, solid PM emissions, if required to be tested, shall also be reported in terms of grains per DSCF.

All exhaust flow rates shall be expressed in terms of dry standard cubic feet per minute (DSCFM) and dry actual cubic feet per minute (DACFM).

All moisture concentration shall be expressed in terms of percent corrected to 15 percent oxygen.

Source test results shall also include the oxygen levels in the exhaust, the fuel flow rate (CFH), the flue gas temperature, and the generator power output (MW) under which the test was conducted.

[RULE 1303(a)(1)-BACT, RULE 1303(b)(2)-Offset, RULE 1703(a)(2) – PSD-BACT, RULE 2005]
[Devices subject to this condition: D165, D173 (combined-cycle), D185, D191, D197, D203 (simple-cycle)]

Verification: The project owner shall submit the source test results no later than 90 days following the source test date to both the District and CPM.

AQ-K2 The project owner shall provide to the District a source test report in accordance with the following requirements:

Source test results shall be submitted to the District no later than 90 days after the source tests required by conditions D29.5 (**AQ-D13**), D29.6 (**AQ-D14**), and D29.4 (**AQ-D12**), are conducted.

Emission data shall be expressed in terms of concentration (ppmv), corrected to 3 percent oxygen (dry basis), mass rate (lbs/hr), lbs/MM cubic feet, and lbs/MMBtu. In addition, solid PM emissions, if required to be tested, shall also be reported in terms of grains per DSCF.

All moisture concentration shall be expressed in terms of percent corrected to 3 percent oxygen.

Source test results shall also include, for each firing rate, the following operating data: (1) the exhaust flow rates, in actual cubic feet per minute (acfm), (2) the firing rates in Btu/hour, (3) the exhaust temperature, in degrees F, (4) the oxygen content of the exhaust gases, in percent, and (5) the fuel flow rate.

[RULE 1146, RULE 1303(a)(1)-BACT, RULE 1303(b)(2)-Offset, RULE 1703(a)(2) – PSD-BACT, RULE 2005]
[Devices subject to this condition: D181]]

Verification: The project owner shall submit the source test results no later than 90 days following the source test date to both the District and CPM.

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ACRONYMS

AAQS	Ambient Air Quality Standard
ACC	Air Cooled Condenser
AERMOD	AMS/EPA Regulatory Model
AEC	Alamitos Energy Center
AES	AES Alamitos Energy-LLC
AES-SD	AES Southland, Development, LLC
AFC	Application for Certification
AGS	Alamitos Generating Station
APCO	Air Pollution Control Officer
AIP	Achieved in Practice
AQCMM	Air Quality Construction Mitigation Manager
AQCMP	Air Quality Construction Mitigation Plan
AQMD	Air Quality Management District
AQMP	Air Quality Management Plan
ARB	California Air Resources Board
ASOS	Automated Surface Observing Systems
ATC	Authority to Construct
BACT	Best Available Control Technology
bhp	brake horsepower
Btu	British Thermal Unit
CAAQS	California Ambient Air Quality Standards
CA ISO	California Independent System Operator
CAM	Compliance Assurance Monitoring
CCGT	Combined-Cycle Gas Turbine
CCR	California Code of Regulations
CEC	California Energy Commission (or Energy Commission)
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CPM	(CEC) Compliance Project Manager
CTG	Combustion Turbine Generator
DPM	Diesel Particulate Matter
Degrees F	Degrees Fahrenheit
EIR	Environmental Impact Report

EPA	Environmental Protection Agency
ERC	Emission Reduction Credit
ESEC	El Segundo Energy Center
FDOC	Final Determination of Compliance
FSA	Final Staff Assessment
GE	General Electric
GHG	Greenhouse Gas
gr/dscf	Grains per Dry Standard Cubic Foot (7,000 grains = 1 pound)
H_2S	Hydrogen Sulfide
HAPs	Hazardous Air Pollutants
hp	Horsepower
hr	Hour
HRSG	Heat recovery Steam Generator
HSC	Health and Safety Code
IP	Implementation Plan
kV	Kilovolt
lb/mmscf	Pounds per Million Standard Cubic Feet
LAER	Lowest Achievable Emission Rate
Lb(s)	Pounds
LLC	Limited Liability Company
LORS	Laws, Ordinances, Regulations and Standards
MCR	Monthly Compliance Report
m^3	Cubic Meter
$\mu g/m^3$	Microgram per Cubic Meter
mg/m^3	Milligrams per Cubic Meter
MMBtu/hr	Million British Thermal Units per Hour
m/s	Meters per Second
$MTCO_2$	Metric Ton of Carbon Dioxide
MW	Megawatts (1,000,000 Watts)
MWh	Megawatt-hour
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Protection Act
NESHAP	National Emission Standard for Hazardous Air Pollutants
ng/J	Nanograms per Joule
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
NOx	Oxides of Nitrogen or Nitrogen Oxides

NSPS	New Source Performance Standard
NSR	New Source Review
O_2	Oxygen
O_3	Ozone
OLM	Ozone Limiting Method
OTC	Once Through Cooling
Pb	Lead
PDOC	Preliminary Determination of Compliance
PM	Particulate Matter
PM10	Particulate Matter less than 10 microns in diameter
PM2.5	Particulate Matter less than 2.5 microns in diameter
Ppb	Parts Per Billion
ppm	Parts Per Million
ppmv	Parts Per Million by Volume
ppmvd	Parts Per Million by Volume, Dry
PSA	Preliminary Staff Assessment (this document)
PSD	Prevention of Significant Deterioration
PTA	Petition to Amend
PTC	Permit to Construct
PTE	Potential to Emit
PTO	Permit to Operate
RECLAIM	Regional Clean Air Incentives Market
RTC	RECLAIM Trade Credit
SB	Senate Bill
SCAQMD	South Coast Air Quality Management District
scf	standard cubic feet
SCE	Southern California Edison
SCGT	Simple Cycle Gas Turbine
SIP	State Implementation Plan
SCR	Selective Catalytic Reduction
SO_2	Sulfur Dioxide
SO_4	Sulfate
SOx	Oxides of Sulfur
SCAB	South Coast Air Basin
STG	Steam Turbine Generator
SWPPP	Storm Water Pollution Prevention Plan

SWRCB	California State Water Resources Control Board
T-BACT	Toxic Best Available Control Technology
tpy	tons per year
U.S. EPA	United States Environmental Protection Agency
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compounds

AIR QUALITY APPENDIX AIR-1

Greenhouse Gas Emissions

Nancy Fletcher and David Vidaver

SUMMARY

The Alamitos Energy Center (AEC) project is considered a proposed addition to the state's electricity system. It would be an efficient, new, dispatchable natural gas-fired combined-cycle and simple-cycle power plant that would provide fast start capabilities but would produce greenhouse gas (GHG) emissions while generating electricity for California consumers. The AEC addition to the system would displace other, less efficient, higher GHG-emitting generation, and facilitate the integration of renewable resources. Therefore, the AEC would improve the efficiency of existing system resources and contribute to a reduction of total and average GHG emissions from the Western U.S. electricity sector. The relative efficiency of the AEC and the system build-out of renewable resources in California would result in a net cumulative reduction of GHG emissions from new and existing fossil sources of electricity.

Electricity is produced by the operation of an inter-connected system of generation sources. Operation of one power plant, like the AEC, affects all other power plants in the interconnected system. The AEC would burn natural gas for fuel and thus produce GHG emissions that contribute cumulatively to climate change,but it would also have a beneficial impact on system operation and facilitate a reduction in GHG emissions in several ways:

- When dispatched,[1] the AEC would displace less efficient (and thus higher GHG-emitting) generation. Because the project's GHG emissions per megawatt-hour (MWh) would be lower than those power plants that the project would displace, the addition of the AEC would contribute to a reduction of Western Electricity Coordinating Council system GHG[2] emissions overall and the GHG emission rate average.
- The AEC would provide fast start and dispatch flexibility capabilities necessary to integrate expected and desired additional amounts of variable renewable generation (also known as "intermittent" energy resources) to meet the state's renewable portfolio standard (RPS) and GHG emission reduction targets.
- The AEC would replace capacity and generation mostly provided by aging, high GHG emitting power plants, including the existing Alamitos Generating Station

[1] The entity responsible for balancing a region's electrical load and generation will "dispatch" or call on the operation of generation facilities. The "dispatch order" is generally dictated by the facility's electricity production cost, efficiency, location or contractual obligations.

[2] Fuel-use closely correlates to the efficiency of and carbon dioxide (CO_2) emissions from natural gas-fired power plants. And since CO_2 emissions from fuel combustion dominate greenhouse gas (GHG) emissions from power plants, the terms CO_2 and GHG are used interchangeably in this section.

(AGS) that will likely be retiring in order to comply with the State Water Resource Control Board's (SWRCB) policy on the use of once through cooling (OTC).

- The AEC would replace less efficient generation in the South Coast local reliability area required to meet local reliability needs, reducing the GHG emissions associated with providing local reliability services and facilitating the retirement of aging, high GHG-emitting resources in the area.

INTRODUCTION

Gases that trap heat in the atmosphere are called greenhouse gases (GHGs). GHG emissions are not criteria pollutants with direct impacts; they are discussed in the context of cumulative impacts. In December 2009, the U.S. Environmental Protection Agency (U.S. EPA) declared that greenhouse gases (GHGs) threaten the public health and welfare of the current and future generations (the "endangerment finding"). This finding became effective on January 14, 2010.

The generation of electricity using any fossil fuel, including natural gas, can produce greenhouse gases along with the criteria air pollutants that have been traditionally regulated under the federal and state Clean Air Acts (CAA). For fossil fuel-fired power plants, the GHG emissions include primarily CO_2, with much smaller amounts of nitrous oxide (N_2O, not NO or NO_2 which are commonly known as NOx or oxides of nitrogen), and methane (CH_4 – often from unburned natural gas). Also included are sulfur hexafluoride (SF_6) from high voltage equipment and hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) from refrigeration/chiller equipment. GHG emissions from the electricity sector are dominated by CO_2 emissions from the carbon-based fuels. Other sources of GHG emissions are small and more easily controlled, reused or recycled. These sources of GHG are included in the analysis because some of the compounds have very high relative global warming potentials[3].

Federal rules that became effective December 29, 2009 (40 CFR 98) require federal reporting of GHGs. As federal rulemaking evolves, staff at this time focuses on analyzing the ability of the project to comply with existing federal- and State-level policies and programs for GHGs. The State has demonstrated a clear willingness to address global climate change though research, adaptation,[4] and GHG inventory reductions. In that context, staff evaluates the GHG emissions from the proposed project, presents information on GHG emissions related to electricity generation, and describes the applicable GHG standards and requirements.

[3] Global warming potential is a relative measure, compared to carbon dioxide, of a compound's residence time in the atmosphere and ability to warm the planet. Mass emissions of GHGs are converted into carbon dioxide equivalent (CO_2E) for ease of comparison.
[4] While working to understand and reverse global climate change, it is prudent to also adapt to potential changes in the state's climate (for example, changing rainfall patterns).

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS) COMPLIANCE

The following federal, state, and local laws and policies in **Greenhouse Gas Table 1** pertain to the control and mitigation of greenhouse gas emissions. Staff's analysis examines the project's compliance with these requirements.

Greenhouse Gas Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable LORS	Description
Federal	
40 Code of Federal Regulations (CFR) Parts 51, 52, 70 and 71	This rule "tailors" GHG emissions to PSD and Title V permitting applicability criteria See discussions below.
40 Code of Federal Regulations (CFR) Parts 51 and 52	A new stationary source that emits more than 100,000 TPY of greenhouse gases (GHGs) is also considered to be a major stationary source subject to PSD requirements. As of June 23, 2014 the US Supreme Court has invalidated this requirement as a sole PSD permitting trigger. However, for permits issued on or after July 1, 2011 PSD applies to GHGs if the source is otherwise subject to PSD (for another regulated NSR pollutant) and the source has a GHG potential to emit (PTE) equal to or greater than 75,000 TPY CO_2E. The proposed AEC is subject to the GHG PSD analysis.
40 Code of Federal Regulations (CFR) Parts 60, 70, 71 and 98	On October 23, 2015, U.S. EPA published new source performance standards (NSPS) for greenhouse gas emissions for new, modified, and reconstructed fossil fuel-fired electric utility generating units. The AEC turbines would be subject to these requirements.
40 Code of Federal Regulations (CFR) Part 98	This rule requires mandatory reporting of GHG emissions for facilities that emit more than 25,000 metric tons of CO_2 equivalent emissions per year. This requirement is triggered by this facility.
State	
California Global Warming Solutions Act of 2006, AB 32 (Stats. 2006; Chapter 488; Health and Safety Code sections 38500 et seq.)	This act requires the California Air Resource Board (ARB) to enact standards to reduce GHG emission to 1990 levels by 2020. Electricity production facilities are included. A cap-and-trade program became active in January 2012, with enforcement beginning in January 2013. Cap-and-trade is expected to achieve approximately 20 percent of the GHG reductions expected under AB 32 by 2020.
California Code of Regulations, Title 17, Subchapter 10, Article 2, sections 95100 et. seq.	These ARB regulations implement mandatory GHG emissions reporting as part of the California Global Warming Solutions Act of 2006 (Stats. 2006; Chapter 488; Health and Safety Code sections 38500 et seq.)
Title 20, California Code of Regulations, Section 2900 et seq.; CPUC Decision D0701039 in proceeding R0604009	The regulations prohibit utilities from entering into long-term contracts with any base load facility that does not meet a greenhouse gas emission standard of 0.5 metric tonnes carbon dioxide per megawatt-hour (0.5 $MTCO_2$/MWh) or 1,100 pounds carbon dioxide per megawatt-hour (1,100 lbs CO_2/MWh).
Local	
Rule 1714 – Prevention of Significant Deterioration for Greenhouse Gases, Gas Turbines	This rule establishes preconstruction review requirements for greenhouse gases (GHG). This rule is consistent with federal PSD rule as defined in 40 CFR Part 52.21. This rule requires the owner or operator of a new major source or a major modification to obtain a PSD permit prior to commencing construction.

GHG ANALYSIS

California is actively pursuing policies to reduce GHG emissions that include adding low-GHG emitting renewable electricity generation resources to the system. GHG emissions are not included in the class of pollutants traditionally called criteria pollutants. Since the impact of the GHG emissions from a power plant's operation has global rather than local effects, those impacts should be assessed not only by analysis of the plant's emissions, but also in the context of the operation of the entire electricity system of which the plant is an integrated part. Furthermore, the impact of the GHG emissions from a power plant's operation should be analyzed in the context of applicable GHG laws and policies, especially Assembly Bill (AB) 32, California's Global Warming Solutions Act of 2006.

GLOBAL CLIMATE CHANGE AND CALIFORNIA

There is general scientific consensus that climate change is occurring and that human activity contributes in some measure (perhaps substantially) to that change. Man-made emissions of GHGs, if not sufficiently curtailed, are likely to contribute further to continued increases in global temperatures. Indeed, the California Legislature found that "[g]lobal warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California" (Cal. Health & Safety Code, sec. 38500, division 25.5, part 1).

GHGs differ from criteria pollutants in that GHG emissions from a specific project do not cause direct adverse localized human health effects. Rather, the direct environmental effect of GHG emissions is the cumulative effect of an overall increase in global temperatures, which in turn has numerous indirect effects on the environment and humans. The impacts of climate change include potential physical, economic and social effects. These effects could include inundation of settled areas near the coast from rises in sea level associated with melting of land-based glacial ice sheets, exposure to more frequent and powerful climate events, and changes in suitability of certain areas for agriculture, reduction in Arctic sea ice, thawing permafrost, later freezing and earlier break-up of ice on rivers and lakes, a lengthened growing season, shifts in plant and animal ranges, earlier flowering of trees, and a substantial reduction in winter snowpack (IPCC 2007b). For example, current estimates include a 70 to 90 percent reduction in snow pack in the Sierra Nevada mountain range. Current data suggests that in the next 25 years, in every season of the year, California could experience unprecedented heat, longer and more extreme heat waves, greater intensity and frequency of heat waves, and longer dry periods.

Recent data collected at Mauna Loa, Hawaii indicate that the atmospheric CO_2 concentration now exceeds 400 ppm all year, and new research suggests that values will remain above this level (Betts et al 2016). According to the latest information available from the Intergovernmental Panel on Climate Change in their document "Climate Change 2014" (IPCC 2016), atmospheric CO_2 concentrations of 430 to 480 ppm would be expected to cause an approximate 2.7 degree Fahrenheit (F) temperature increase and CO2 concentrations ranging from 580 ppm to 650 ppm are expected to cause an approximate 3.6 F temperature increase.

In April 2007, the U.S. Supreme Court held that GHG emissions are pollutants within the meaning of the Clean Air Act (CAA). In reaching its decision, the Court also acknowledged that climate change results, in part, from anthropogenic causes (Massachusetts et al. v. Environmental Protection Agency 549 U.S. 497, 2007). The Supreme Court's ruling paved the way for the regulation of GHG emissions by U.S. Environmental Protection Agency (U.S. EPA) under the CAA.

In response to this Supreme Court decision, on December 7, 2009 the U.S. EPA Administrator signed two distinct findings regarding GHGs under Section 202(a) of the CAA:

- Endangerment Finding: That the current and projected concentrations of the GHGs in the atmosphere threaten the public health and welfare of current and future generations; and
- Cause or Contribute Finding: That the combined emissions of GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution, which threatens public health and welfare.

As of June 23, 2014, the U.S. Supreme Court has validated that GHG emissions should continue to be regulated, but only for those facilities that are already regulated under Prevention of Significant Deterioration (PSD) for New Source Review (NSR) pollutants.

As federal rulemaking evolves, staff at this time focuses on analyzing the ability of the project to comply with existing federal- and state-level policies and programs for GHGs. As of June 23, 2014, the US Supreme Court has validated that GHG emissions should continue to be regulated, but only for those facilities that are already regulated under Prevention of Significant Deterioration (PSD) for NSR pollutants.

On October 23, 2015, the U.S. EPA published in the Federal Register a New Source Performance Standard (NSPS) for GHG emissions for new electric power plants with an immediate effective date. It sets standards to limit emissions of CO_2 from new, modified and reconstructed power plants. The New Source Performance Standards Subpart TTTT-Standards of Performance for Greenhouse Gas Emissions for Electrical Generating Units (Title 40, Code of Federal Regulations, Part 60.5508) are set under the authority of the Clean Air Act section 111(b) and are applicable to new fossil fuel-fired power plants commencing construction after January 8, 2014.

According to Subpart TTTT, base load rating is defined as maximum amount of heat input that an electric generating unit (EGU) can combust on a steady state basis at ISO conditions. For stationary combustion turbines, base load rating includes the heat input from duct burners. Each EGU is subject to the standard if it burns natural gas on a 12-month rolling basis more than 90% of the time and if the EGU supplies more than the design efficiency times the potential electric output as net-electric sales on a 3 year rolling average basis. Affected EGUs supplying equal to or less than the design efficiency times the potential electric output as net electric sales on a 3 year rolling average basis are considered non-base load units and are subject to a heat input limit of 120 lbs CO_2/MMBtu. Each affected 'base load' EGU is subject to the gross energy output standard of 1,000 lbs of CO_2/MWh unless the Administrator approves the EGU being subject to a net energy output standard of 1,030 lbs CO_2/MWh. AES would comply with these requirements. See the **Air Quality** section for further discussion.

The AEC combined-cycle turbines would be expected to supply more than the design efficiency times the potential electric output as net-electric sales on a 3 year rolling average basis and would therefore be considered base load units. The combined-cycle turbines would be subject to a gross energy output standard of 1,000 lbs of CO_2 per megawatt hour (MWh) or a net energy output standard of 1,030 lbs CO_2/MWH. The project owner has proposed demonstrating compliance on a gross energy output basis. Should the combined cycle operate as non-base load unit, compliance with the 120 lb CO_2 per MMBtu limit would be expected by the use of natural gas.

The state has demonstrated a clear willingness to address global climate change (GCC) through research, adaptation, and GHG emission reductions. In that context, staff evaluates the GHG emissions from the proposed project, presents information on GHG emissions related to electricity generation (see the section **California Electricity and Greenhouse Gases** below), and describes the applicable GHG policies and programs. It is likely that GHG reductions mandated by AB32, the Global Warming Solutions Act of 2006, which is being implemented by ARB, will be non-uniform or disproportional across emitting sectors, in that most reductions will be based on cost-effectiveness (i.e., the greatest GHG reduction for the least cost). For example, ARB proposes a 40 percent reduction in statewide GHG emissions from the electricity sector even though that sector currently only produces about 20 to 22 percent of the state's GHG emissions.

SB 1368,[5] enacted in 2006, and regulations adopted by the Energy Commission and the CPUC pursuant to that bill, prohibits California utilities from entering into long-term commitments with any base load facilities that exceed the Emission Performance Standard (EPS) of 0.5 metric tonnes CO_2 per megawatt-hour[6] (1,100 pounds CO_2/MWh). Specifically, the SB 1368 EPS applies to new California utility-owned power plants, new investments in existing power plants, and new or renewed contracts with terms of five years or more, including contracts with power plants located outside of California, where the power plants are "designed or intended" to operate as base load generation.[7] If a project, in state or out of state, plans to sell electricity or capacity to California utilities, those utilities will have to demonstrate that the project meets the EPS. *Base load* units are defined as units that are expected to operate at a capacity factor 60 percent or higher. Compliance with the EPS is determined by dividing the annual average carbon dioxide emissions by the annual average net electricity production in MWh. This determination is based on capacity factors, heat rates, and

[5] Public Utilities Code § 8340 et seq.

[6] The Emission Performance Standard only applies to carbon dioxide and does not include emissions of other greenhouse gases converted to carbon dioxide equivalent.

[7] See Rule at http://www.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/64072.htm

corresponding emissions rates that reflect the *expected* operations of the power plant and not on full load heat rates [Chapter 11, Article 1 §2903(a)].

The AEC would be required to participate in California's GHG cap-and-trade program. This cap-and-trade program is part of a broad effort by the State of California to reduce GHG emissions as required by AB 32, which is being implemented by ARB. As currently implemented, market participants such as the AEC are required to report their GHG emissions and to obtain GHG emissions allowances (and offsets) for those reported emissions by purchasing allowances from the capped market and offsets from outside the AB 32 program. As new participants enter the market and as the market cap is ratcheted down over time, GHG emission allowance and offset prices will increase, encouraging innovation by market participants to reduce their GHG emissions. Thus, the AEC, as a GHG cap-and-trade participant, would be consistent with California's AB 32 Program.

ELECTRICITY SYSTEM GREENHOUSE GAS EMISSIONS

While electricity use can be as simple as turning on a switch to operate a light or fan, the system to deliver the adequate and reliable electricity supply is complex and variable. It operates as an integrated whole to reliably and effectively meet demand, such that the dispatch of a new source of generation unavoidably curtails or displaces one or more less efficient or less competitive existing sources. Within the system, generation resources provide electricity, or energy, generating capacity, and ancillary services to stabilize the system and facilitate electricity delivery, or movement, over the grid. *Capacity* is the instantaneous output of a resource, in megawatts. *Energy* is the capacity output over a unit of time, for example an hour or year, generally reported as megawatt-hours or gigawatt-hours (GWh). Ancillary services[8] include regulation, spinning reserve, non-spinning reserve, voltage support, and black start capability. Individual generation resources can be built and operated to provide only one specific service. Alternatively, a resource may be able to provide one or all of these services, depending on its design and constantly changing system needs and operations.

GHG EMISSIONS FROM THE PROPOSED FACILITY

Project Construction

Construction of industrial facilities such as power plants requires coordination of numerous equipment and personnel. The concentrated on-site activities result in temporary, unavoidable increases in vehicle and equipment emissions that include greenhouse gases. Construction of the AEC project would include the Alamitos Generating Station Unit 7 demolition, combined-cycle construction, and simple-cycle construction occurring over approximately 56 months. The project owner provided an annual GHG emission estimate for the construction phase. The GHG emissions estimate is presented below in **Greenhouse Gas Table 2**. The term CO_2E represents the total GHG emissions after weighting by the appropriate global warming potential.

[8] See CEC 2009b, page 95.

Greenhouse Gas Table 2
Estimated Maximum Annual Construction Greenhouse Gas Emissions

AEC	GHG Construction Emissions, Metric Tons per Year[a]			
	CO_2	CH_4	N_2O	CO_2E
Weighted Construction Total[b]	6,591	3.25	16.99	6,611

Source: AEC 2015 Table 5.1A30 CH2 2016s, staff analysis
Notes: [a] One metric tonne (MT) equals 1.1 short tons or 2,204.6 pounds or 1,000 kilograms.
[b] Global Warming Potential weighting factors: CH_4 = 25, N_20 =298

Project Operations

The primary sources of GHG during operation of the AEC would be the natural gas fired combustion turbines and the auxiliary boiler. The employee and delivery traffic GHG emissions from off-site activities are negligible in comparison with the gas turbine GHG emissions.

Greenhouse Gas Table 3 shows estimated annual GHG emissions of CO_2 and CO_2E for the AEC combined-cycle portion only (power block 1), assuming the facility would operate at maximum permitted hours per year of operation.

Greenhouse Gas Table 3
AEC Combined Cycle (Power Block 1)
Estimated Potential Annual Greenhouse Gas (GHG) Emissions

AEC	Operational GHG Emissions ($MTCO_2E/yr$)[a]
Carbon Dioxide (CO_2)	1,100,963
Methane (CH_4)	206
Nitrous Oxide (N_2O)	9.24
Sulfur Hexafluoride (SF_6) Leakage	15.8
Total Project GHG Emissions ($MTCO_2E/yr$)[b]	**1,101,194**
Estimated Annual Energy Output (MWh/yr)[c]	2,509,309
Estimated Annualized GHG Performance ($MTCO_2/MWh$)	**0.44**

Source: AEC 2015 Table 5.1A30 CH2 2016s, SCAQMD 2016b, staff analysis
Notes: [a] One metric tonne (MT) equals 1.1 short tons or 2,204.6 pounds or 1,000 kilograms.
[b] Global Warming Potential weighting factors: CH_4 = 25, N_20 =298, SF6 = 22,800
[c] Annualized basis uses the project owner's assumed maximum permitted operating basis.

The project owner expects the plant capacity factor of the AEC (both the combined-cycle and simple-cycle turbines) each to be below 60 percent. Therefore, the AEC would not be subject to SB 1368 Greenhouse Gas Emission Performance Standard of 0.500 $MTCO_2$/MWh. The combined cycle portion of AEC (block 1) is the only portion of the proposed facility whose actual operation could potentially approach a 60 percent capacity factor. It would comply with this requirement should it operate at a 60 percent capacity factor.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Staff assesses the cumulative effects of GHG emissions caused by both construction and operation. As the name implies, construction impacts result from the emissions occurring during the construction of the project. The operation impacts result from the emissions of the proposed project during operation.

METHOD AND THRESHOLDS FOR DETERMINING SIGNIFICANCE

The CEQA guidelines provide three factors for lead agencies to consider when assessing the significance of impacts for the analysis of GHG emissions impacts (CEQA Guidelines, tit. 14, §15064.4).

- *The extent to which the project may increase or reduce greenhouse gas emissions as compared to the existing environmental setting;*
- *Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project; and*
- *The extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions. Such requirements must be adopted by the relevant public agency through a public review process and must reduce or mitigate the project's incremental contribution of greenhouse gas emissions. If there is substantial evidence that the possible effects of a particular project are still cumulatively considerable notwithstanding compliance with the adopted regulations or requirements, an EIR must be prepared for the project.*

Staff evaluates the emissions of the project in the context of the electricity sector as a whole and the AB 32 Scoping Plan implementation efforts for the sector, including the cap and trade regulation that constitutes the state's primary mechanism for reducing GHG emissions from the electricity sector. The Energy Commission's assessment approach does not include a specific numeric threshold of significance for GHG emissions; rather the assessment is completed in the context of how the project will affect the electricity sector's emissions based on its proposed role and its compliance with applicable regulations and policies.

Included in this sector-wide GHG emission analysis method is the determination of whether a project is consistent with the Avenal precedent decision, which requires a finding as a conclusion of law that any new natural gas-fired power plant certified by the Energy Commission "must:

- *not increase the overall system heat rate for natural gas plants;*
- *not interfere with generation from existing renewables or with the integration of new renewable generation; and*

- *taking into account the two preceding factors, reduce system-wide GHG emissions."*[9]

CONSTRUCTION EMISSIONS

Staff believes that the small GHG emission increases from mitigated construction activities would not be significant for several reasons. First, the intermittent emissions during the construction phase are not ongoing during the life of the project. Additionally, control measures that staff recommends to address criteria pollutant emissions, such as limiting idling times and requiring, as appropriate, equipment that meets the latest criteria pollutant emissions standards, would further minimize greenhouse gas emissions to the extent feasible. The use of newer equipment will increase efficiency and reduce GHG emissions and be compatible with low-carbon fuel (e.g., bio-diesel and ethanol) mandates that will likely be part of future ARB regulations to reduce GHG from construction vehicles and equipment.

DIRECT/INDIRECT OPERATION IMPACTS AND MITIGATION

Operational impacts of the proposed project are described in detail in a later section titled "**The Impact of the AEC on GHG Emissions from the State's Electricity Sector**" since the evaluation of these effects must be done by considering the project's role(s) in the integrated electricity system. In summary, these effects include reducing the operation and greenhouse gas emissions from the older, existing power plants; potentially displacing local electricity generation; the penetration of renewable resources; and accelerating generation retirements and replacements, including facilities currently using once-through cooling. Additionally, GHG emissions impacts arising from operation are mitigated through compliance with the State's cap and trade regulation, which is designed to reduce electricity sector GHG emissions over time in order to meet AB 32 statewide GHG emissions reduction goals.

CUMULATIVE IMPACTS

Cumulative impacts are defined as "two or more individual effects which, when considered together, are considerable or . . . compound or increase other environmental impacts" (CEQA Guidelines § 15355). "A cumulative impact consists of an impact that is created as a result of a combination of the project evaluated in the EIR together with other projects causing related impacts" (CEQA Guidelines § 15130[a][1]). Such impacts may be relatively minor and incremental, yet still be significant because of the existing environmental background, particularly when one considers other closely related past, present, and reasonably foreseeable future projects.

This entire assessment is a cumulative impact assessment. The project alone would not be sufficient to change global climate, but would emit greenhouse gases and therefore has been analyzed as a potential cumulative impact in the context of existing GHG regulatory requirements and GHG energy policies.

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[9] Final Commission Decision, Avenal Energy Application for Certification (08-AFC-1) December 2009, p. 114.

COMPLIANCE WITH LORS

FEDERAL

The CEQA guidelines provide three factors for lead agencies to consider when assessing the significance of impacts for the analysis of GHG emissions impacts (CEQA Guidelines, tit. 14, §15064.4).

The SCAQMD PDOC calculated the gross energy output for the combined-cycle and simple-cycle gas turbines. A thermal efficiency of 937.88 lbs CO_2 per MWh (gross), assuming 8 percent performance degradation, was calculated for the proposed combined-cycle turbines. For the combined-cycle turbines, this is less than the allowable 1,000 lbs CO_2/MWh (gross). A thermal efficiency of 1,356.03 lbs CO_2 per MWh (gross), assuming 8 percent performance degradation, was calculated for the proposed SCGTs.

The inability of the simple-cycle turbines to meet the allowable 1,000 lbs CO_2/MWh (gross) is expected for these non-base load units. The GE LMS-100PB simple cycle turbines are expected to have capacity factors less than their lower heating value efficiency and thus would be required to emit no more than 120 lb CO_2 per million Btus of heat input. Each GE LMS-100PB turbine is estimated to emit 117 lb CO_2 per MMBtu, which rounds to 120 lb CO_2 per MMBtu at two digits of precision.

Conditions of Certification **AQ-E6**, **AQ-E7, AQ-E8 and AQ-E10** would ensure compliance with the new standards.

STATE

The AEC would be required to participate in California's GHG cap-and-trade program, which became active in January 2012, with enforcement beginning in January 2013. This cap-and-trade program is part of a broad effort by the state of California to reduce GHG emissions as required by AB 32, which is being implemented by ARB. As currently implemented, market participants such as the AEC are required to report their GHG emissions and to obtain GHG emissions allowances (and offsets) for those reported emissions by purchasing allowances from the capped market and offsets from outside the AB 32 program. The AEC, as a GHG cap-and-trade participant, would be consistent with California's landmark AB 32 Program, which is a statewide program coordinated with a region wide Western Climate Initiative program to reduce California's GHG emissions to 1990 levels by 2020. ARB staff continues to develop and implement regulations to refine key elements of the GHG reduction measures to improve their linkage with other GHG reduction programs.

The project owner has proposed that the AEC would have less than a 60 percent annual full load capacity factor; therefore, AEC would not be subject to the requirements of SB 1368 and the current Emission Performance Standard. The project's combined cycle GHG emission performance has been demonstrated to be below the SB 1368 EPS limit of 1,100 $lb/_{net}$ MWh (see **Greenhouse Gas Table 3**), and with the proposed federal New Source Performance Standard (NSPS) of 1,000 $lb/_{gross}$ MWh for new combustion. The project's simple cycle GHG performance would not be subject to SB 1368 ESP limit.

LOCAL

SCAQMD Rule 1714 establishes preconstruction review requirements for GHGs and the AEC is evaluated for these requirements in the PDOC. The AEC would be a major PSD source. The SCAQMD performed a PSD BACT analysis for GHGs and concluded thermal efficiency is the only technically and economically feasible alternative for CO_2/GHG emissions control for the AEC. The current design proposed for the AEC meets the BACT requirement for GHG emission reductions.

CONCLUSIONS AND RECOMMENDATIONS

The AEC would lead to a net reduction in GHG emissions across the electricity system that provides energy and capacity to California. Thus, staff believes that the AEC would result in a cumulative overall reduction in GHG emissions from the state's power plants, would not worsen current conditions, and would thus not result in impacts that are cumulatively significant. In addition, it would provide flexible, dispatchable and fast ramping power in relatively small increments of capacity, which should improve the electric system reliability in a high-renewables, low-GHG system.

The AEC would be subject to mandatory reporting of GHG emissions per federal government and California Air Resources Board (CARB) greenhouse gas regulations. These reports enable these agencies to gather information needed to regulate the AEC in trading markets, such as those that are required by regulations implementing the California Global Warming Solutions Act of 2006 (AB 32). In addition, the AEC may be subject to additional reporting requirements and GHG reduction and trading requirements as these regulations continue to evolve.

GHG emissions increases from construction activities would be mitigated. Construction emissions would be temporary and intermittent, and not continue during the life of the project. The control measures or best practices that staff recommends such as limiting idling times and requiring, as appropriate, equipment that meet the latest emissions standards, would further minimize greenhouse gas emissions. Staff believes that the use of newer equipment would reduce GHG emissions and be compatible with low-carbon fuel (e.g., bio-diesel and ethanol) mandates that would likely be part of the ARB regulations to reduce GHG from construction vehicles and equipment.

The AEC would not be considered a base load facility subject to the Greenhouse Gases Emission Performance Standard (Title 20, California Code of Regulations, section 2900 et seq.). However the proposed AEC combined-cycle gas turbine block (CCGT) would meet the standard of 0.5 metric tonnes CO_2 per megawatt-hour ($MTCO_2$/MWh) with a rating of 0.44 $MTCO_2$/MWh. See **Greenhouse Gas Table 3**.

The GE 7FA.05 combined-cycle turbines are also expected to comply with the federal Standards of Performance for Greenhouse Gas Emissions (or Clean Air Act section 111[b]) of 1,000 pounds of carbon dioxide per gross megawatt hour (lb CO_2/MWh, gross) or (1,030 lb CO_2/ MWh, net) for base load natural gas fueled turbines. The GE

LMS-100PB simple-cycle turbines are expected to comply with the limit of 120 lb CO_2 per million Btus (MMBtu) of natural gas heat input for non-base load natural gas fueled turbines. Should the combined-cycle turbines operate as non-base load units, compliance with the 120 lb CO_2 per MMBtu limit would be expected by the use of natural gas. Conditions of Certification **AQ-E7** and **AQ-E8** would ensure compliance with the new standards.

Staff has reached the following conclusions about the AEC based on CEQA guidelines:

- The AEC would have less than significant GHG emissions impacts because:
  - The combined cycle portion of the AEC would have lower heat rate and lower GHG emissions than the units utilizing OTC that currently provide a share of the local reliability needs for the local capacity area (LCA). It would also be dispatched in lieu of less efficient, higher-emitting combined cycles when providing local reliability services.
  - The proposed simple cycle turbines of the AEC would have lower heat rates and lower GHG emissions than those of the existing peaking facilities in the LCA.
  - The AEC would facilitate the integration of renewable energy resources that would lower the state-wide GHG emissions from the electricity sector.
- The AEC would have less than significant impacts by complying with applicable regulations and plans related to the reduction of GHG emissions as follows:
  - The AEC would be subject to compliance with the AB 32 Cap and Trade regulation that implements the state's regulatory plan for reducing GHG emissions from the electricity sector;
  - The construction emissions mitigation measures that staff recommends to address criteria pollutant emissions would further minimize GHG emissions. The use of newer equipment will increase efficiency and reduce GHG emissions and be compatible with low-carbon fuel (e.g., bio-diesel and ethanol) mandates that will likely be part of future ARB regulations to reduce GHG from construction vehicles and equipment.

The AEC would be consistent with all three main conditions in the Energy Commission's precedent decision regarding GHG emissions established by the Avenal Energy Project's Final Energy Commission Decision (not increase the overall system heat rate for natural gas plants, not interfere with generation from existing or new renewable facilities, and ensure a reduction of system-wide GHG emissions).

PROPOSED CONDITIONS OF CERTIFICATION

Conditions of Certification **AQ-E6**, **AQ-E7**, **AQ-E8**, **AQ-E9**, and **AQE10** in the Air Quality section relate to the greenhouse gas emissions from project operation and are proposed here by reference. The facility owner would participate in California's GHG cap-and-trade program, and is required to report GHG emissions and to obtain GHG emissions allowances (and offsets) for those reported emissions, by purchasing allowances from the capped market and offsets from outside the AB 32 program.

Similarly, the AEC would be subject to federal mandatory reporting of GHG emissions. The facility owner may have to provide additional reports and GHG reductions, depending on the future regulations formulated by the U.S. EPA or the ARB.

CALIFORNIA ELECTRICITY AND GREENHOUSE GASES – DAVID VIDAVER

California's commitments to dramatically reduce greenhouse gas (GHG) emissions over the next four decades include moving to a high-renewable/low GHG electricity system. However, natural gas-fired power plants--and the GHG emissions associated with their output--will still be integral to the reliable operation of the electricity system at the outset of this period. In the long-run, zero- and low carbon resources, including demand-side and storage resources, may provide a majority, if not all of the balancing services needed to both integrate variable energy[10] renewable resources, as well as rapidly respond to sudden failures of major system components (power plants and transmission lines) . However, the zero-carbon technologies that are needed for balancing and contingency response are not expected to be available in sufficient quantities by the early- to mid-2020s to obviate the need for flexible natural gas-fired electricity generation, which can be quickly dispatched as energy and other services are needed. In the interim, state policies serve to (a) limit utility financing and development of new natural gas-fired generation to that needed to reliably operate the electricity system, and (b) require privately-owned generators to participate in the AB 32 cap-and-trade program that is designed to reduce economy-wide GHG emissions in a manner that is as economically efficient as possible.

Given that natural gas-fired generation is needed for reliable system operation, the development and operation of new facilities to replace aging plants, the nuclear facility at San Onofre, and those retiring pursuant to the State Water Resource Control Board's (SWRCB) policy limiting the use of once-through cooling technologies is not only necessary for system and local reliability, such development serves to reduce GHG emissions from the electricity sector. This outcome is discussed in detail below.

The amount of new natural gas-fired capacity needed to provide reliable service to the customers of the state's investor-owned utilities, direct access providers and community choice aggregators over a ten-year planning horizon is determined in the California Public Utilities Commission's (CPUC's) Long-term Procurement Planning (LTPP) proceeding. The resulting portfolio of demand- and supply-side resources satisfies the state's loading order, which mandates development of cost-effective preferred resources (zero- and low-GHG emitting resources, such as energy efficiency, demand response, and renewable generation) in support of the state's climate change policies before authorizing the development/financing of conventional fossil resources.[11] It is

[10] Variable and intermittent are often used interchangeably, but variable more accurately reflects the integration issues of renewable into the California grid. Winds can slow across a wind farm or cloud cover can shade portions of a solar field, temporarily reducing unit or facility output, but not shut down the unit or facility.

[11] The loading order is set forth in California's Energy Action Plans. Energy Action Plan I was adopted by the state's energy agencies in April/May 2003 and Energy Action Plan II in September 2005. An update to these plans was issued in February 2008.

also consistent with Commission direction to investor-owned utilities to procure energy storage resources in support of a high variable generation resource system.[12]

THE ROLE OF NATURAL GAS-FIRED GENERATION IN A LOW-GHG ENVIRONMENT

The need for natural gas-fired generation to reliably operate the electricity system is well established. On October 8, 2008, the Energy Commission adopted an Order Instituting Informational Proceeding (08-GHG OII-1) to solicit comments on how to assess the greenhouse gas impacts of proposed new power plants in accordance with the California Environmental Quality Act (CEQA).[13] A report prepared as a response to the GHG OII (CEC 2009a) indicates the services that natural gas-fired power plants provide in an evolving high-renewables, low-GHG system (CEC 2009b, pp 93 and 94). Among these are (a) variable generation and grid operations support and (b) local capacity.

Variable Generation and Grid Operations Support

California's renewable portfolio standard (RPS) requires that the state's energy service providers meet 50 percent of retail sales with renewable energy by 2030; meeting GHG emission reduction targets for 2050 will likely require a far higher percentage. Much of this energy will come from variable wind and solar resources to be developed in California, or on an "as generated" basis from neighboring states.

The CA ISO has identified an increased need for regulation services, "load-following" generation, and multi-hour ramping as a result of the increase in these variable ("intermittent energy") renewable resources, whose output changes over the course of the day, often in a sudden and unpredictable fashion. Dispatchable capacity must provide "regulation," small changes in output over a 5-minute period at CA ISO direction, requiring that the generator be equipped with automated generation control (AGC). "Load following" requires larger changes in output by the generation portfolio over a 5-minute to one-hour period. Multi-hour ramping needs require that units be dispatched, at CA ISO direction if necessary, over time periods of one to nine hours and wider ranges of output in aggregate, requiring dispatchable generation that can start and ramp up and down quickly and be capable of operating at relatively low load levels if the amount of dispatchable capacity and associated energy needed from these resources is to be minimized.

Natural gas-fired power plants are currently the only type of new facility that can provide these "ancillary" services in the quantities needed now and in the near future. While dispatchable hydroelectric plants can also provide them, the potential for adding hydroelectric resources to the system is limited. Nuclear, coal and geothermal facilities

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[12] D.13-10-040 (October 17, 2013) established a procurement target of 1,325 MW in total for the state's three largest investor-owned utilities.

[13] This need for gas-fired generation to reliably operate the system was reaffirmed in the CPUC decision authorizing Southern California Edison to procure new gas-fired generation in the Los Angeles Basin (D.13-02-015) See *Decision Authorizing Long-Term Procurement for Local Capacity Requirements*, February 13, 2013, p. 2.

are generally more economic if operated at or near their design point (i.e., base loaded)[14] and, therefore, are not the preferred technologies for providing load-following and ramping services. While demand-side resources and storage may ultimately provide significant quantities of these services, only pumped hydro storage facilities are currently capable of doing so on a large scale.

Historically, a large share of California's load-following and ramping needs have been provided by the natural gas-fired steam turbines built on the Pacific Coast and in the San Francisco Bay Delta during the 1960s and 1970s. Very efficient when constructed, these provided base load energy through the 1980s and 1990s; they were supplanted in this role by newer, more efficient combined cycle technologies built pursuant to the energy crisis of 2000 – 2001. While these units were modified to operate successfully as load following and peaking generation, they are not as efficient or economic as newer technologies. Several of these facilities have retired as a result of the State Water Resource Control Board's (SWRCB's) policy on the use of OTC technologies; others plan to retire by 2020. This represents a loss of capacity capable of operating at a very wide range of output and thus large quantities of flexible generation and other ancillary services.

Local Capacity Requirements

The CA ISO has identified numerous local capacity areas (LCA) and sub-areas in which threshold amounts of capacity are required to ensure reliability. Transmission constraints prevent the import of sufficient energy into these areas under high load conditions to ensure reliable service without requiring specified amounts of local capacity be generating or available to the CA ISO for immediate dispatch.

Reliable service requires that the CA ISO be able to maintain service under 1-in-10-year load conditions given the sequential failure of two major components (a large power plant and a major transmission line, for example); this requirement is imposed by the North American Electric Reliability Council (NERC). The amount of capacity needed in each of these areas (the local capacity requirement, or "LCR") is determined annually by the CA ISO; the LCR study process culminates in an annual *Local Capacity Technical Analysis*. The LCRs of the Los Angeles Basin, San Diego and Big Creek-Ventura LCAs are too large to be met solely with non-natural gas fired generation, as evidenced by the procurement authorization issued in the 2012 LTPP proceeding (see below).

QUANTIFYING THE NEED FOR NATURAL GAS-FIRED GENERATION

Prior to the deregulation of the California electricity system during the 1990's, the Energy Commission's power plant siting process considered the need for power plant development. SB 110 (Chapter 581, Statutes of 1999) eliminated the requirement that

[14] Issues can arise from: thermal fatigue due to cycling; difficulties starting and stopping solid or geothermal fuel supplies; significant inefficiencies at low loads or standby points used to avoid full shutdowns; and, significant capital outlays that make it necessary to operate the units as much as possible.

projects licensed by the Energy Commission be in conformance with an integrated assessment of need that was conducted by the Energy Commission until that time.

The need for new generation capacity to ensure reliable service in the investor-owned utility (IOU) service territories is now determined in the CPUC's biennial LTPP proceeding.[15] This proceeding is the forum in which the state's major IOUs are authorized to finance the development of new "least-cost, best-fit" generation (on behalf of either IOU customers or all ratepayers not served by publicly-owned utilities) needed to reliably meet electricity demand. This need, specified in terms of: (a) the MW of capacity needed; (b) the desired or required operating characteristics of the resource(s) to be financed; and (c) the location of proposed additions if required for local reliability, is a function of planning assumptions that reflect the state's commitment to dramatically reduce GHG emissions from the electricity sector. The MWs of capacity needed are driven by:

- Peak demand growth due to economic and demographic factors;
- Reductions in peak demand due to committed and uncommitted energy efficiency and demand response programs;
- Reserve margins (dependable capacity in excess of peak demand) needed to ensure system reliability, normally assumed to be 15 to 17 percent of peak demand, but also including any additional dispatchable capacity needed to ensure reliability given variation in the output of renewable resources (e.g., wind or solar generation);
- Capacity to be provided by fossil-fired resources being developed by California-based investor-owned utilities pursuant to authorization by the CPUC in previous LTPP proceedings;
- Capacity to be provided by new renewable resources built/contracted with to meet the state's RPS; and,
- Capacity to be lost due to retirement, for example, capacity expected to cease operation as a result of the SWRCB policy regarding the use of OTC.

The planning assumptions adopted for use in the LTPP proceeding, and thus determinant of the amount of new capacity authorized, consider both the state's loading order for resource development, as well as the expected development of specific types of preferred resources, including energy efficiency, demand response, and renewable generation. In other words, in authorizing the procurement/financing of dispatchable, natural gas-fired capacity by an IOU, the CPUC assumes that all cost-effective amounts of preferred resources will have been procured.

Authorization for Southern California Edison (SCE) and San Diego Gas & Electric (SDG&E) to procure natural gas-fired generation or other least-cost resources to replace retiring once-through cooled generation units and the San Onofre Nuclear Generating Station was granted in D.13-02-015 (February 13, 2013) and D.14-03-004

[15] The need for new generation capacity to ensure reliable service by publicly-owned utilities (POU) is determined by the governing authorities of the individual utilities.

(March 13, 2014) in the CPUC's 2012 LTPP proceeding (R.12-03-014). The decisions authorized SCE to procure a minimum of 1,000 MW and up 1,500 MW of new gas-fired generation capacity in the Los Angeles Basin LCA and up to 290 MW in the Moorpark sub-area of the Big Creek – Ventura LCA, and for SDG&E to procure up to 600 MW in the San Diego LCA.

The CPUC does not require Energy Commission certification for a generation project to participate in a utility request for offers (RFOs), nor does the Energy Commission require a contract with a utility for a merchant project to be considered for certification. Requiring the sequencing of these processes would not only lengthen the time needed to bring projects on line and thus threaten system reliability, it would reduce the number of projects that could compete in utility RFOs. This could lead to non-competitive solicitations, unnecessarily raising ratepayer costs.

Energy Commission certification of fossil generation without a utility contract does not result in the development of more fossil generation than that needed to reliably operate the system. It is not expected that developers of new capacity, such as the developer of AEC, would bring a project to completion without a contract, which would guarantee recovery of the investment of several hundred million dollars. No merchant plant has been developed since the energy crisis (2000 – 2001) without a contract. This plant, in turn, provides energy, capacity and ancillary services that obviate the need for other, new gas-fired generation and contributes to reduction in GHG emissions. Even if AEC were to be constructed and operated without CPUC approval of a utility contract, it would still: (a) displace energy from higher GHG-emission facilities (see below), and (b) not "crowd out" renewable generation and demand-side programs, as requirements for the procurement of these preferred resources would be unaffected.

THE IMPACT OF AEC ON GHG EMISSIONS FROM THE ELECTRICITY SECTOR

Any assessment of the impact of a new power plant on system-wide GHG emissions must begin with the understanding that electricity generation and demand must be in balance at all times; the energy provided by any new generation resource simultaneously displaces exactly the same amount of energy from an existing resource or resources. The GHG emissions produced by AEC are thus not incremental additions to system-wide emissions, but are offset by reductions in GHG emissions from those generation resources that are displaced. The operation of the system so as to meet the demand for electricity at the lowest cost in fact leads to a reduction in system-wide GHG emissions if AEC is added.

At low to moderate penetration levels of renewable generation, new natural gas-fired plants such as AEC displace less efficient natural gas-fired generation[16] in a very

[16] At very low gas prices relative to coal prices, i.e., when electricity from natural gas is cheaper than that from coal, new gas-fired generation will displace coal-fired generation, leading to even greater reductions in GHG emissions. In markets such as California, where GHG emissions allowance costs are a component of the market price, coal-fired generation is displaced even sooner due to its higher carbon

straightforward fashion. It is reasonable to assume that AEC would be dispatched (called upon to generate electricity) whenever they are a cheaper source of energy than an alternative - i.e., that they will displace a more expensive resource, if not the most expensive resource that would otherwise be called upon to operate. The costs of dispatching a power plant are largely the costs of fuel, plus variable operations and maintenance (O&M) costs, with the former representing the lion's share of such costs (90 percent or more). It follows that AEC would be dispatched when it burns less fuel per MWh than the resource(s) it displaces, i.e., when it produces fewer GHG emissions. There are exceptions in theory, but not in practice.[17]

In the longer-term, the development and operation of AEC, ultimately leads to the retirement of less-efficient (higher-emitting) generation. By reducing their revenue streams (for the provision of both energy and capacity-related services, whether through markets or under a bilateral contract), AEC would render these other facilities less profitable and riskier to operate. This follows from the fixed demand for energy and ancillary services; the developers of AEC cannot stimulate demand for energy and other products they provide, but merely provide a share of the energy that is needed to meet demand and the capacity needed to reliably operate the system. In doing so, AEC both discourages the use of, and allows for the retirement of less-efficient generation.

The long-run impact of the natural gas fired fleet turnover as described here can be seen from historical changes in resources that are providing electricity in California as presented below in **Greenhouse Gas Figure 1** (data includes combined cycles and boilers only). In 2001, approximately 74,000 GWh (62.5 percent of natural gas-fired generation) in California was from pre-1980 natural gas fired steam turbines, combusting an average of 11,268 Btu per kWh (not shown in the figure). By 2010, this share had fallen to approximately 6,000 GWh (5.4 percent); 64.1 percent of natural-gas fired generation was from new combined cycles with an average heat rate of 7,201 Btu per kWh (CEC 2011, also not shown in the figure).[18] The net change over this period was a 22 percent reduction in GHG emissions (also not shown in the figure) despite a 3.5 percent increase in generation. The post-2000 development of new combined cycle generation has allowed for the retirement of aging natural gas fired steam turbines along the California Coast and in the San Francisco Bay Delta. Those that remain in

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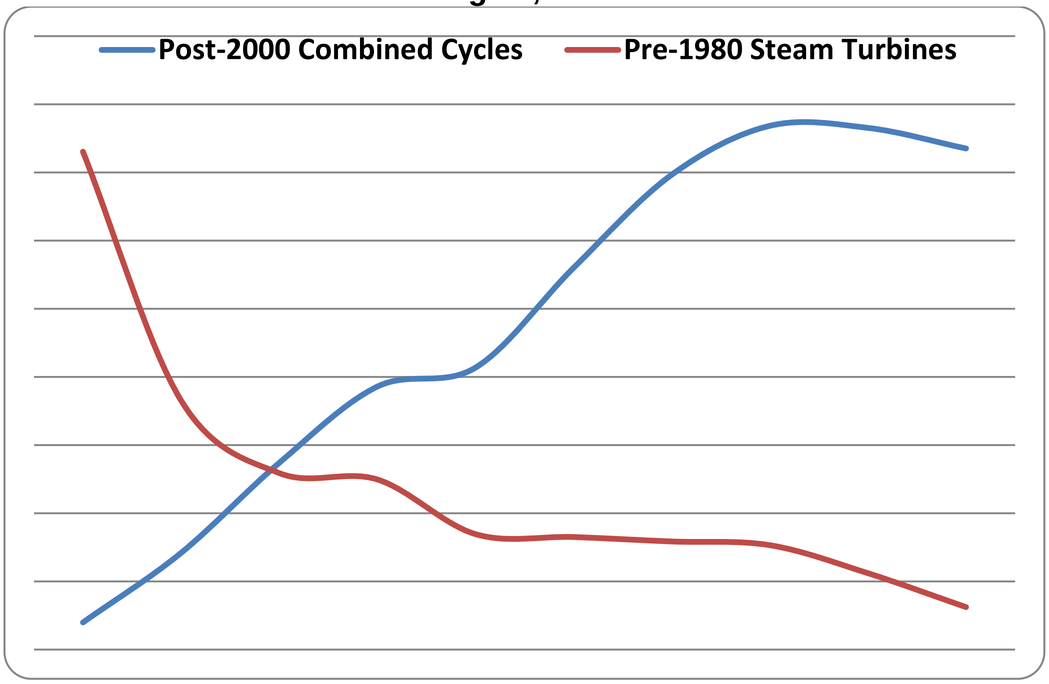
content. The development and operation of AEC would not lead to the displacement of energy from zero-carbon generation such as that of renewable, large hydro or nuclear facilities. These have zero (or, in the case of nuclear, very low) fuel costs and will still be dispatched before natural gas-fired generation.

[17] If a plant's variable O&M costs are so low as to offset the costs associated with its greater fuel combustion, a less efficient (higher GHG emission) plant may be dispatched first. There is no indication that AEC has unusually low variable O&M costs and would be dispatched before a more efficient facility. In addition, if a natural gas-fired plant's per-mmBtu fuel costs are very low, it may be less efficient (higher GHG emitting) but still be dispatched first. Natural gas costs in California, however, are higher than elsewhere in the WECC; thus this scenario is very unlikely to occur.

[18] The remaining 30 percent of natural-gas-fired generation is largely cogeneration; slightly more than one percent is from peaking units. For a detailed discussion of the evolution of natural gas-fired generation in California since 2000, see *Thermal Efficiency of Gas-Fired Generation in California: 2012 Update* (CEC-200-2013-002; May 2013)

operation have seen a dramatic reduction in their capacity factors[19] and primarily as a source of dispatchable capacity, used only during highest-demand hours and when needed to reliably operate the system.

Greenhouse Gas Figure 1
Annual California Output (GWh), Selected Natural Gas-Fired Generation Technologies, 2001 – 2010



Source: Generator Quarterly Fuel and Report Filings with the Energy Commission

The relationship between a natural gas-fired plant's heat rate and its dispatch in the real world is in fact more complicated than that described above. While natural gas-fired plants differ in their thermal efficiency – the amount of fuel combusted, and thus GHG emissions per unit of electricity generated –natural gas plants *that are very efficient when run at maximum output* are not necessarily dispatched before less efficient ones. While this would seem to contradict the assertion that output from a new plant will always displace a higher emitting one, a plant that is less efficient (in other words, has a higher heat rate) may actually combust less fuel during a duty cycle than a plant with a lower heat rate, and thus produce fewer GHG emissions. Consider a 30-MW peaking plant with a heat rate of 10,000 Btu/kWh when operated at full output that can be turned on quickly, generating approximately 15 to 30 MW in a matter of minutes. Use of this plant to meet contingency needs (e.g., demand on a hot afternoon) may result in less incremental fuel combustion than a 100 MW plant with a lower heat rate at full output if the latter requires several hours and combusts large amounts of fuel to start up, must

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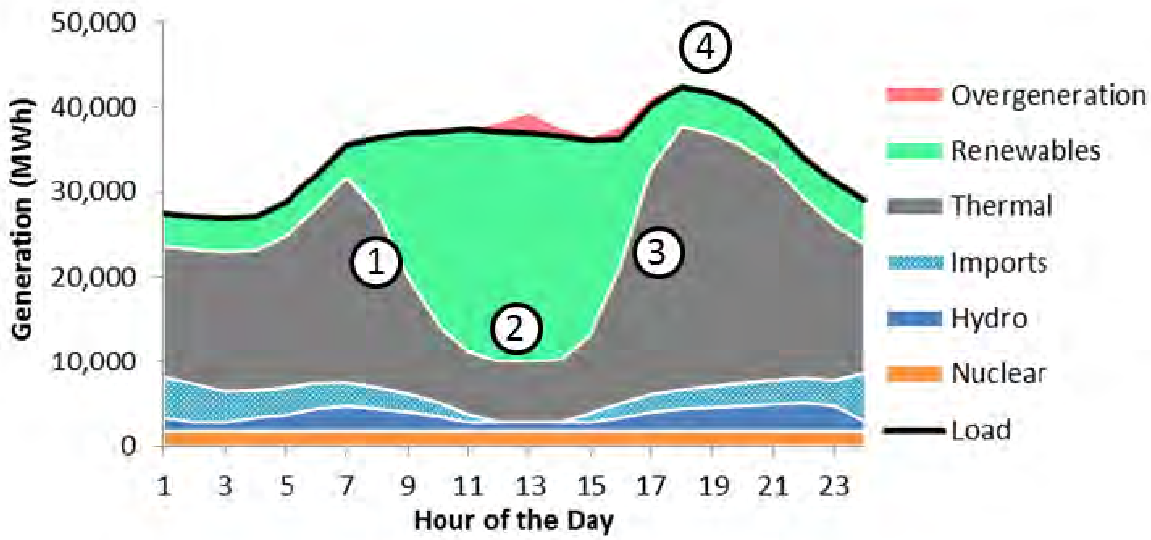
[19] A unit's capacity factor is its output expressed as a share of potential output, the amount it would generate if it were operated continuously at 100 percent of its maximum capacity for every hour of the year.

be kept on overnight or for several hours in order to be available later the same day or the next day, and/or cannot operate at 30 MW without a marked degradation in thermal efficiency (and thus increases in GHG emissions). As a result, a resource such as AEC, which has sacrificed some degree of thermal efficiency at full load in order to provide additional flexibility (multiple starts and shutdowns, faster starts and ramp rates,[20] lower minimum operating levels) may produce fewer GHG gas emissions in providing the same services as a gas-fired alternative with a lower full-load heat rate.

At higher levels of renewable energy penetration, such as that necessary to meet California's 2030 renewable portfolio standard of 50 percent, relatively efficient fast-start, fast-ramping resources such as AEC further contribute to GHG emission reductions by increasing the amount of renewable energy that can be integrated into the electricity system. This can be seen in **Greenhouse Gas Figure 2,** which depicts the estimated operating profile of the generating resources of the high-solar electricity system that California will increasingly have over the next 15 years and beyond. Much of the additional renewable energy will come from solar resources even if there is limited development of utility-scale solar generation, as the residential and commercial sectors take advantage of falling distributed solar costs and new residential construction post-2020 is required to be zero-net energy, i.e., include solar panels.

[20] A generator's ramp rate indicates how quickly (MW/minute) it can change output levels.

Greenhouse Gas Figure 2
California Generation Typical for a Non-Summer Day ("Duck" Chart)



The large "belly" (Number 2 in the figure) represents solar generation on a typical non-summer day; this gets larger over time as more solar is added to the system. The gray area represents necessary thermal generation, which is increasing natural gas over time as California portfolios are divested of coal pursuant to the state's Emissions Performance Standard. Note that imports are reduced to zero at mid-day, and hydro generation is limited to run-of-river (from hydro-generation facilities that do not have water storage, and from water that must be allowed to flow due to recreational needs, flood control, habitat preservation, etc.). A share of mid-day generation must also be thermal/natural gas as a threshold amount of thermal capacity needs to be idling at mid-day at minimum output to (a) protect against sudden component failures (major power plants and transmission lines); and (b) in order to be generating 4-8 hours later when solar energy is unavailable.

Greenhouse Gas Figure 2 illustrates a case of over-generation (the orange section above the load curve), in which renewable output at mid-day and necessary gas-fired generation jointly result in too much energy being produced. There are several ways to deal with over-generation. In theory, the surplus energy can be exported to neighboring states. But much of the over-generation expected in California will occur during the low-demand months of February - April, when similar surpluses exist In the Pacific Northwest due to the snow-melt and the resulting increase in hydroelectric generation in the Columbia River basin. Under these conditions, export potential is likely to be limited and export prices would be near zero. The long-term solution for over-generation is expected to be the development of cost-effective multi-hour storage, allowing the surplus to be stored until it can be used in evening hours. In the interim, however, over-generation can only be dealt with by curtailing renewable generation or reducing the amount of gas-fired generation that is needed during mid-day and early afternoon hours. The latter is facilitated by developing gas-fired resources capable of starting up quickly and/or operating at lower minimum load levels.[21] While AEC is less thermally efficient than the natural gas-fired combined cycles built in California during the past decade, AEC is capable of operating at lower levels of output, and doing so without a marked decrease in efficiency. Moreover, it can be off line until shortly before being needed in the late afternoon and early evening, As a result, it can allow for more renewable generation than a conventional combined cycle, with the concomitant reduction in GHG emissions serving to offset the impact of its lower efficiency at full output.

AVENAL PRECEDENT DECISION

The Energy Commission established a precedent decision in the Final Commission Decision for the Avenal Energy Project (CEC 2009b), finding as a conclusion of law that any new natural gas-fired power plant certified by the Energy Commission "must:

- not increase the overall system heat rate for natural gas plants;
- not interfere with generation from existing renewables or with the integration of new renewable generation; and
- take into account the two preceding factors, reduce system-wide GHG emissions".[22]

The average heat rate for the Western Electricity Coordinating Council (WECC) is presented in **Greenhouse Gas Table 4**.

Greenhouse Gas Table 4
Weighted Average Heat Rate for Operating Natural Gas-Fired Plants[1] in the WECC 2010-2012

Year	Average Heat Rate (mmBtu/kWh)
2010	7,784
2011	7,995
2012	7,918

[1] Excludes cogeneration facilities
Source: Ventyx, Velocity Suite (compiled from EPA hourly Continuous Emission Monitoring Survey data

While the exact heat rate of AEC will depend upon how it is dispatched, its operation will result in a reduction in the system heat rate for natural gas plants in the WECC due to its displacing energy from less-efficient natural gas-fired generation as discussed above. In those instances where AEC is higher emitting on a per-MWh basis than the resources it displaces but does so because it can operate at lower output levels and thus allow for more renewable integration and generation, the result might be a higher system heat rate, but total gas-fired generation and GHG emissions will fall.

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[21] For a detailed discussion of the operational needs for a high-solar portfolio, see Energy and Environmental Economics, *Investigating a Higher Renewables Standard in California*, January 2014, available at http://www.ethree.com/public_projects/renewables_portfolio_standard.php.

[22] Final Commission Decision, Avenal Energy Application for Certification (08-AFC-1) December 2009, p. 114.

As noted above, the addition of AEC would not interfere with generation from existing renewable facilities or with the integration of new renewable generation. The flexible nature of AEC would in fact serve to facilitate the integration of additional variable renewable resources.

AEC would reduce system-wide GHG emissions as discussed above; its development is consistent the goals and policies of AB 32 and thus are consistent with the Avenal precedent decision.

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ACRONYMS

AB	Assembly Bill
ARB	California Air Resources Board
CAA	Clean Air Act
CalEPA	California Environmental Protection Agency
California ISO	California Independent System Operator
CCCC	California Climate Change Center
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CH_4	Methane
CO_2	Carbon Dioxide
CO_2E	Carbon Dioxide Equivalent
CPUC	California Public Utilities Commission
EIR	Environmental Impact Report
EPS	Emission Performance Standard
GCC	Global Climate Change
GHG	Greenhouse Gas
GWh	Gigawatt-hour
GWP	Global Warming Potential
HBEP	Huntington Beach Energy Project
HFC	Hydrofluorocarbons
HSC	Health and Safety Code
IEPR	Integrated Energy Policy Report
IPCC	Intergovernmental Panel on Climate Change
LCA	Local Capacity Area
LTPP	Long-term Procurement Planning
MT	Metric tones
$MTCO_2E$	Metric Tons of CO_2-Equivalent
MW	Megawatts
MWh	Megawatt-hour
N_2O	Nitrous Oxide
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
NOx	Oxides of Nitrogen or Nitrogen Oxides

NSPS	New Source Performance Standard
OTC	Once-Through Cooling
PFC	Perfluorocarbons
PSA	Preliminary Staff Assessment
PSD	Prevention of Significant Deterioration
RPS	Renewables Portfolio Standard
SB	Senate Bill
SF_6	Sulfur hexafluoride
SWRCB	State Water Resource Control Board
U.S. EPA	United States Environmental Protection Agency
WCI	Western Climate Initiative

ALTERNATIVES

Steven Kerr and David Vidaver

INTRODUCTION AND SUMMARY OF CONCLUSIONS

As required by the California Environmental Quality Act (CEQA), this section evaluates a reasonable range of alternatives to the proposed Alamitos Energy Center (AEC or proposed project) that would feasibly attain most of the basic objectives of the project and would avoid or substantially lessen any of the significant effects of the project. CEQA establishes the framework and guiding principles for selection and evaluation of project alternatives, and the alternatives evaluation process applied by staff is consistent with the CEQA Guidelines (Cal. Code Regs., tit. 14, §15000 et seq.). The following subsections describe these guidelines in more detail.

Staff has reviewed the alternatives analysis provided by the project applicant in the AEC Supplemental Application for Certification (SAFC). The applicant acknowledges that the alternatives considered in the SAFC were either infeasible, unable to reduce or avoid any adverse environmental impacts, or would not attain most of the basic objectives of the project (AES 2015). Staff concurs with the applicant's assessment of their alternatives. And although the information provided in the SAFC served as a starting point for this alternatives evaluation, the alternatives evaluated within this section of the Preliminary Staff Assessment (PSA) are those recommended and developed by staff.

The alternatives considered by staff include one off-site alternative and the no-project alternative. The No-Project Alternative presented here evaluated a no-build scenario at the project site. Subsequently, the off-site alternative was eliminated from further consideration, while the no-project alternative was carried forward for further evaluation. Staff has not identified a feasible alternative that would be environmentally superior to the proposed AEC.

CEQA REQUIREMENTS

As the CEQA lead agency for the AEC, the Energy Commission is required to consider and discuss alternatives to the proposed project. The principles for the selection of alternatives for analysis are provided by the CEQA Guidelines (Cal. Code Regs., tit. 14, §15000 et seq.). According to section 15126.6 of the CEQA Guidelines, the alternatives analysis must:

- describe 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;
- consider alternatives that would avoid or substantially lessen any significant environmental impacts of the project, including alternatives that would be more costly or would otherwise impede the project's objectives; and
- evaluate the comparative merits of the alternatives.

The lead agency is responsible for selecting a reasonable range of project alternatives for examination and must publicly disclose its reasoning for selecting those alternatives. CEQA does not require an agency to "consider every conceivable alternative to a project." Rather, CEQA requires consideration of a "reasonable range of potentially feasible alternatives" (Cal. Code Regs., tit. 14, §15126.6, subd. (a)). The reasonable range of alternatives must be selected and discussed in a manner that fosters meaningful public participation and informed decision making (Cal. Code Regs., tit. 14, §15126.6, subd. (f)). That is, the range of alternatives presented in this analysis is limited to ones that will inform a reasoned choice by the Energy Commissioners. Under the "rule of reason," an agency need not consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative (Cal. Code Regs., tit. 14, §15126.6, subd. (f)(3)).

The CEQA lead agency is also required to:

- evaluate a ''no-project' alternative;
- identify alternatives that were initially considered but then rejected from further evaluation; and
- identify an environmentally superior alternative among the other alternatives if the environmentally superior alternative is the "no-project" alternative (Cal. Code Regs., tit. 14, §15126.6).

ENERGY COMMISSION STAFF'S ALTERNATIVES SCREENING PROCESS

The CEQA Guidelines describe selection of a reasonable range of alternatives and the requirement to include those that could feasibly accomplish most of the basic project objectives while avoiding or substantially lessening one or more of the significant effects. The CEQA Guidelines require the alternatives analysis to briefly describe the rationale for selecting alternatives to be discussed. In addition, the analysis should identify any alternatives that were considered by the lead agency but were rejected as infeasible and briefly explain the reasons underlying the lead agency's determination (Cal. Code Regs., tit. 14, § 15126.6, subd. (c)).

Alternatives may be eliminated from detailed consideration by the lead agency if they fail to meet most of the basic project objectives, are infeasible, or could not avoid any significant environmental effects (Cal. Code Regs., tit. 14, §15126.6, subd. (c)). According to the CEQA Guidelines, the factors that may be considered when addressing the feasibility of alternatives are site suitability, economic viability, availability of infrastructure, general plan consistency, other plans or regulatory limitations, jurisdictional boundaries, and whether the proponent can reasonably acquire, control or otherwise have access to the alternative site (or the site is already owned by the proponent). No one of these factors establishes a fixed limit on the scope of reasonable alternatives (Cal. Code Regs., tit. 14, § 15126.6, subd. (f)(1)).

Pursuant to CEQA, the purpose of staff's alternatives analysis is to focus on alternatives to the project or its location that are capable of avoiding or substantially lessening any of significant effects of the project.

Staff used the following process in preparation for this alternatives analysis:

- identify the objectives of the project, as defined by the applicant;
- identify any potential significant environmental impacts of the project;
- identify and evaluate alternatives to the project that may reduce or avoid environmental impacts;
- Evaluate a "no-project" alternative to compare the impacts of approving the proposed project with the impacts of not approving the proposed project.

PROJECT OBJECTIVES

The applicant's SAFC identifies the project's primary objective to design a project that provides local area capacity at the existing Alamitos Generating Station (AGS) site (AES 2015).

In addition to the primary objective, these are the basic project objectives:

- Develop a project capable of providing energy, generating capacity, and ancillary electrical services (voltage support, spinning reserve, inertia) to satisfy Los Angeles Basin Local Reliability Area requirements and transmission grid support, particularly in the western subarea of the Los Angeles Basin.
- Provide fast starting and stopping, flexible, controllable generation with the ability to ramp up and down through a wide range of electrical output to allow the efficient integration of renewable energy sources into the electrical grid, and replace older, once-through cooled (OTC) and less efficient generation.
- Develop on a brownfield power plant site and use existing infrastructure, including the existing switchyard and related facilities, the Southern California Edison (SCE) switchyard and transmission facilities, the Southern California Gas Company (SoCalGas) natural gas pipeline system, the Long Beach Water Department (LBWD) water connections, process water supply lines, and existing fire suppression and emergency service facilities.
- Use qualifying technology under the South Coast Air Quality Management District's (SCAQMD) Rule 1304(a)(2) exemption that allows for the replacement of older, less-efficient electric utility steam boilers with specific new generation technologies on a megawatt-to-megawatt basis (that is, the replacement megawatts are equal or less than the megawatts from the electric utility steam boilers).

Staff's alternatives analysis broadly interprets the applicant's project objectives to foster a complete and robust discussion of potential alternatives to the applicant's proposed project.

The California Independent System Operator (CAISO) has identified the importance of new power generation facilities in their Los Angeles Basin Local Reliability Area to replace the OTC plants that are expected to retire as a result of the State Water Resources Control Board's (SWRCB) *Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling* (referred to here as OTC Policy), which was adopted in 2010. The project objectives are consistent with OTC Policy. They are also consistent with the use of the offset exemption contained in SCAQMD Rule 1304(a)(2), which allows for the replacement of older, less efficient, electric utility steam boilers with specific new generation technologies on a megawatt-to-megawatt basis.

The applicant's first two objectives address providing generating capacity and controllable, fast-ramping generation to support integration of renewable energy sources into the electrical grid. As discussed below under "Preferred Resources," the California Public Utilities Commission (CPUC) issues decisions authorizing procurement by the state's investor-owned utilities (IOUs) based on the need for new resources. In the two most recent CPUC decisions in the Long-term Procurement Planning (LTPP) proceeding, levels of procurement are specified for preferred resources, energy storage, and gas-fired generation; these procurement authorizations are intended to ensure local reliability following the potential retirement of OTC generation facilities in the Southern California portion of the CAISO balancing authority area and permanent closure of the San Onofre Nuclear Generating Station (SONGS). (Future CPUC decisions will adjust the procurement levels according to changes in need and in response to the IOUs' progress developing preferred resources.)

Preferred resources cannot fully substitute for generating capacity in providing reliability services, the closest to an exception being event-triggered demand response. However, staff has not perfunctorily eliminated preferred resources from the alternatives analysis due to that limitation. Rather, staff fully discusses preferred resources and assesses the characteristics that determine and limit their ability to attain the basic project objectives. The preferred resources analysis is important to include given that the proposed project's generating capacity is not the only way to meet local capacity needs. The SCAQMD Rule 1304(a)(2) exemption allows for replacement of electric utility steam boilers with new gas-fired technologies and equipment and with renewable energy sources and equipment.

PREFERRED RESOURCES

California is rapidly and fundamentally changing its electricity supply system. These changes are driven in large part by the state's programs addressing global climate change and the policy imperative of reducing greenhouse gas (GHG) emissions. California's transition to a low-carbon economy requires dramatically reducing GHG emissions from the electricity sector, in turn allowing other economic sectors (e.g., transportation, industry) to transition from fossil fuels to electricity as a primary fuel source. The state's Renewable Portfolio Standard (RPS) requires that providers of retail electricity procure a minimum share of energy (measured as a percentage of retail sales) from renewable sources. The RPS was established in 2002 under Senate Bill

(SB) 1078 and accelerated in 2006 under SB 107. SB 2 (2011) expanded RPS to require all electricity retailers in the state to increase procurement from eligible renewable energy resources to 33 percent of total procurement by the end of 2020. SB 350 (2015) increased the RPS target to 50 percent by 2030. It is estimated that an amount equal to 25 percent of retail sales was procured by California load-serving entities from renewable sources in 2014.

State energy policies includes a *loading order* for electric generation that prefers and maximizes cost-effective, reliable, and feasible energy efficiency, demand response programs and measures, and renewable generation to supplant the need for new fossil fuel-fired generation. Consistent with state law, the CPUC has held that all utility procurement must be consistent with this loading order (Pub. Utilities Code, § 454.5, subd. (b)(9)(C)).

At the same time, state policies and other factors have dramatically increased the near-term need for new resources with which to reliably meet—or reduce—the state's demand for reliably delivered electricity. The state's policy objective to phase out OTC power plants is forcing the rapid retirement of a substantial amount of dispatchable generation in coastal areas and its replacement with new generation, transmission, and demand-side resources to preserve system reliability. In addition, concerns about nuclear safety led to the permanent closure of a large nuclear baseload facility in 2012 that was a critical source of Southern California electricity generation.

All of these factors are considered by the state's energy agencies when determining the need for new, natural gas-fired electric generation capacity (NGFG) over the 10-year horizon for which the state energy agencies undertake procurement planning. The Energy Commission considers them in developing its 10-year electricity demand forecast. The CAISO considers them as part of its efforts to maintain electric system reliability. In tandem with CAISO planning, the CPUC conducts its biennial LTPP proceeding, in which it determines how much new natural gas-fired generation is required and should be financed by the state's IOUs. In estimating the need for new "least-cost best-fit" generation capacity or specifically for new NGFG over the 10-year planning horizon, the CPUC first assumes the timely development of all cost-effective preferred resources.

RELIABLE OPERATION OF THE ELECTRICITY SYSTEM

State law emphasizes the importance of maintaining the reliability of the electric grid, including sections of the Public Utilities Code addressing the importance of maintaining reliable electric services to the state's citizens and businesses (Pub. Utilities Code, §§ 330, subds. (g) and (h), 334, 345.5, subd. (b), and 362, subd. (a)).

In May 2010, the SWRCB adopted the statewide OTC Policy. The OTC Policy established compliance dates for existing power plant operators to implement measures to greatly reduce impingement mortality and entrainment of marine life. Compliance with the OTC Policy is expected to lead to the retirement of a large amount of OTC capacity in transmission-constrained areas of Southern California. As a result, the CPUC devoted a share of its 2012 LTPP proceeding (Rulemaking 12-03-014) to the potential need for new NGFG to meet local reliability requirements in the CAISO-defined Los Angeles Basin (LA Basin), San Diego, and Big Creek/Ventura areas. Such generation, if necessary, would be required to meet reliability standards imposed by the North American Electric Reliability Council and the Western Electricity Coordinating Council, which are based on load circumstances that are projected to occur once in 10 years and the assumption that two major component failures (generator, transmission line) occur in a transmission-constrained area nearly simultaneously.

In February 2013, as part of its 2012 LTPP proceeding, the CPUC issued a decision (D.13-02-015, referred to as the Track 1 decision) authorizing procurement to meet the local capacity requirement (LCR) in the West LA subarea of the LA Basin local reliability area (West LA Basin). The authorization for new capacity was done to maintain reliability after the expected retirement of generating units at Alamitos, Huntington Beach, and Redondo Beach, totaling 3,818 MWs of capacity. The State Water Board set December 31, 2020, as the compliance date for these three generators. SCE was authorized to procure between 1,400 and 1,800 MWs of electrical capacity to meet the West LA Basin LCR by 2021 (CPUC 2013a). At least 1,000 MWs and up to 1,200 MWs of total capacity must be procured from natural gas-fired resources.

In establishing a level of development for natural gas-fired generation, the CPUC found that such generation is needed to provide reliability services (regulation, spinning reserves, load following, frequency response, and voltage support). The remaining capacity was to come from preferred resources (energy efficiency, demand response, renewable generation, and energy storage). The CPUC concluded that relying on the timely development of additional preferred resources would be imprudent and could threaten system reliability. Issuance of D.13-02-015 occurred before the permanent retirement of SONGS)

In March 2014, the CPUC issued its Track 4 decision in the 2012 LTPP proceeding (D.14-03-004) authorizing SCE and San Diego Gas & Electric (SDG&E) to procure generating capacity from a combination of preferred resources and gas-fired resources to meet local capacity needs stemming from the permanent retirement of SONGS. In combining the Track 1 and Track 4 procurement, SCE is authorized to procure between 1,900 and 2,500 MWs in the West LA Basin (CPUC 2014a). The Track 4 decision increased SCE’s maximum allowable NGFG from 1,200 to 1,500 MWs, providing SCE greater flexibility to meet reliability needs. Consistent with the loading order, SCE is required to procure at least 550 MWs from preferred resources. SCE is required to procure at least 50 MWs from energy storage. Subject to the overall cap of 2,500 MWs for SCE, any additional local capacity beyond these amounts may only be procured through preferred resources.

To satisfy authorized procurement under the Track 1 and Track 4 decisions, SCE issued a Request for Offers (RFO) seeking new LCR resources in the West LA Basin, including preferred resources, energy storage, and NGFG. SCE entered into contracts with AES to meet a share of the West LA Basin LCR, including a contract for new NGFG generation at the Alamitos site. On November 21, 2014, SCE submitted an application (A.14-11-012) to the CPUC seeking approval of all contracts entered into as a result of the LCR RFO for the West LA Basin, including cost recovery for those contracts. On November 24, 2015, the CPUC issued its decision approving most of the contracts, including two separate contracts with AES for new combined-cycle gas turbines at the Alamitos and Huntington Beach sites (D.15-11-041) (CPUC 2015).

PREFERRED RESOURCES AS SUBSTITUTES FOR DISPATCHABLE NATURAL GAS-FIRED GENERATION

The state's loading order established by the energy agencies in 2003 calls for meeting new electricity needs first with efficiency and demand response (jointly, demand-side management), followed by renewable energy and distributed generation, and only then with efficient, utility-scale natural gas-fired generation. Section 454.5 (b)(9)(C) of the California Public Utilities Code addresses requirements for an electrical corporation's proposed procurement plan, including the requirement to "first meet its unmet resource needs through all available energy efficiency and demand reduction resources that are cost effective, reliable, and feasible." In recent years, energy storage has achieved preferred resource status due to its ability to a) absorb over-generation that may occur at high levels of solar penetration, and b) obviate the need for natural gas-fired generation and associated capacity to meet ramping needs during evening hours when solar resource output declines to zero.

Preferred resources can provide many of the services provided by dispatchable, natural gas-fired generation. However, where preferred resources cannot ensure reliability, because they lack necessary operating characteristics or are not available in sufficient quantities, the CPUC has found that the procurement of clean, efficient natural gas-fired generation is necessary and is consistent with the state's loading order.

The ability of individual resources (energy efficiency, demand response, utility-scale and distributed renewable generation, and storage) to provide specific services is discussed below.

Energy Efficiency

Energy efficiency entails using less energy to provide the same service such as by improving the efficiency of air conditioners or the insulation characteristics of building shells, thereby using less energy to keep the temperature of a building at desired levels. Continued development and implementation of comprehensive, long-term energy efficiency strategies and programs remains the top priority to offset increased energy demand. The CPUC oversees the IOU energy efficiency programs, and many of the state's municipal utilities administer similar programs. These efforts are funded by ratepayers and include a wide variety of initiatives aiming to move energy-efficient equipment and effective energy management practices into the marketplace at increasing scale. The CPUC issues decisions approving the electric energy efficiency budgets for the state's IOUs. For 2013–2015, the approved electricity energy efficiency budgets for the state's three major IOUs total $2.388B (D.12-11-015 and D.14-10-046) (CPUC 2012, 2014b).

SB 350 (2015) reflects California's commitments to energy efficiency in its efforts to transition to a low-carbon economy. The bill requires the Energy Commission to establish annual targets for statewide energy efficiency savings and demand reduction that will achieve a cumulative doubling of statewide energy efficiency savings by January 1, 2030, and requires the CPUC (for the IOUs) and local publicly owned utilities to establish efficiency targets consistent with this goal.

Energy efficiency programs can serve as substitutes for dispatchable, natural gas-fired generation such as the AEC and partially meet the project objectives by: 1) reducing the amount of electricity that needs to be generated when targeted at consumption during high-demand hours and when flexible generation is needed most, and 2) reducing the need for natural gas-fired generation capacity, as well as the need for load-serving entities to procure such capacity to satisfy CAISO- and CPUC-imposed system-wide resource adequacy requirements. In targeting consumption in the West LA Basin, energy efficiency programs can reduce the need for conventional generation in the area and the need to procure such capacity to satisfy resource adequacy requirements for local, flexible resources. Energy efficiency programs are thus capable of reducing the need for energy and capacity-related reliability services that conventional natural gas-fired generation such as the AEC would provide.

Demand Response

Demand response (DR) programs provide an economic incentive for end users to modify energy use, whether through direct payments to reduce consumption when requested to do so (i.e., event-triggered DR programs) or rate structures that encourage reducing energy use during hours in which generation is expensive and/or system reliability is threatened. On September 25, 2013, the CPUC authorized a new rulemaking (R.13-09-011), in part, to facilitate the participation of aggregated loads in ancillary service markets, allowing them to directly compete with generation resources in providing reliability services and to satisfy resource adequacy requirements imposed on load-serving entities in exchange for a stream of revenue.

DR continues to play an important role in meeting California's capacity planning, including requirements for peak summer demand. These programs are operated by the state utilities; DR programs operated by the IOUs meet roughly 5 percent of total CAISO-system resource adequacy capacity requirements (CAISO 2015a). DR has attributes that can partially meet some of the AEC's project objectives by: 1) contributing to or reducing the need for capacity-related reliability services, including an array of ancillary services (regulation and spinning reserves), and 2) reducing the need for flexible generation if called upon during hours in which ramping needs are highest. When such programs reduce loads in the West LA Basin, they reduce local capacity requirements. DR programs can facilitate the integration of renewable resources by meeting incremental needs for regulation and reserves and reducing ramping needs. Unlike gas-fired generation, DR can absorb load during periods of renewable over-generation (a condition that occurs when total supply exceeds total demand in the CAISO balancing authority area).

Utility Scale and Distributed Renewable Generation

In 2010, Governor Brown's Clean Energy Jobs Plan established a target of 12,000 MWs of renewable distributed generation (DG) by 2020. As of October 31, 2015, 7,200 MW of renewable DG was operational, contracts with another 900 MWs had been approved, and 2,200 MWs of capacity was anticipated from various incentive programs (the Renewable Auction Mechanism, Renewable Feed-in Tariff, Bioenergy Feed-in Tariff, and utility photovoltaic programs) (Energy Commission 2015).

Utility-scale and distributed renewable generation can substitute for natural gas-fired generation as sources of energy. To the extent that they can be relied on to produce energy during periods of peak or high demand, they are also substitute sources of capacity, thereby reducing the need to build and operate gas-fired generation. When located in transmission-constrained areas such as the West LA Basin, they can provide local capacity, reducing the need to build and operate local natural gas-fired generation, such as the AEC.

Energy Storage

As California increasingly relies on wind and solar resources to meet its energy needs and environmental goals, other energy resources are increasingly called upon to "balance the system." Expected changes in wind and solar output over the course of a day and random swings due to changing weather conditions require construction and operation of more flexible, dispatchable natural gas-fired generation to compensate for the variations in wind and solar output[1].

Mature, utility-scale technologies include pumped hydroelectric and compressed air storage. Several pumped hydroelectric facilities have been operating in California for decades. The 1,212-MW Helms facility has been operated by the Pacific Gas and Electric Company since 1984.

California's energy agencies recognize the key role that storage will play in integrating wind and solar resources in a "high variable energy" system in setting an ambitious target for the procurement of energy storage capacity for 2020. On October 17, 2013, the CPUC established a target of 1,325 MWs for energy storage development, apportioning it to the transmission and distribution systems and the customer side of the meter (D.13-10-040).

Energy storage cannot replace generation as a source of energy because it requires injections of energy in excess of the amounts that are discharged when the stored energy is needed. However, energy storage can replace generation capacity by being charged during non-peak hours and discharged on peak, in lieu of dispatching natural

[1] In some systems (in the Pacific Northwest, for example), there is sufficient dispatchable hydroelectric energy to balance a wind- and solar-intensive generation fleet. The scale of wind and solar development in California, however, is such that energy storage is expected to absorb surplus generation during midday hours, as well as use energy generated during the day to reduce the need for energy and capacity from natural gas-fired generation resources during evening hours.

gas-fired generation. If located in a transmission-constrained area, storage can replace generation capacity needed for local reliability.

CONCLUSIONS FOR PREFERRED RESOURCES

In D.13-02-015, the CPUC found that at least 1,000 MWs of dispatchable, natural-gas fired generation resources are needed in the West LA Basin for local reliability (CPUC 2013a):

> *The record shows that the most certain technology which can meet LCR needs (from the ISO's perspective) is gas-fired generation. In order to ensure a base level of procurement certain to ensure reliability under the most stringent criteria, we will require that at least 1000 MW in the LA basin local [reliability] area be from gas-fired generation*.

Selected preferred resources might meet the CAISO's criteria for contributing to local reliability. The CPUC found that this possibility should be considered by the CAISO and discussed in SCE's application to procure specific resources; the application was subsequently submitted to the CPUC in November 2014 (A.14-11-012). As stated in D.13-02-015 (CPUC 2013a):

> *The ISO finds that gas-fired generation meets its criteria [for the provision of local reliability services], as well as any other resources (or combination of resources) which have the same performance criteria as gas-fired generation. Demand response resources and [combined heat and power, also referred to as cogeneration] may meet the ISO's criteria, but not at this time. It is possible that other resources will pass the ISO test as well in the future. Of course, acquisition of more energy efficiency and demand side resources would reduce the LCR need.*
>
> *We will require SCE to consult with the ISO regarding ISO performance characteristics (such as ramp-up time) for local reliability. In its application to procure specific resources to meet local reliability needs (discussed herein), SCE shall provide documentation of such efforts and how SCE meets ISO performance requirements.*

A substantial share of the testimony and subsequent discussion in the 2012 LTPP proceeding was devoted to determining the appropriate assumptions for development of preferred resources in the West LA Basin over the planning horizon, which, in turn, largely determined the need for NGFG in the area. In its approval of SCE's contracts in D.15-11-041, given that approval of a procurement plan requires that it be consistent with the loading order for electric generation, the CPUC effectively found that preferred resources beyond those procured by SCE in response to its RFO cannot feasibly and reliably be counted on to cost-effectively meet local reliability needs.

ALTERNATIVES ELIMINATED FROM DETAILED CONSIDERATION

As discussed, the alternatives analysis should identify any alternatives that were considered by the lead agency but were rejected as infeasible. In addition, CEQA requires a brief explanation of the reasons underlying the lead agency's determination to eliminate alternatives from detailed analysis.

ALTERNATIVE SITES

Relationship of the Proposed AEC to the Project Site

The Warren-Alquist Act addresses aspects of an applicant's site selection criteria for thermal power plants and the use of an existing industrial site for such use when the project has a strong relationship to the existing industrial site. When this is the case, it is "reasonable not to analyze alternative sites for the project" (Pub. Resources Code, § 25540.6, subd. (b)). This subsection of the alternatives analysis addresses the project's strong relationship to the project site from a regulatory and practical standpoint, which provides part of the context for staff's analysis of alternatives to the proposed AEC.

Use of the Existing Project Site for Electrical Power Generation

The long-term historical use of the project site for electrical power generation is applicable to the discussion of the project's strong relationship to the site. The proposed AEC would be constructed and operated at the existing Alamitos Generating Station (AGS) site, which began operating in 1956, when it was owned by SCE. During the late 1990s, the electric industry was restructured and SCE sold most of its generating facilities. In 1998, AES Southland purchased the Alamitos, Huntington Beach, and Redondo Beach generating facilities from SCE.

The proposed project would use the site's existing infrastructure, including the existing fresh water supply, stormwater drainage system, wastewater system, natural gas supply line, and access to the adjacent SCE switchyard for connection to the transmission grid. The proposed AEC would include a new 1,000-foot-long process/sanitary wastewater pipeline to the first point of interconnection to the existing Long Beach Water Department sewer system to eliminate the current practice of treatment and discharge of process/sanitary wastewater to the San Gabriel River.

City of Long Beach Land Use and Zoning

As discussed in detail in the **Land Use** section of this staff assessment, the city of Long Beach General Plan Land Use designation for the project site is LUD No. 7 and the zoning district is Planned Development-1 Subarea (19) (PD-1(19)). The PD-1 Planned Development District was adopted as part of the city's Local Coastal Plan (LCP) and is also referred to as the Southeast Area Development Improvement Plan (SEADIP). The SEADIP District includes numerous subareas subsequently adopted by the city to identify specific land uses and provide development standards that guide any future development within the SEADIP. Subarea 19 allows for industrial uses and the city has ensured that the Subarea 19 is fully developed in accordance with the provisions of the

General Industrial (IG) zone. Land Use staff concluded that the project as proposed at the existing AGS site would be consistent with the development standards for the PD-1(19) zoning district, as well as other applicable provisions of the Municipal Code, and would be consistent with both the California Coastal Act and the Long Beach LCP. The project would have no adverse significant unmitigated impacts with the existing surrounding land uses in the following areas: **Air Quality, Hazardous Materials Management, Noise and Vibration, Public Health, Transmission Line Safety and Nuisance, Soil and Water Resources, and Traffic and Transportation**. Furthermore, with the implementation of Condition of Certification **VIS-3** the proposed project would not result in any physical land use incompatibilities to **Visual Resources**.

Expansion of Existing Coastal Power Plants

The California Coastal Act of 1976 (Coastal Act) protects coastal resources from the major impacts of power plant siting. In 1978, the California Coastal Commission (Coastal Commission) adopted a report that satisfied a requirement of the Coastal Act to designate specific locations in the state's Coastal Zone where the location of an electric generating facility would prevent the achievement of the objectives of the Coastal Act (Pub. Resources Code § 30413, subd. (b)). The 1978 report was revised in 1984 and re-adopted in 1985 (Coastal Commission, 1985). In accordance with the Coastal Act, the report designates sensitive resource areas along the California coast as unsuitable for power plant construction and provides "that specific locations that are presently used for such facilities and reasonable expansion thereof shall not be so designated." This policy encourages expansion of existing power plant sites if new plants are necessary, thereby protecting undeveloped coastal areas (Coastal Commission, 1985).

In a related effort, the Energy Commission prepared a 1980 study that examined opportunities for the reasonable expansion of existing power plants in the state's Coastal Zone and reviewed the effects of the designated resource areas on expansion opportunities (Energy Commission, 1980). The 1980 study defines "reasonable" in this context to mean the provision or maintenance of land area adequate to satisfy a specific site's share of the state's need for increased electrical power generating capacity over the Energy Commission's planning intervals of 12 and 20 years (Energy Commission, 1980). According to the 1980 study, the expansion areas should be inside or adjacent to the existing site boundaries, or within a distance that would permit the cost effective use of the existing power plant support facilities, where necessary or advisable. The study acknowledged that other conventional siting factors (e.g., local land use plans) could affect expansion opportunities. The Energy Commission study is not intended to be used to endorse specific sites or types and sizes of power plants for expansion.

The 1980 study describes expansion opportunities for various combinations of plant types and sizes at 20 of the 25 evaluated sites. The Alamitos power plant is generally characterized as having reasonable on-site expansion opportunities; off-site expansion opportunities at the power plant are considered "seriously constrained" by the lack of available land due to the encroachment of urban land uses (Energy Commission, 1980). The proposed AEC would replace the AGS and be constructed on the brownfield site of the existing AGS. No off-site expansion of power plant facilities is proposed.

Potential for the Proposed AEC to Contribute to Local Grid Capacity Requirements

The CAISO regularly evaluates grid reliability issues in its balancing authority area for the state. The CAISO develops and publishes its annual Transmission Plan, which includes a comprehensive evaluation of the CAISO transmission grid identifying the upgrades required to successfully meet California's energy policy goals, maintain grid reliability requirements, and provide economic benefits to ratepayers. The CAISO's transmission planning process involves collaboration with the CPUC, the Energy Commission, and other stakeholders. The most recent plan adopted by the CAISO Board of Governors, the 2015–2016 Transmission Plan, assesses challenges to grid reliability in Southern California due to the SONGS closure and the State Water Board's requirement to replace or retire OTC units. A total of approximately 9,290 MWs of generation in the region is affected (CAISO 2016).

AES power plants in the West LA Basin affected by the OTC Policy include the existing Alamitos Generating Station (approximately 2,000 MWs), the Huntington Beach Generating Station (approximately 450 MWs), and the Redondo Beach Generating Station (approximately 1,300 MWs). To comply with the OTC Policy, these generators must be retrofitted, repowered, or retired.

The CPUC's LTPP Track 1 decision (D.13-02-015) ordered SCE to procure 1,400 to 1,800 MWs of new local energy resources in the West LA Basin to meet long-term local capacity requirements by 2021. Of this total, at least 1,000 MWs but not more than 1,200 MWs must be from conventional gas-fired resources. The CPUC's LTPP Track 4 decision concerning the SCE service territory authorized procurement of additional resources and increased the upper limit for gas-fired generation to 1,500 MWs of local capacity (D.14-03-004) (CPUC 2014a). The proposed AEC would contribute to meeting local capacity requirements for NGFG, and in November 2015, the CPUC approved SCE's contract for 640 MWs of NGFG at the Alamitos site (D.15-11-041) (CPUC 2015).

San Onofre Nuclear Generating Station (SONGS)

With the permanent closure and decommissioning of SONGS, the site was considered due to its potential to contribute to meeting LCR in the West LA Basin and its relatively remote location; the area in the vicinity of SONGS is less developed and has a lower population density compared to the more urbanized area near the AEC site. The existing infrastructure at the SONGS site, including its transmission lines, switchyard, substation, water and sewage lines, and a natural gas pipeline, could be used for an AEC equivalent project. As an existing power generation facility equipped with the appropriate infrastructure and connected to the transmission grid serving southern California, the SONGS site satisfies most of the proposed project objectives as an alternative site location.

SONGS was a nuclear-powered thermal power plant located between the CAISO-defined LA Basin and San Diego areas. The SONGS site is situated on two separate areas of land that are leased from the U.S. Marine Corps Base Camp Pendleton (Camp Pendleton). The two areas are located on either side of Interstate 5 (I-5). The main portion of the facility is situated on 84 acres of land along the Pacific Ocean, west of I-5 and south of San Onofre State Beach. In this area, SCE operated Units 1, 2, and 3 until Unit 1 was shut down in 1992 (Tetra Tech 2008). The dismantlement of Unit 1 is essentially complete, and Units 2 and 3, each rated at 1,127 MW, for a facility total of 2,254 MW, ceased operations in 2013 (U.S. Nuclear Regulatory Commission 2014). SCE submitted a Post-Shutdown Decommissioning Activities Report to the U.S. Nuclear Regulatory Commission in 2014, providing their current plans to decommission the plant within 35 years (U.S. Nuclear Regulatory Commission 2015). The remaining portion is on approximately 130 acres of land east of I-5 and opposite the main portion of the facility. This area, referred to as the Mesa Complex, houses various administrative, maintenance, and support services for the facility. No power-generating activities occur at the Mesa Complex (Tetra Tech 2008). SONGS is principally owned by SCE. Other owners of SONGS include SDG&E and the city of Riverside. The city of Anaheim is a former owner of the facility and will share responsibility for decommissioning (SCE 2014).

According to the San Diego County General Plan Land Use Element, the lands owned by Camp Pendleton are within unincorporated San Diego County but outside the land use jurisdiction of the county, and therefore, the Land Use Element does not contain goals or policies that guide future development of those lands (San Diego County General Plan 2011). The future development of Camp Pendleton falls under the jurisdiction of the U.S. Marine Corps and the U.S. Department of Defense. Current real estate grants authorize SONGS to maintain a presence on Camp Pendleton until approximately 2024 (U.S. Marine Corps 2007).

In a letter dated April 11, 2014, the U.S. Marine Corps informed SDG&E that it intends to return the SONGS Mesa Complex site to the Marine Corps as a training site for the "critically needed maneuver corridor and mission-supporting infrastructure…" that the Mesa site provides. SDG&E had been working with the Marine Corps to help site a new substation and voltage stabilizing equipment associated with the closure of SONGS. In the letter, the U.S. Marine Corps advises SDG&E to locate the proposed equipment components on the SONGS power plant easement west of I-5 (U.S. Marine Corps 2014).

After considering the SONGS site (both the power plant and Mesa Complex areas), staff determined that the site would not provide a feasible alternative site location. The power plant portion of SONGS would not be available for approximately 35 years due to the lengthy decommissioning process. This presents a notable feasibility issue for development of new NGFG capacity at the site due to the significant delay in the project schedule. The Mesa Complex, because it contains no power generation facilities but is in close proximity to the power facility's infrastructure, would be the more feasible of the two areas for development of an AEC equivalent project. But considering that the U.S. Marine Corps owns the land occupied by the SONGS facility and has complete land use jurisdiction over the site, and that it has demonstrated its intention to use the Mesa area for training purposes for the foreseeable future, the applicant would not be able to reasonably acquire site access. Because the SONGS site is not a feasible alternative site location for the AEC, this alternative was eliminated from further consideration.

Alternative Site Summary

The proposed project has a strong relationship to the existing industrial site, which has a long history of generating electrical power; the infrastructure, including transmission lines, switchyard, natural gas pipeline, and fresh water lines, is in place, and a process/sanitary wastewater pipeline would be constructed to eliminate the discharge of wastewater to the San Gabriel River (which would be an improvement to the health of the river and the Pacific Ocean). In addition, the project site, which is owned by AES, is consistent with local land use policies, and development of the AEC would be in compliance with local plans and ordinances, including the city of Long Beach's general plan, local coastal program, the SEADIP Specific Plan, and standards for industrial development. Further, the applicant does not propose expanding the AEC outside the boundaries of the existing AGS brownfield site.

Beyond the SONGS site, the extent to which development of a different site could meet most of the project objectives is unknown, and it is questionable whether any alternative site location that is not currently provided with transmission lines and a switchyard would allow the project to contribute in a timely manner to satisfy the local capacity requirements identified by CAISO and supported by the CPUC. Development of the AEC at the project site would satisfy project objectives and help contribute to meeting local grid capacity requirements.

NO-PROJECT ALTERNATIVE

This analysis evaluates the "no-project" alternative to the AEC to fulfill the requirements of section15126.6, subdivision (e)(1) of the CEQA Guidelines. As mentioned above, under "Energy Commission Screening Process," the Energy Commission is required to consider a "no-project" alternative, the purpose of which is to compare the impacts of approving the proposed project with the impacts of not approving the proposed project. The "no-project" alternative is required to discuss the existing conditions at the time the environmental analysis is commenced, as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved. In this case, because the proposed project is a development project on identifiable property, the "no-project" alternative is the circumstance under which the proposed project does not proceed (Cal. Code Regs., tit. 14, §15126.6, subd. (e)(2)).

SCE built the AGS between 1955 and 1969. Unit 1 began commercial operation in 1956, Unit 2 in 1957, Unit 3 in 1961, Unit 4 in 1962, Units 4 and 5 in 1966, and Unit 7 in 1969. Unit 7 was decommissioned and removed in 2003. The facility was designed to be dual-source, powered by either oil or natural gas, and had four large fuel tanks to hold oil. In the 1970s, all dual source-fueled plants were required to convert to natural gas only. By the 1980s, the AGS was converted to natural gas only, and the fuel oil tanks were removed in 2010. AES Alamitos Energy acquired the AGS plant from SCE in 1998. (AES 2015, p. 5.3-16)

AGS Units 1-6 are currently in operation and if the AEC is licensed, would continue to provide electrical service concurrent with the construction of the AEC Power Block 1. Units 3, 4, 5, and 6 would likely operate until December 31, 2020, which is the final date for the AGS facility to comply with the OTC Policy. The city and project owner have entered into a Memorandum of Understanding (MOU) for the demolition of the existing units after the AEC is constructed and operating. Demolition of Units 1-6 would be conducted in accordance with the MOU once all necessary regulatory approvals to retire and decommission the existing units are received. (AES 2015, p.1-3)

The most reasonably expected "no project" alternative if the AEC is not licensed by the Energy Commission, would be for AGS Units 1-6 to continue operating until the end of 2020 and then cease operations. Units 1-6 would be decommissioned and left in place. There are no existing requirements to demolish Units 1-6.

Under the "no project" alternative, the construction and operational impacts from the proposed AEC would not occur. As determined by Energy Commission staff in this PSA, the construction and operation of the AEC is not likely to cause potentially significant adverse impacts with the incorporation of staff's recommended conditions of certification. Additionally, the existing visual condition of the AGS site and viewshed would remain visually degraded as the opportunity to implement enforceable measures to restore and enhance the visual quality at the project site in compliance with section 30251 of the California Coastal Act as part of the AEC project would be missed.

The "no-project" alternative would likely result in the construction and operation of another new, natural gas-fired generation unit or units in the Western sub-area of the Los Angeles Basin to serve the predicted demand for the service area and electric system, and would not make use of the existing AGS infrastructure. It is assumed that under the "no-project" alternative, the AGS would continue to operate under existing conditions until the end of 2020 and then cease operations. It is possible that a project similar to the AEC could be permitted and constructed elsewhere in the LA Basin area, although no specific site or project is identified; therefore, the potential impacts of such a project are unknown.

AGS Units 1-6 are older power generation facilities that the state is looking to replace with fast-start and dispatch flexibility capabilities to provide grid stability to accommodate increased renewable energy and provide back-up for planned and unplanned grid outages in response to excessive demands. Thus, the "no-project" alternative would also fail to meet most of the basic project objectives.

CONCLUSIONS

Staff has not identified a feasible alternative that would be environmentally superior to the proposed AEC. Staff considered a reasonable range of alternatives to the proposed project, including an alternative site location, "no-project" alternative, and provided a discussion on preferred resources as substitutes for dispatchable natural gas-fired generation. Each of these alternatives have been eliminated from detailed consideration do to a failure to meet most of the basic project objectives, infeasibility, inability to avoid significant environmental impacts, or any combination thereof. As determined by Energy Commission staff in this PSA, the construction and operation of the AEC is not likely to cause potentially significant adverse impacts with the incorporation of staff's recommended conditions of certification.

Staff concludes that:

- Energy efficiency, demand response, energy storage, and utility scale and distributed renewable generation are not viable or feasible alternatives to the AEC.
- Demand reduction, energy efficiency, and utility scale and distributed renewable generation are not capable of meeting project objectives, particularly the objectives that address providing grid stability to accommodate integration of renewable energy generation and removal of the existing once-through cooling process to comply with OTC Policy.
- The SONGS site, as an alternative site location, would meet most of the proposed project's objectives, and could potentially reduce or avoid environmental impacts at the AEC project site. In addition, as proposed, the AEC would comply with OTC Policy if constructed at the SONGS site; however, this alternative was eliminated from further consideration because the project owner would not be able to reasonably acquire the SONGS site from the U.S. Marine Corps.
- The facility owner has selected a mix of natural gas combined cycle and natural gas simple cycle components utilizing fast start and dispatch flexibility in order to support southern California grid load balancing and renewable energy integration (NRG 2013a, § 1.1). This configuration would provide an important element in the introduction of renewable energy sources by providing a bridge for power-loss intermittencies characteristic of wind turbines, solar photovoltaic, and solar thermal electric generation systems. Given the project objectives, location, and the commercial experience of the selected technologies, staff agrees with the facility owner that only natural gas-burning technologies are feasible for this project.
- AGS Units 1-6 are older power generation facilities that the state is looking to replace with fast-start and dispatch flexibility capabilities to provide grid stability to accommodate increased renewable energy and provide back-up for planned and unplanned grid outages in response to excessive demands. Thus, the "no-project" alternative (i.e., continued operation of Units 1-6 until the end of 2020) would fail to meet most of the basic project objectives.
- Coastal Commission policy encourages expansion of existing power plant sites if new plants are necessary, thereby protecting undeveloped coastal areas (Coastal Commission 1985).
- If all conditions of certification contained in the PSA are implemented, construction and operation of the AEC would not create any significant direct, indirect, or cumulative adverse environmental impacts.

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BIOLOGICAL RESOURCES

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SUMMARY OF CONCLUSIONS

Staff has completed review of the Alamitos Energy Center (AEC) relative to the biological landscape on the project site and surrounding area. Vegetation in the project area is limited to weedy species and landscaping, and there is no natural wildlife habitat on site. Rare plants and special-status wildlife are not expected to occur on the site; however, nearby marshes and other natural areas support special-status species including the Pacific green sea turtle (federally listed threatened), Belding's savannah sparrow (state listed endangered), western snowy plover (federally listed threatened), California least tern (federally and state listed endangered), and California brown pelican (state fully protected). The proposed offsite wastewater pipeline alignment and adjacent areas could support the southern tarplant (California Rare Plant Rank [CRPR] 1B.1).

Construction and operation of the proposed project would result in direct and indirect effects to biological resources near the site. Staff concludes that the project, with implementation of proposed conditions of certification, would comply with the laws, ordinances, regulations, and standards listed in **Biological Resources Table 1** and direct, indirect, and cumulative impacts would be avoided, minimized, or mitigated to less than significant levels (refer to **Biological Resources Table 4** in the subsection "Conclusions" below for a summary of the proposed project's impacts, applicable conditions of certification, and determination of significance).

INTRODUCTION

This section provides the California Energy Commission (Energy Commission) staff's analysis of potential impacts to biological resources from the construction, demolition, and operation of the proposed AEC.

This analysis addresses potential impacts to special-status species, wetlands, and other waters of the state and waters of the U.S. It includes a detailed description of the existing biotic environment, an analysis of potential impacts to biological resources and, where necessary, specifies mitigation measures (conditions of certification) to reduce impacts to less than significant. Additionally, this analysis assesses compliance with applicable laws, ordinances, regulations, and standards (LORS).

This analysis is based, in part, on information provided in the AEC Application for Certification (AFC) for an earlier proposed project configuration (AEC 2013a), Data Adequacy Supplement (AEC 2014a), responses to staff data requests (AEC 2014b), staff's observations during a site visit of the proposed AEC on March 25, 2014; the supplemental AFC for the proposed project as analyzed here (AEC 2015f), and ongoing communications with the California Department of Fish and Wildlife (CDFW), the National Oceanic and Atmospheric Administration (NOAA) Fisheries, and the U.S. Fish and Wildlife Service (USFWS).

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The applicant must comply with the LORS listed in **Biological Resources Table 1** during project construction, demolition, and operation.

Biological Resources Table 1
Laws, Ordinances, Regulations, and Standards

Applicable Law	Description
Federal	
Endangered Species Act (Title 16, United States Code, section 1531 et seq., and Title 50, Code of Federal Regulations, part 17.1 et seq.)	Designates and provides for protection of threatened and endangered plant and animal species, and their critical habitat. Take of federally listed species as defined in the Act is prohibited without incidental take authorization, which may be obtained through Section 7 consultation (between federal agencies) or Section 10 Habitat Conservation Plan. The administering agencies are the USFWS and NOAA (National Marine Fisheries Service).
Clean Water Act (Title 33, United States Code, sections 1251 through 1376, and Code of Federal Regulations, part 30, section 330.5(a)(26))	Requires the permitting and monitoring of all discharges to surface water bodies. Section 404 requires a permit from the U.S. Army Corps of Engineers (USACE) for a discharge of dredged or fill materials into Waters of the U.S., including wetlands. Section 401 requires a permit from a regional water quality control board (RWQCB) for the discharge of pollutants.
Migratory Bird Treaty (Title 16, United States Code, sections 703 through 711)	Makes it unlawful to take or possess any migratory nongame bird (or any part of such migratory nongame bird including nests with viable eggs). The administering agency is the USFWS.
State	
California Endangered Species Act of 1984 (Fish and Game Code, sections 2050 through 2098)	Protects California's rare, threatened, and endangered species. The administering agency is CDFW.

Applicable Law	Description
California Code of Regulations (Title 14, sections 670.2 and 670.5)	Lists the plants and animals of California that are declared rare, threatened, or endangered. Take of state listed species is prohibited without incidental take authorization, according to Section 2081 or 2080.1 of the Act. The administering agency is CDFW.
Fully Protected Species (Fish and Game Code sections 3511, 4700, 5050, and 5515)	Designates certain species as fully protected and prohibits the take of such species unless for scientific purposes (see also Title 14, California Code of Regulations, section 670.7). The administering agency is CDFW.
Nest or Eggs (Fish and Game Code section 3503)	Protects California's birds by making it unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. The administering agency is CDFW.
Migratory Birds (Fish and Game Code section 3513)	Protects California's migratory birds by making it unlawful to take or possess any migratory nongame bird as designated in the Migratory Bird Treaty Act or any part of such migratory nongame birds. The administering agency is CDFW.
Lake and Streambed Alteration Agreement (Fish and Game Code sections 1600 et seq.)	Regulates activities that may divert, obstruct, or change the natural flow or the bed, channel, or bank of any river, stream, or lake in California designated by CDFW in which there is at any time an existing fish or wildlife resource or from which these resources derive benefit. Impacts to vegetation and wildlife resulting from disturbances to waterways are also reviewed and regulated during the permitting process. The administering agency is CDFW.

Applicable Law	Description
California Coastal Act (Public Resources Code, sections 30000 et seq.)	Establishes comprehensive land use planning along the California coast; sets forth general policies (§30200 et seq.) which govern the California Coastal Commission's review of permit applications and local plans. Specific to energy facilities, requires that the Coastal Commission designate specific locations within the coastal zone where a thermal power plant subject to the Warren-Alquist Act could prevent the achievement of the objectives of the Coastal Act (30413(b)). Section 30231 requires actions that minimize adverse impacts to biological productivity of coastal waters. Section 30240 mandates protection of environmentally sensitive habitats from the degradation of habitat value. The administering agency is the California Coastal Commission.
Porter-Cologne Water Quality Control Act	Regulates discharges of waste and fill materials to waters of the state, including "isolated" waters and wetlands. The administering agency is the State Water Resources Control Board.
Local	
City of Long Beach General Plan/Southeast Area Development and Improvement Plan (SEADIP)/Local Coastal Program (LCP)	The city of Long Beach regulates new development through design review and permit issuance to ensure consistency with Coastal Act requirements and minimize adverse impacts to identified environmentally sensitive habitats and wetland areas. New development projects that are contiguous to wetlands or environmentally sensitive habitat areas must include a buffer.

SETTING

PROJECT OVERVIEW

The proposed project is described in detail in Section 2 of the AFC and Section 3 of this Staff Assessment. Those project components pertinent to biological resources are briefly summarized in the following paragraphs. The proposed AEC would be constructed on the site of the existing AGS, an operating power plant in Long Beach, California. The project would be constructed on approximately 21 acres entirely within the 71.1-acre footprint of the existing AGS. AEC would consist of two new power blocks. The first power block would consist of combined cycle combustion gas turbine (CCGT) generators and the second would consist of simple-cycle combustion gas turbine (SCGT) generators. Construction would require the removal of the existing (retired and decommissioned) AGS Unit 7 and several other existing facilities. Natural gas would be supplied via an existing 30-inch diameter pipeline that currently serves Units 5 and 6 of the AGS. Construction of the first power block and demolition of the existing unit would occur over approximately 56 months (about 4½ years), scheduled to begin in the second quarter of 2017. Construction of the second power block would continue through the third quarter of 2021.

During AEC operation, stormwater would be directed to oil/water separators, held on the site in an existing retention basin, and ultimately discharged to the Los Cerritos Channel via existing outfalls. The AEC would include a new 1,000 linear foot process/sanitary wastewater pipeline to the first point of interconnection with the existing Long Beach Water Department sewer system and would eliminate the current AGS practice of treatment and discharge of process/sanitary wastewater to the San Gabriel River. Construction of the new wastewater line would take approximately 4 months. The alignment would be in the road shoulder along Studebaker Road and Loynes Drive.

AEC construction would require onsite laydown areas comprising approximately 8 acres dispersed throughout the site, and an approximately 10-acre area adjacent to the site.

REGIONAL SETTING

The regional setting addressed in this section encompasses the area within 10 miles of the AEC. Land use proximate to the proposed project area primarily includes urban development, industrial areas, the San Gabriel River, parklands and open space, and wetlands preserves.

The 71.1-acre AGS site is bounded on the west by Studebaker Road, and to the south by a tank farm. The AEC project area consists of 21 acres within the larger AGS site (see Project Description - Figure 2). The eastern edge of the AEC site is bounded by the San Gabriel River, about two miles upstream from its terminus at the Pacific Ocean. The Haynes Generating Station is located on the east side of the river, opposite the proposed project.

The river in this area has a soft bottom and riprap banks, and it is channelized between levees. The Los Cerritos Channel is located just west of the project site, across Studebaker Road, and terminates about one mile to the southwest, at Alamitos Bay. Two side channels deliver cooling water from the Los Cerritos Channel to the operating

AGS; the cooling water is discharged to the San Gabriel River via existing outfalls. Los Cerritos Channel, Alamitos Bay, and the portion of the San Gabriel River in the project site vicinity are all tidal waters.

Extensive urban development throughout the region has replaced most of the natural open space. Natural habitats are now limited to scattered open space preserves and other protected areas. Much of the undeveloped open space south and west of the site is former oil production land.

Regional Wetlands and Other Protected Areas

Several ecological reserves, wetland preservation sites, and designated open space areas are located in the region. These protected areas represent some of the most significant remaining habitat in the region; provide wintering, feeding, and resting habitat for migratory birds along the Pacific Flyway; and provide habitat for several special-status plants and animals. Following is a brief description of each of these areas:

Los Cerritos Wetlands

The Los Cerritos wetlands complex consists of over 500 acres of coastal open space on both sides of the San Gabriel River, located south of Cerritos Channel, west of Studebaker Road, and south of East 2nd Street. Within the Los Cerritos complex, the nearest tidal wetland habitat to proposed project components is located west of Studebaker Road, about 800 feet from the proposed AEC. Several organizations, including the Los Cerritos Wetlands Authority and Los Cerritos Land Trust are working to acquire and restore habitat within the open space area. Portions of the wetlands are undergoing restoration, with additional phases being planned. Several listed and other special-status species occur there year-round or seasonally; these include southern tarplant (*Centromadia parryi* ssp*. australis*), Coulter's goldfields (*Lasthenia glabrata* ssp*. coulteri*), Lewis' evening primrose (*Camissoniopsis lewisii*), California box-thorn *(Lycium californicum)*, California least tern (*Sternula antillarum browni*), Pacific green sea turtle (*Chelonia mydas*), and Belding's savannah sparrow (*Passerculus sandwichensis beldingi*).

Bolsa Chica Wetlands

The Bosla Chica wetlands are located five miles to the southeast of the AEC site, and encompass over 1,400 acres. Approximately 80 percent of the wetlands comprise a mixture of salt marsh and open mudflats with the remaining 20 percent consisting of open water with tidal flows controlled by flood gates. Many bird species occur at these wetlands, including 32 special-status birds such as the California least tern, western snowy plover, Belding's savannah sparrow, and light-footed clapper rail (*Rallus longirostris levipes*). Several special-status plants, reptiles, and mammals also are found in this area including southern tarplant, Coulter's goldfields, San Diego horned lizard (*Phrynosoma coronatum blainvillii*), western pond turtle (*Emys marmorata*), silvery legless lizard (*Anniella pulchra*), and the southern California salt marsh shrew (*Sorex ornatus salicornicus*).

Seal Beach National Wildlife Refuge

The Seal Beach National Wildlife Refuge is located approximately two miles southeast of the proposed AEC site within the boundaries of the Seal Beach Naval Weapons Station. The refuge includes 911 acres of remnant saltwater marsh in the Anaheim Bay estuary. It provides important habitat for migratory birds and four threatened or endangered species including the Pacific green sea turtle, light-footed clapper rail, California least tern, and Belding's savannah sparrow.

Jack Dunster Marine Biological Reserve

The Jack Dunster Marine Biological Reserve is a 2.7–acre site on the northwestern side of the Los Cerritos Channel, containing 1.5 acres of land and 1.2 acres of shallow water. Habitats in this small reserve include coastal sage scrub, coastal marsh, intertidal mudflats, and rocky intertidal zone (City of Long Beach 2012a). The reserve is located approximately one mile west of the project site and provides habitat for waterfowl and fish.

Golden Shore Marine Biological Reserve Park

In 1997, the city of Long Beach's Golden Shore Marine Biological Reserve Park, originally a launch ramp and parking lot, was converted into 6.4 acres of intertidal and subtidal wetlands habitat (City of Long Beach 2012b). This park is located approximately six miles west of the AEC project site. This reserve park has salt marsh habitat that contains cordgrass, pickleweed, and saltgrass at slightly higher elevations, which provides habitat for waterfowl and fish.

El Dorado Nature Center and Regional Park

The city of Long Beach's El Dorado Regional Park is a 105-acre park located between the San Gabriel River and the 605 freeway, about three miles north of the proposed AEC site. Two miles of dirt trails and a ¼ mile paved trail wind around two lakes, a stream, and forested areas.

Critical Habitat

Critical habitat is a formal designation under the federal Endangered Species Act. It is designated based on presence of the physical and biological features essential to the conservation of the species that may require special management considerations or protection. There is designated critical habitat for one federally listed species within 10 miles of the proposed AEC: the western snowy plover.

Critical habitat for western snowy plover includes the Bolsa Chica State Beach and Bolsa Chica Preserve, which are located approximately five miles southeast of the proposed AEC site (USFWS 2012a). The beach habitats for western snowy plover within the designated critical habitat are generally characterized by large, flat, and open spaces.

EXISTING VEGETATION AND WILDLIFE

The applicant conducted a reconnaissance-level survey of biological resources within the proposed project area in September 2011. Supplemental surveys were conducted in July 2013 and January 2014, to assess biological resources along the 1,000-foot offsite sewer pipeline alignment and in April 2015 in support of the Supplemental AFC. The supplemental reconnaissance survey in January 2014 encompassed the pipeline alignment and a 100-foot buffer, while the other surveys focused on the proposed power plant site and laydown areas. The following text summarizes the applicant's biological surveys, as verified during staff's site visit on March 25, 2014, and updated in the Supplemental AFC.

Vegetation

The proposed AEC site and laydown areas are in industrial land use. The majority of the project area is paved and any unpaved areas are subject to regular chemical weed control. Landscaped areas, including trees, shrubs and lawns are present on portions of the project site, but no natural habitats or wetlands are present. Other than the landscaping plants, species on the site are primarily "ruderal" (i.e., weedy species characteristic of disturbed areas) and most are not native. Typical species include landscape plants and fan palm (*Washingtonia robusta*), gum tree (*Eucalyptus* sp.), great bougainvillea (*Bougainvillea spectabilis*), iceplant (*Carpobrotus edulis*), mustard (*Brassica* sp.), and tree tobacco (*Nicotiana glauca*).

Land uses within one mile of the AEC site are briefly characterized as follows:

- **Urban.** Urban developed areas include residential, commercial, and light industrial uses, as well as public schools and other municipal facilities. The majority of the land uses to the north, northeast, southwest, south, and northwest of the AEC site consist of urban development.
- **Industrial.** Industrial areas include the existing AGS, SCE 230-kV switchyard, and former fuel oil tank farm. Additional industrial areas are located across the San Gabriel River channel to the east and include the Los Angeles Department of Water and Power Haynes Generating Station.
- **Parks and open space.** Parks and open space include natural and landscaped areas that have been designated for recreational uses or provide undeveloped green space. Parks and open space are located west and south of the AEC site.
- **Wetland Preserves.** As described above (see "Regional Wetlands and Other Protected Areas"), the Los Cerritos Wetlands complex is approximately 700 feet west and 2,000 feet south of the AEC site (about 800 feet south of the adjacent laydown area).

Although there are no natural habitats on or adjacent to the site, the following sensitive natural communities are present within 10 miles, as identified by the CDFW's California Natural Diversity Database (CNDDB) (excerpted from AEC 2013a and verified by staff).

Southern Coastal Salt Marsh

Southern coastal salt marsh is found in areas subject to regular tidal flooding such as sheltered inland bays, estuaries, and lagoons. Vegetation and habitat within the salt marsh are in distinct zones based on the frequency and duration of tidal flooding. Typically California cordgrass (*Spartina folosia*) is found at the lowest intertidal levels, subject to regular, prolonged tidal inundation. Mid-tidal areas are typically characterized by pickleweed (*Salicornia virginica*) and are generally subject to cyclical inundation during high tides and drying during low tides. The upper intertidal marsh zone is generally subject to flooding for short durations and only during higher high tides. It supports a more diverse mixture of plant species including pickleweed, saltgrass (*Distichlis spicata*), alkali heath (*Frankenia salina*), alkali weed (*Cressa truxilensis*), California seablite (*Suaeda californica*), and marsh jaumea (*Jaumea carinosa*).

The historical extent of salt marsh habitat in the south coast region has been dramatically reduced by urban coastal development. Today, this community is limited to isolated patches surrounded by development. Southern coastal salt marsh habitat is found in several of the protected areas in the regional vicinity, listed above. The nearest southern coastal salt marsh is in the Los Cerritos Wetlands complex just west and south of the AEC, though this location is not recorded in the CNDDB.

Southern Foredunes

Southern California coastlines once featured extensive dune systems extending inland from beaches, but recreation and other land uses have largely eliminated these habitats. Southern foredunes were a component of these larger systems, and remnant foredunes are still found in a few areas. They are located shoreward of beaches and active coastal sand dunes, where they are subject to less wind, have more stable sand, and greater availability of groundwater. The foredune area supports plant species that tend to stabilize the dune sand. Native plant species commonly found in this habitat include beach morning glory (*Calystegia soldanella*), silver bur ragweed (*Ambrosia chamissonis*), and common eucrypta (*Eucrypta chrysanthemifolia*). Southern foredune habitat is located approximately five miles southeast of the AEC site within the Bolsa Chica Ecological Reserve.

Southern Dune Scrub

Southern dune scrub is a coastal scrub community of scattered shrubs, subshrubs, and herbs that are typically less than one meter tall and often constitute dense cover. This habitat is drier, warmer, and experiences less onshore wind than central and northern dune scrub habitats. Native plants commonly found in this habitat include beach saltbush (*Atriplex leucophylla*), California croton (*Croton californicus*), California ephedra (*Ephedra californica*), mock heather (*Ericameria ericoides*), dune lupine (*Lupinus chamissonis*), desert thorn (*Lycium brevipes*), prickly pear (*Opuntia* sp.), lemonade berry (*Rhus integrifolia*), and jojoba (*Simmondsia chinensis*). Southern dune scrub occurs approximately five miles southeast of the AEC in the Bolsa Chica Ecological Reserve.

Common Wildlife

Due to the existing industrial AGS land use, the proposed AEC site does not provide important habitat for native wildlife. Species observed during project surveys include American crow (*Corvus brachyrhynchos*), Anna's hummingbird (*Calypte anna*), bufflehead (*Bucephala albeola*), western gull (*Larus occidentalis*), rock pigeon (*Columba livia*), and western fence lizard (*Sceloporus occidentalis*). Species observed during the same dates in the surrounding area within one mile of the AEC site included great egret (*Ardea alba*), cormorant (*Phalacrocorax* spp.), great blue heron (*Ardea erodias*), killdeer (*Charadrius vociferous*), green heron (*Butorides virescens*), red-tailed hawk (*Buteo jamaicensis*), black phoebe (*Sayornis nigricans*), and western fence lizard.

Special-status birds are not expected to use the project site, except for incidental flyover or possibly roosting. Common birds that are protected under the Migratory Bird Treaty Act (MBTA) and California Fish and Game Code, may nest in open areas and in unused structures on the AEC site. Examples include killdeer, hummingbirds, and house finch (*Carpodacus mexicanus*).

The nearby marshes provide habitat for a greater diversity of common wildlife species. Birds observed in this habitat include American crow, barn swallow (*Hirundo rustica),* common yellowthroat (*Geothlypis trichas*), double-crested cormorant (*Phalacrocorax auritus*), elegant tern (*Thalasseus elegans*), great blue heron, great egret (*Ardea alba*), great horned owl (*Bubo virginianus*), hooded oriole (*Icterus cucullatus*), long-billed curlew (*Numenius americanus*), snowy egret (*Egretta thula*), turkey vulture (*Cathartes aura*), and a variety of other species. Reptiles and amphibians include gopher snake (*Pituophis melanoleucus*), red-diamond rattlesnake (*Crotalus ruber*), southern alligator lizard (*Gerrhonotus multicarinatus*), and Baja California treefrog (*Pseudacris hypochondriaca*). Mammals include coyote (*Canis latrans*), opossum (*Didelphis virginiana*), Botta's pocket gopher (*Thomomys bottae*), and raccoon (*Procyon lotor*). A wide variety of invertebrates and fish have also been recorded in the Los Cerritos Wetlands (Tidal Influence, 2012).

SPECIAL-STATUS SPECIES

Special-status species are plant and wildlife species that have been afforded special recognition by federal, state, or local resource agencies or organizations. Listed and special-status species are of relatively limited distribution and typically require unique habitat conditions. Special-status species are defined as meeting one or more of the following criteria:

- Federally or state listed, proposed, or candidate for listing, as rare, threatened or endangered under the Endangered Species Act or California Endangered Species Act;
- Protected under other state or federal regulations (e.g., Migratory Bird Treaty Act);
- Identified as a California Species of Special Concern by the CDFW;
- California Fully Protected Species;
- A plant species ranked by the California Native Plant Society and CDFW as "rare, threatened, or endangered in California" (California Rare Plant Rank [CRPR] 1A, 1B, and 2) as well as CRPR 3 and 4 species;
- A plant listed as rare under the California Native Plant Protection Act;
- A locally significant species, that is, a species that is not rare from a statewide perspective but is rare or uncommon in a local context such as within a county or region or is so designated in local or regional plans, policies, or ordinances; or
- Any other species receiving consideration during environmental review under the California Environmental Quality Act (CEQA).

Most special-status plants and wildlife are not expected to occur on the site due to its existing industrial land use. However, nearby marshes, parks, and other natural areas support special-status species that may be affected by construction or operation of the proposed project. **Biological Resources Table 2** identifies special-status species reported within 10 miles of the project site in the California Natural Diversity Database (CDFW 2016) and California Native Plant Society's (CNPS 2016) Inventory of Rare and Endangered Plants, but the majority of the species would not be likely to occur on site.

Biological Resources Table 2
Special-status Species in the AEC Area and Vicinity

Common Name (*Scientific Name*)	**Conservation Status Fed/State/ CRPR/G-Rank/S-Rank**	**Potential for Occurrence in Project Impact Area**
PLANTS		
Chaparral sand-verbena (*Abronia villosa* var. *aurita*)	__/__/1B.1/ G5T2T3/S2	**Not Likely to Occur.** No chaparral or coastal scrub habitat on the project site or pipeline alignment.
Ventura Marsh milk-vetch (*Astragalus pycnostachyus var. lanosissimus*)	FE/SE/1B.1/ G2T1/S1	**Not Likely to Occur.** No coastal salt marsh habitat on the project site or pipeline alignment.
Coulter's saltbush (*Atriplex coulteri*)	__/__/ 1B.2/ G3/S2	**Not Likely to Occur.** No coastal dunes, scrub, or valley and foothill grasslands on the project site or pipeline alignment.
Parish's brittlescale (*Atriplex parishii*)	__/__/1B.1/ G1G2/S1	**Not Likely to Occur.** No alkali meadows, vernal pools, chenopod scrub, or playas on the project site or pipeline alignment.
Davidson's saltscale (*Atriplex serenana* var. *davidsonii*)	__/__/1B.2/ G5T1/S1	**Not Likely to Occur.** No coastal scrub habitat on the project site or pipeline alignment.
Plummer's mariposa-lily (*Calochortus plummerae*)	__/__/4.2/ G4/S4	**Not Likely to Occur.** No coastal scrub, chaparral, valley and foothill grassland, woodlands, or forests on the project site or pipeline alignment.
Intermediate mariposa-lily (*Calochortus weedii* var. *intermedius*)	__/__/1B.2/ G3G4T2/S2	**Not Likely to Occur.** No coastal scrub, chaparral, or valley and foothill grassland on the project site or pipeline alignment.
Santa Barbara Morning-glory (*Calystegia sepium* ssp. *binghamiae*)	__/__/1A/ G5TXQ/SX	**Not Likely to Occur.** No coastal marsh habitat on the project site or pipeline alignment.
Lewis' evening primrose (*Camissoniopsis lewisii*)	__/__/3/ G4/S4	**Not Likely to Occur.** No coastal scrub, woodlands, dunes, or valley and foothill grassland on the project site or pipeline alignment, but recorded in Los Cerritos Wetlands.

Common Name (*Scientific Name*)	Conservation Status Fed/State/ CRPR/G-Rank/S-Rank	Potential for Occurrence in Project Impact Area
Southern tarplant (*Centromadia parryi* ssp. *australis*)	__/__/1B.1/ G3T2/S2	**Not Likely to Occur** on the project site; no marsh or swamp margins or valley and foothill grassland. **High** along the pipeline alignment; recorded in the Los Cerritos Wetlands including marsh uplands at sw corner of Loynes Dr. and Studebaker Rd. across Loynes Dr. from alignment. Often in disturbed sites at marsh edges; potential habitat along alignment at intersection of Studebaker Rd. and Loynes Dr.
Salt marsh bird's-beak (*Chloropyron maritimum* ssp. *maritimum*)	FE/SE/1B.2/ G4?T1/S1	**Not Likely to Occur.** No coastal salt marsh or dune habitat on the project site or pipeline alignment.
Many-stemmed dudleya (*Dudleya multicaulis*)	__/__/1B.2/ G2/S2	**Not Likely to Occur.** No coastal scrub, chaparral, or valley and foothill grassland on the project site or pipeline alignment.
Los Angeles sunflower (*Helianthus nuttallii* ssp. *parishii*)	__/__/1A/ G5TH/SH	**Not Likely to Occur.** No marshes or swamps on the project site or pipeline alignment. Presumed extinct.
Southwestern spiny rush (*Juncus acutus* ssp. *leopoldii*)	__/__/4.2/ G5T5/S4	**Not Likely to Occur.** No marshes or swamps, meadows or seeps, or dunes on the project site or pipeline alignment, but recorded in Los Cerritos Wetlands.
Coulter's goldfields (*Lasthenia glabrata* ssp. *coulteri*)	__/__/1B.1/ G4T2/S2	**Not Likely to Occur.** No vernal pools, coastal salt marshes, valley and foothill grasslands, or playas on the project site or pipeline alignment, but recorded in Los Cerritos Wetlands.
California box-thorn (*Lycium californicum*)	__/__/4.2/ G4/S4	**Not Likely to Occur.** No coastal scrub or coastal bluff scrub on the project site or pipeline alignment, but recorded in Los Cerritos Wetlands.
Mud nama (*Nama stenocarpa*)	__/__/2B.2/ G4G5/S1S2	**Not Likely to Occur.** No marshes or swamps on the project site or pipeline alignment.
Gambel's water cress (*Nasturtium gambelii*)	FE/ST/1B.1/ G1/S1	**Not Likely to Occur.** No marshes or swamps on the project site or pipeline alignment.

Common Name (*Scientific Name*)	Conservation Status Fed/State/ CRPR/G-Rank/S-Rank	Potential for Occurrence in Project Impact Area
Prostrate vernal pool navarretia (*Navarretia prostrata*)	__/__/1B.1/ G2/S2	**Not Likely to Occur.** No vernal pools, coastal scrub, or valley and foothill grasslands on the project site or pipeline alignment.
Coast woolly-heads (*Nemacaulis denudata* var. *denudata*)	__/__/1B.2/ G3G4T2/ S2	**Not Likely to Occur.** No coastal dune habitat on the project site or pipeline alignment.
California Orcutt grass (*Orcuttia californica*)	FE/SE/1B.1/G 1/S1	**Not Likely to Occur.** No vernal pools on the project site or pipeline alignment.
Lyon's pentachaeta (*Pentachaeta lyonii*)	FE/SE/1B.1/G 1/S1	**Not Likely to Occur.** No coastal scrub, chaparral, or valley and foothill grassland on the project site or pipeline alignment.
Brand's star phacelia (*Phacelia stellaris*)	__/__/1B.1/ G1/S1	**Not Likely to Occur.** No coastal scrub or dunes on the project site or pipeline alignment.
Sanford's arrowhead (*Sagittaria sanfordii*)	__/__/1B.2/ G3/S3	**Not Likely to Occur.** No marshes or swamps on the project site or pipeline alignment.
Salt spring checkerbloom (*Sidalcea neomexicana*)	__/__/2B.2/ G4/S2	**Not Likely to Occur.** No coastal scrub, chaparral, alkali playas, marshes, desert scrub, or coniferous forests on the project site or pipeline alignment.
Estuary seablite (*Suaeda esteroa*)	__/__/1B.2/ G3/S2	**Not Likely to Occur.** No marshes or swamps on the project site or pipeline alignment, but recorded in Los Cerritos Wetlands.
Woolly seablite (*Suaeda taxifolia*)	__/__/4.2/ G3?/S4	**Not Likely to Occur.** No marshes or swamps, coastal bluff scrub, or dunes on the project site or pipeline alignment, but recorded in Los Cerritos Wetlands.
San Bernardino aster (*Symphyotrichum defoliatum*)	__/__/1B.2/ G2/S2	**Not Likely to Occur.** No meadows or seeps, coastal scrub, woodlands, forest, grasslands, marshes, or swamps on the project site or pipeline alignment.
WILDLIFE		
Invertebrates		
Western tidal-flat tiger beetle (*Cicindela gabbii*)	__/SA/__/ G2G4/S1	**Not Likely to Occur.** No estuary or mudflat habitat on the project site or pipeline alignment.

Common Name (*Scientific Name*)	Conservation Status Fed/State/ CRPR/G-Rank/S-Rank	Potential for Occurrence in Project Impact Area
Sandy beach tiger beetle (*Cicindela hirticollis gravida*)	__/SA/__/ G5T2/S1	**Not Likely to Occur.** No areas adjacent to non-brackish water on the project site or pipeline alignment.
Western beach tiger beetle (*Cicindela latesignata latesignata*)	__/SA/__/ G2G4T1T2 /S1	**Not Likely to Occur.** No beaches or mudflats on the project site or pipeline alignment.
Senile tiger beetle (*Cicindela senilis frosti*)	__/SA/__/ G2G3T1T3 /S1	**Not Likely to Occur.** No marine shoreline on the project site or pipeline alignment.
Monarch butterfly (winter roosts) (*Danaus plexippus*)	__/SA/__/ G4T2T3 /S2S3	**Not Likely to Occur.** No wind-protected tree groves for winter roosting on the project site or pipeline alignment.
Wandering (saltmarsh) skipper (*Panoquina errans*)	__/SA/__/ G4G5/S2	**Not Likely to Occur.** No salt marsh habitat on the project site or pipeline alignment, but recorded in Los Cerritos Wetlands.
Dorothy's El Segundo Dune weevil (*Trigonoscuta dorothea dorothea*)	__/SA/__/ G1T1/S1	**Not Likely to Occur.** No coastal sand dune habitat on the project site or pipeline alignment.
Mimic tryonia (=California brackishwater snail) (*Tryonia imitator*)	__/SA/__/ G2/S2	**Not Likely to Occur.** No coastal lagoon, estuary, or salt marsh habitat on the project site or pipeline alignment.
Fish		
Tidewater goby (*Eucyclogobius newberryi*)	FE/CSC/__/ G3/S3	**Not Likely to Occur.** No aquatic habitat on the project site or pipeline alignment, and true estuarine conditions do not occur in the project vicinity.
Reptiles and Amphibians		
Orange-throated whiptail (*Aspidoscelis hyperythra*)	__/CSC/__/ G5/S2	**Not Likely to Occur.** No coastal scrub, chaparral, or valley-foothill hardwood woodlands on the project site or pipeline alignment.
Pacific green sea turtle (*Chelonia mydas*)	FT/__/__/ G3/S1	**Not Likely to Occur.** No aquatic habitat within the project site or pipeline alignment. **Present off-site.** Pacific green sea turtles inhabit the lower San Gabriel River and vicinity and congregate near the existing AGS outfall adjacent to the project site.

Common Name (*Scientific Name*)	Conservation Status Fed/State/ CRPR/G-Rank/S-Rank	Potential for Occurrence in Project Impact Area
Western pond turtle (*Emys marmorata*)	__/CSC/__/ G3G4/S3	**Not Likely to Occur.** No aquatic habitat on the project site or pipeline alignment, but could occur in freshwater marsh areas in the Los Cerritos wetlands.
Coast horned lizard (*Phrynosoma blainvillii*)	__/CSC/__/ G3G4/S3S4	**Not Likely to Occur.** No sandy natural habitats on the project site or pipeline alignment.
Western spadefoot (*Spea hammondii*)	__/CSC/__/ G3/S3	**Not Likely to Occur.** No grasslands or valley-foothill hardwood woodlands on the project site or pipeline alignment.
Birds[1]		
Tricolored blackbird (*Agelaius tricolor*)	BCC/CSC/__/ G2G3/S1S2	**Low.** No marsh or grain fields for nesting and foraging on the project site or pipeline alignment. Recorded approximately 0.5 mile from the project site.
Short-eared owl (*Asio flammeus*)	__/CSC/__/ G5/S3	**Low.** No marsh or grassland foraging habitats on the project site or pipeline alignment, but recorded in Los Cerritos Wetlands. Outside of breeding range.
Burrowing owl (*Athene cunicularia*)	BCC/CSC/__/ G4/S3	**Low.** No grasslands or similar open habitats with abundant burrows on the project site or pipeline alignment, but recorded in Los Cerritos Wetlands.
Ferruginous hawk (*Buteo regalis*)	BCC/WL/__/ G4/S3S4	**Low.** No grassland, shrub, or desert habitats on the project site or pipeline alignment. Outside of breeding range.
Western snowy plover (*Charadrius alexandrinus nivosus*)	FT, BCC/CSC/__/ G3T3/S2	**Moderate.** No salt flats or beaches for nesting and foraging on the project site or pipeline alignment. Nests at Bolsa Chica; rarely at Seal Beach National Wildlife Refuge.
Northern Harrier (*Circus cyaneus*)	__/CSC/__/ G5/S3	**Low.** No grassland or marsh breeding and foraging habitats on the project site or pipeline alignment, but forages in Los Cerritos Wetlands.
Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*)	FT, BCC/SE/__/ G5T2T3/S1	**Not Likely to Occur.** No riparian woodlands for breeding and foraging on the project site or pipeline alignment, and presumed extirpated from the area.

Common Name (*Scientific Name*)	Conservation Status Fed/State/ CRPR/G-Rank/S-Rank	Potential for Occurrence in Project Impact Area
White-tailed kite (*Elanus leucurus*)	__/FP/__/ G5/S3S4	**Moderate.** No grassland, agricultural, wetland, oak-woodland, or savannah habitats for nesting and foraging on the project site or pipeline alignment, but recorded in Los Cerritos Wetlands.
Southwestern willow flycatcher (*Empidonax traillii extimus*)	FE/SE/__/ G5T2/S1	**Not Likely to Occur.** No riparian habitat for breeding and foraging on the project site or pipeline alignment.
Yellow-breasted chat (*Icteria virens*)	__/CSC/__/ G5/S3	**Low.** No riparian or shrubby habitats for foraging and nesting on the project site or pipeline alignment, but recorded in Los Cerritos Wetlands.
Loggerhead shrike (*Lanius ludovicianus*)	BCC/CSC/__/ G4/S4	**Low.** No riparian habitats, woodlands, or open natural habitats for foraging and nesting on the project site or pipeline alignment, but recorded in Los Cerritos Wetlands.
Osprey (*Pandion haliaetus*)	__/WL/__/ G5/S4	**Moderate.** No open water for foraging on the project site or pipeline alignment, but recorded in Los Cerritos Wetlands.
Belding's savannah sparrow (*Passerculus sandwichensis beldingi*)	__/SE/__/ G5T3/S3	**Moderate.** No salt marsh habitat for breeding or foraging on the project site or pipeline alignment, but a breeding population is present in the Los Cerritos Wetlands to the west and south of the project.
California brown pelican (*Pelecanus occidentalis californicus*)	FD/SD, FP/__/ G4T3/S3	**High.** No aquatic habitat for foraging or coastal island habitat for roosting on the project site or pipeline alignment. Roosts offshore approximately 6 miles southwest of the project site. Routinely observed throughout the area, including the Los Cerritos Wetlands.
Coastal California gnatcatcher (*Polioptila californica californica*)	FT/CSC/__/ G3T2/S2	**Not Likely to Occur.** No coastal sage scrub habitat on the project site or pipeline alignment. Occurs at Bolsa Chica Ecological Reserve and on the Palos Verdes Peninsula.

Common Name (*Scientific Name*)	Conservation Status Fed/State/ CRPR/G-Rank/S-Rank	Potential for Occurrence in Project Impact Area
Light-footed clapper rail (*Rallus longirostris levipes*)	FE/SE, FP/__/ G5T1T2/S1	**Moderate.** No salt marsh habitat for breeding or foraging on the project site or pipeline alignment. Nests at Seal Beach National Wildlife Refuge and may use the Los Cerritos Wetlands as a corridor to travel among occupied habitats in the region.
Bank swallow (*Riparia riparia*)	__/ST/__/ G5/S2	**Not Likely to Occur.** No riparian habitat for breeding and foraging on the project site or pipeline alignment. Nesting populations are considered extirpated in southern California.
Black skimmer (*Rynchops niger*)	BCC/CSC/__/ G5/S2	**Moderate.** No gravel bars or sandy beaches for nesting on the project site or pipeline alignment, but forages in the Los Cerritos Wetlands to the west and is present year-round on sandy beaches in the vicinity.
California least tern (*Sternula antillarum browni*)	FE/SE, FP/ G4T2T3Q/S2	**Moderate.** No sandy beaches or alkali flats for nesting on the project site or pipeline alignment, but forages and trains offspring in the Los Cerritos Wetlands to the west of the project. Historically nested in the Los Cerritos wetlands, but current closest nesting grounds are at the Seal Beach National Wildlife Refuge and Bolsa Chica.
Least Bell's vireo (*Vireo bellii pusillus*)	FE/SE/__/ G5T2/S2	**Not Likely to Occur.** No riparian habitat for breeding and foraging on the project site or pipeline alignment.
Mammals		
Western mastiff bat (*Eumops perotis californicus*)	__/CSC/__/ G5T4/S3S4	**Not Likely to Occur.** No woodlands, coastal scrub, grasslands, chaparral, or other open arid to semi-arid habitats on the project site or pipeline alignment.
Silver-haired bat (*Lasionycteris noctivagans*)	__/SA/__/ G5/S3S4	**Low.** No coastal or montane forest habitats on the project site or pipeline alignment. Could forage in the nearby Los Cerritos wetlands complex.
Western yellow bat (*Lasiurus xanthinus*)	__/CSC/__/ G5/S3	**Low.** No riparian, desert wash, or palm oasis habitat on the project site or pipeline alignment, but could occur in the nearby Los Cerritos wetlands complex.

Common Name (*Scientific Name*)	Conservation Status Fed/State/ CRPR/G-Rank/S-Rank	Potential for Occurrence in Project Impact Area
South coast marsh vole (*Microtus californicus stephensi*)	__/CSC/__/ G5T1T2/S1S2	**Not Likely to Occur.** No tidal marsh habitat on the project site or pipeline alignment, but could occur in salt marsh habitats in the nearby Los Cerritos wetlands.
Pocketed free-tailed bat (*Nyctinomops femorosaccus*)	__/CSC/__/ G4/S3	**Not Likely to Occur.** No rocky areas with high cliffs on the project site or pipeline alignment.
Big free-tailed bat (*Nyctinomops macrotis*)	__/CSC/__/ G5/S3	**Not Likely to Occur.** No rocky outcrops or high cliffs on the project site or pipeline alignment.
Pacific pocket mouse (*Perognathus longimembris pacificus*)	FE/CSC/__/ G5T1/S1	**Not Likely to Occur.** No coastal strand, coastal dune, river alluvium, or coastal sage scrub habitat on the project site or pipeline alignment. Presumed extirpated in the area.
Southern California saltmarsh shrew (*Sorex ornatus salicornicus*)	__/CSC/__/ G5T1? /S1	**Not Likely to Occur.** No coastal marsh habitat on the project site or pipeline alignment, but could occur in salt marsh habitats in the nearby Los Cerritos wetlands.
American badger (*Taxidea taxus*)	__/CSC/__/ G5/S3	**Not Likely to Occur.** No shrub, forest, or grasslands with friable soils on the project site or pipeline alignment.

Sources: CDFW 2016; CNPS 2016; Tidal Influence 2012

1. Most special-status birds could occasionally fly over the site, or briefly roost or rest on the site; these casual occurrences are not included in the indicated occurrence probabilities.

Biological Resources Table 2 – Notes

STATUS CODES:

State

CSC: California Species of Special Concern. Species of concern to CDFW because of declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction.
SE: State listed as endangered
SR: State listed as rare
ST: State listed as threatened
SFP: Fully protected
WL: Watch List: includes species formerly on California Species of Special Concern List (Remsen 1978) but which did not meet the criteria for the current list of special concern bird species (Shuford and Gardali 2008).
SA: Special Animal. Species is tracked in the CNDDB (due to rarity, limited distribution in California, declining throughout the range, etc.) but holds no other special status at the state or federal level.

Federal

FE: Federally listed endangered: species in danger of extinction throughout a significant portion of its range
FT: Federally listed, threatened: species likely to become endangered within the foreseeable future
BCC: Fish and Wildlife Service: Birds of Conservation Concern: Identifies migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent highest conservation priorities
http://www.fws.gov/migratorybirds/NewReportsPublications/SpecialTopics/BCC2008/BCC2008.pdf
D: Delisted taxon that is considered recovered

California Rare Plant Rank (CRPR)

CRPR 1A: Plants presumed extirpated in California and either rare or extinct elsewhere
CRPR 1B: Rare, threatened, or endangered in California and elsewhere

CRPR 2A: Rare, threatened, or endangered in California but more common elsewhere
CRPR 2B: Plants rare, threatened, or endangered in California, but more common elsewhere
CRPR 3 = Plants which need more information
CRPR 4 = Limited distribution – a watch list
0.1: Seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)
0.2: Moderately threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat) 0.3: : Not very threatened in California (less than 20% of occurrences threatened / low degree and immediacy of threat or no current threats known) **Global Rank/State Rank**
Global rank (G-rank) is a reflection of the overall condition of an element throughout its global range. Subspecies are denoted by a T-Rank; multiple rankings indicate a range of values
G1 = Critically Imperiled – At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.
G2 = Imperiled – At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.
G3 = Vulnerable – At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.
G4 = Apparently Secure – Uncommon but not rare; some cause for long-term concern due to declines or other factors.
G5 = Secure – Common; widespread and abundant.
State rank (S-rank) is assigned much the same way as the global rank, except state ranks in California often also contain an imperilment status only within California's boundaries.
S1 = Critically Imperiled – Critically imperiled in the state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state.
S2 = Imperiled – Imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the state.S3 = Vulnerable – Vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation from the state.
S4 = Apparently Secure – Uncommon but not rare in the state; some cause for long-term concern for population within state due to declines or other factors.S5 = Secure – Common, widespread, and abundant in the state/province.
SH = All California occurrences historical (i.e., no records in > 20 years).
Potential Occurrence:

High – Suitable habitat is present within or near the proposed site: occurrence records exist for species in proximity to the site; species expected to occur on or near site

Moderate – Low quality habitat is present within or near the proposed site; species was not identified during reconnaissance surveys of the site; species may occur on or near site

Low – Marginal habitat is present on or adjacent to site; no recent records within 10 miles of the site

Not Likely to Occur – No recent records within 10 miles, no suitable habitat occurs on or near site

Special-Status Plants

Rare plant surveys were not conducted at the project site or along the pipeline alignment due to existing urbanized and industrial land uses. However, several special-status plant species have been documented in the regional vicinity, including at the nearby marshes. In addition, southern tarplant (CRPR 1B.1) has been recorded near the offsite pipeline alignment at Loynes Drive and Studebaker Road (CDFW 2016). It is unlikely that special-status plants would colonize or persist at the project site due to landscape maintenance and weed management practices, but there is a high probability that southern tarplant may occur on or near the offsite pipeline alignment in ruderal habitat or at margins of wetlands, particularly at Loynes Drive and Studebaker Road.

Southern Tarplant

Southern tarplant is a CRPR 1B.1 annual herb in the sunflower family (Asteraceae) that blooms between May and November. It ranges from Santa Barbara County south into Baja California, and on Santa Catalina Island. Typical habitat includes the margins of marshes and swamps, vernally mesic sites within valley and foothill grassland, and vernal pools below 1,400 feet. It is usually found on alkaline soils, including disturbed sites. Southern tarplant occurs in the Los Cerritos Wetlands complex. The nearest record is in the northwest corner of the wetlands complex, about 200 feet south of the offsite pipeline alignment at Loynes Drive and Studebaker Road. Although the record is across Loynes Drive from the pipeline location, and the pipeline would be constructed in the ruderal road shoulder, southern tarplant can be found on disturbed sites and there is a high potential for it to occur in the pipeline footprint. It is not likely to occur on the developed industrial AEC site because there is no suitable habitat.

Special-Status Wildlife

The applicant conducted general reconnaissance surveys of the project site and offsite pipeline alignment (including a 4,000-foot alignment no longer proposed as part of the AEC) in September 2011, July 2013, January 2014, and April 2015. No protocol or focused surveys were performed due to the low potential for special-status wildlife species to occur within the site (except during casual stopover or flyover). The following accounts focus on species with a moderate or high potential to occur near the site, and that could be affected by project construction and operation.

Birds

The project site is located within the Pacific Flyway, a very broad migration corridor stretching along the Pacific Coast from Mexico north to Alaska and into Siberia, Russia. Birds in the region include year-round resident breeding birds, migratory birds that breed in the region but winter elsewhere, birds that forage and rest in the area during migration between breeding and wintering grounds, and species that winter in the project region. Nesting habitat on the site is limited to landscaped areas including trees where common upland birds such as house finches may nest, and open gravelly substrates where ground-nesting birds such as killdeer could nest. There is no suitable nesting habitat for special-status birds of the surrounding marshlands. Small mammals, reptiles, and landscape plants provide some cover and foraging opportunities for birds on site. Although the site itself provides relatively little nesting and foraging habitat for native birds, the nearby wetlands are regionally important for many bird species. Native birds, regardless of any additional conservation status at the local, state, or federal level, are afforded protection by the federal MBTA and California Fish and Game Code (**Biological Resources Table 1**).

Belding's Savannah Sparrow

The Belding's savannah sparrow (*Passerculus sandwichensis beldingi*) is a state-listed endangered species. It is a subspecies of the more common savannah sparrow, and is endemic to the coastal salt marshes of southern California. It is one of few birds that reside year-round in the local marshes. It ranged historically from Goleta in Santa Barbara County in California south to El Rosario, Baja California, Mexico.

Belding's savannah sparrow is found in tidal and non-tidal coastal wetlands where it is closely associated with pickleweed. Breeding territories can be very small and the birds nest semi-colonially or in localized concentrations within a larger block of habitat. They forage on the ground for insects, snails and other invertebrates, and seeds. Breeding begins in early March. The Belding's savannah sparrow occupies the Los Cerritos Wetlands complex and breeds in the coastal salt marsh wetlands in the immediate vicinity of the AEC site (Merkel & Associates 2004; CDFW 2016; Zembal and Hoffman 2010). It is also found in the Bolsa Chica wetlands and the Seal Beach National Wildlife Refuge. Surveys conducted in 2010 documented 23 Belding's savannah sparrow territories in the Los Cerritos Wetlands; larger populations also occur at the Seal Beach National Wildlife Refuge (326 territories in 2010) and Bolsa Chica (280 territories in 2010) (Zembal and Hoffman 2010).

There is no suitable habitat within the proposed AEC or pipeline alignment, and no Belding's savannah sparrows were observed during reconnaissance-level project surveys.

California Least Tern

The California least tern (*Sternula antillarum browni*) is federally and state-listed as endangered. It nests along the west coast of North America, from Baja California, Mexico, north to the San Francisco Bay area (USFWS 1980). It was listed as endangered by federal and state agencies due to a population decline resulting from loss of nesting habitat (Cogswell 1977). It forages for fish in open water habitats including near shore ocean waters, tidal channels, and estuaries. It breeds colonially on sandy soils with little vegetation or other open sites along the ocean, lagoons, and bays. Its nests are shallow depressions lined with shells or other debris (Massey 1974). California least terns are generally present at nesting areas between mid-April and late September (Massey 1974; Cogswell 1977; Patton 2002), often with two waves of nesting during this time period (Massey and Atwood 1981).

In the project region, California least terns nest at the Bolsa Chica wetlands and Seal Beach National Wildlife Refuge (CDFW 2016; Frost 2013; Marschalek 2008, 2009, 2010). There is no suitable nesting habitat for the California least tern at the AEC site and it has very limited potential to occur on the site, except while flying overhead. However, it uses the neighboring Los Cerritos Wetlands for foraging, loafing, and training young (Tidal Influence 2012).

Light-Footed Clapper Rail

The light-footed clapper rail (*Rallus longirostris levipes*) is federally and state listed as endangered. It occupies coastal salt marshes from Santa Barbara County, California, to San Quintin Bay, Baja California, Mexico. Within its historical range the amount of suitable habitat has been severely reduced by conversion of marshes for other uses.

The light-footed clapper rail forages for mollusks and crustaceans in coastal salt marshes, mudflats, and along tidal channels. Nest sites are usually in areas of dense marsh vegetation including pickleweed and cord grass (*Schoenoplectus* spp.). It breeds from early March through August.

The light-footed clapper rail breeds in wetland habitats in the regional vicinity including the Bolsa Chica wetlands and Seal Beach National Wildlife Refuge (Zembal et al. 2010; Zembal and Hoffman 2012). Although not documented breeding in the Los Cerritos Wetlands complex, it could use the wetlands as a corridor for traveling between regional breeding and foraging grounds (Tidal Influence 2012).

Western Snowy Plover

The western snowy plover (*Charadrius alexandrinus nivosus*) is a federally listed threatened species and a California Species of Special Concern. It typically forages for small invertebrates in wet or dry beach sand, in salt marshes, and within low foredune vegetation. The range of the Pacific coast breeding population of the western snowy plover extends along coastal beaches from the southern portion of Washington State to southern Baja California, Mexico. This population breeds primarily above the high-tide line on coastal beaches and other open, sandy or salt panne areas, sometimes including dredged material disposal sites, salt pond levees, and dry salt ponds. The snowy plover winters mainly in coastal areas from southern Washington to Central America. In winter, snowy plovers are found on many of the beaches used for nesting as well as on beaches where they do not nest, in man-made salt ponds, and on estuarine sand and mud flats. The breeding season normally extends from March 1 through September 15, however the first nest at Bolsa Chica in 2009 occurred on February 23 and courting behavior has been observed as early as late January (Knapp and Peterson 2009).

Poor reproductive success resulting from human disturbance, predation, and inclement weather, combined with permanent or long-term habitat loss from urban development and recreation has led to the decline in active nesting colonies and an overall decline in the breeding and wintering population along the Pacific coast (USFWS 2007).

Designated critical habitat for western snowy plover includes the Bolsa Chica State Beach and Bolsa Chica Preserve (USFWS 2012). Bolsa Chica State Beach supported an average wintering flock of 27 western snowy plover from 2003 through 2010 (USFWS 2012). The site annually supports a significant wintering flock of western snowy plover in a location with high-quality breeding habitat. The Bolsa Chica Reserve is located east of Highway 1 in Orange County. It supported 47 breeding adult western snowy plover in 2009 (Knapp and Peterson, 2009).

Although no breeding or wintering habitat occurs on the AEC site or pipeline alignment, the western snowy plover could fly over as it travels among occupied habitats in the region.

White-Tailed Kite

The white-tailed kite is a fully protected species in California. It forages over open grasslands, savannahs, wetlands and marshes, oak woodlands, and agricultural habitats and nests in trees, generally on edges of forging habitats. In California, it is a year-round resident and its range includes nearly all areas from the coast to the western Sierra Nevada foothills, and south through the deserts. Its overall range is expanding, and the present distribution is the largest in the species' known history (Dunk 1995). White-tailed kites forage in the nearby Los Cerritos Wetlands complex. Although no foraging habitat is found on the AEC site or pipeline alignment, the white-tailed kite could fly over as it moves among occupied habitats in the region.

Osprey

The osprey is on CDFW's Watch List. It is a large raptor that feeds almost exclusively on fish. It is found in coastal areas, and inland near rivers and lakes. The osprey is globally distributed. In southern California, it is primarily an uncommon winter visitor, but has been nesting in recent years in Upper Newport Bay and surrounding areas (Reicher 2010). It has been observed in the Los Cerritos Wetlands complex, and could fly over the AEC site while moving among habitats in the region.

Black Skimmer

The black skimmer is a California Species of Special Concern and a USFWS Bird of Conservation Concern. It is a coastal waterbird, and the western population breeds from Orange and San Diego counties in California south to Nayarit, Mexico (Gochfeld and Burger 1994). It nests on open sandy or gravelly areas with sparse vegetation or on broad mats of dead vegetation in salt marshes. It is a colonial nester that prefers areas with other species such as terns that provide early warning of intruders. It forages in the Los Cerritos Wetlands complex, and nests at Bolsa Chica (CDFW 2016). Although the AEC site and pipeline alignment support no nesting or foraging habitat, black skimmers could fly over while moving among habitats in the region.

California Brown Pelican

The California brown pelican (*Pelecanus occidentalis*) is a California state fully protected species. It was formerly state and federally listed as endangered, but was de-listed in 2007 due to recovery of the population (Burkett et al. 2007). Brown pelicans feed on fish which they catch by diving from the air into the water. It nests in colonies, usually on offshore islands where predators are absent, on the ground.

The open space and wetland habitats immediately surrounding the site provide resting and loafing habitat for brown pelicans; however, there is no natural habitat on the AEC site. Brown pelicans may fly over or (occasionally) land on the facilities or on the ground, but there is no potential for feeding, breeding, or other important activity on the site. Although California brown pelican is not expected to breed in nearby marshes due to lack of suitable breeding habitat, it is routinely observed foraging and loafing in the marshes and Alamitos Bay.

Reptiles

Pacific Green Sea Turtle

The green sea turtle (*Chelonia mydas*) is federally listed as threatened. It is found in tropical and subtropical waters world-wide. It breeds on tropical beaches; the hatchling turtles enter the ocean immediately and, over the course of five to ten years, grow to juvenile size and move to nearshore areas where they feed largely on plant material such as algae and eelgrass. On reaching sexual maturity, green sea turtles migrate to their natal beaches to breed, but otherwise spend most of their time in shallow nearshore waters (Arthur et al. 2008).

Green sea turtles are found year-round in the San Gabriel River mouth and surrounding areas and have been resident there at least since 2008 (Lawson et al. 2014). The number of turtles is unknown, but sizes range from juvenile to adults. Genetic work indicates that these turtles originate from an unknown breeding population, related to populations breeding in Mexico. They are often observed at the warm water discharges from the Alamitos Generating Station adjacent to the project site, and the Los Angeles Department of Water and Power's (LADWP's) Haynes Generating Station, just across the river from the project site (D. Lawson, pers. comm.). The turtles visit other local estuaries seasonally (Anaheim Bay, Seal Beach National Wildlife Refuge, and Alamitos Bay), but the warm water discharged from the power plants may be the primary reason for the species' presence in the area (Moffatt and Nichol 2015). Studies suggest that the resident turtles are more likely to move among locations in local waters during the summer and fall months when ocean temperatures are warmer, and stay in the warm effluent in the river during the winter (Lawson et al. 2014).

JURISDICTIONAL WETLANDS AND WATERS

The proposed AEC site and laydown areas are in industrial land use. The majority of the project area is paved. Some portions of the site are landscaped with trees, shrubs and lawns, but no natural habitats are present. Federal jurisdiction as waters of the United States includes navigable waters and their tributaries, based on presence of an “ordinary high water mark” (OHWM). Jurisdictional waters of the state include all waters within California, including those that may be isolated from navigable waters and their tributaries. The project site is above the OHWMs of the adjacent water bodies, and runoff from the site is collected in a retention basin on-site and discharged into the San Gabriel River by outfalls (AEC 2015f). These features are not regulated as waters of the US or waters of the state.

Wetlands are generally defined according to three criteria (or parameters): Hydric soil characteristics, caused by saturation; hydrophytic vegetation, adapted to wetland conditions; and hydrology, the seasonal or long-term presence of water. Under the federal definition, a site must ordinarily meet all three criteria to be considered a wetland. Under state criteria a site may be defined as a wetland if it meets only one or two of the criteria and, if so, it may be regulated by the CDFW or California Coastal Commission as waters of the state. Soils on the site are covered by existing land use (pavement, industrial structures, or landscaping) or are strongly compacted for use as staging areas. Water (e.g., from precipitation or runoff) does not reach the soil profile to cause development of hydric soil characteristics. Vegetation is limited to landscaped areas and scattered weedy areas (AEC 2015f). Water may be present on the ground’s surface in temporary puddles (after rainfall) or in the lined retention basin, but these conditions do not meet the hydrology criterion for wetland determination. Therefore, the site does not meet criteria as a wetland, under applicable definitions of state or federal agencies.

IMPACT ASSESSMENT

METHOD AND THRESHOLDS FOR DETERMINING SIGNIFICANCE

A significant impact is defined under CEQA as “a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project” (Cal Code Regs. tit. 14, [hereinafter CEQA Guidelines] section 15382). In this analysis, impacts to biological resources are considered significant if the project would result in the following:

- a substantial adverse effect to wildlife species that are federally-listed or state-listed or proposed to be listed; a substantial adverse effect to wildlife species of special concern to CDFW, candidates for state listing, or animals fully protected in California;
- a substantial adverse effect to plant species considered by CDFW, USFWS, or CNPS to be rare, threatened, or endangered in California or with strict habitat

requirements and narrow distributions; a substantial impact to a sensitive natural community (i.e., a community that is especially diverse; regionally uncommon; or of special concern to local, state, and federal agencies);

- substantial adverse effects on habitats that serve as breeding, foraging, nesting, or migrating grounds and are limited in availability or that serve as core habitats for regional plant and wildlife populations;
- interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- substantial adverse effect on important riparian habitats or wetlands and any jurisdictional waters of the U.S. or waters of the state; or
- conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

Direct and Indirect Impacts and Mitigation

The CEQA Guidelines define direct impacts as those impacts that result from the project and occur at the same time and place. Indirect impacts are caused by the project, but can occur later in time or farther removed in distance and are still reasonably foreseeable and related to the project. Direct or indirect impacts on biological resources could be permanent or temporary in nature. All impacts that result in the irreversible removal of biological resources are considered permanent. Any impact considered to have reversible effects on biological resources can be viewed as temporary.

This section evaluates the potential direct, indirect, permanent, and temporary impacts to biological resources from proposed AEC construction and associated demolition activities, operation, maintenance, and decommissioning, and provides mitigation, as necessary, to reduce impacts to less than significant levels.

General Biological Resources Conditions of Certification

In order to avoid or minimize potentially adverse impacts to biological resources, staff recommends that the project owner appoint a Designated Biologist and, if needed, additional Biological Monitor(s) to ensure impact avoidance and minimization measures described below and protection of sensitive biological resources described above are implemented. The selection criteria and minimum qualifications of the Designated Biologist and Biological Monitor(s) are described in staff's proposed Conditions of Certification **BIO-1** (Designated Biologist Selection) and **BIO-3** (Biological Monitor Selection). The duties and authority of the Designated Biologist and Biological Monitor are described in staff's proposed Conditions of Certification **BIO-2** (Designated Biologist Duties) and **BIO-4** (Designated Biologist and Biological Monitor Authority). The Designated Biologist would be responsible, in part, for developing and implementing the Worker Environmental Awareness Program (WEAP) (see Condition of Certification **BIO-5**), which is a training program for the on-site personnel on how to protect sensitive biological resources and the consequences of non-compliance.

Staff's proposed Condition of Certification **BIO-6** (Biological Resources Mitigation

Implementation and Monitoring Plan [BRMIMP]) requires preparation of a BRMIMP, which consolidates all biological resource mitigation, monitoring, and compliance measures, as well as other information necessary to ensure compliance with, and effectiveness of, all impact avoidance, minimization, and mitigation measures.

CONSTRUCTION AND DEMOLITION IMPACTS AND MITIGATION

Construction and Demolition Impacts to Native Vegetation

Construction and demolition impacts to vegetation could occur through the direct removal or crushing of plants by equipment or vehicles. As these impacts would be localized and primarily temporary, they are not usually considered significant unless the habitat type is regionally unique or supports special-status species.

The developed industrial project area and ruderal lands along the wastewater pipeline do not provide regionally unique habitat or important habitat for special-status species. Significant impacts to native vegetation would not occur and no mitigation is proposed.

Construction and Demolition Impacts to Common Wildlife

Direct loss of small mammals, reptiles, and other less mobile species could occur during construction and demolition activities. This loss would result primarily from vehicles and equipment which could collapse underground burrows or drive over animals. Additionally, construction and demolition activities and increased human presence may temporarily disrupt breeding or foraging activities of some common wildlife species.

Wildlife could become entrapped in open trenches during construction, especially if trenches remain open during inactive construction periods. Staff recommends Condition of Certification **BIO-7**, which would require exclusion measures for open trenches (e.g., fencing or covering), inspection of trenches prior to resuming construction activities each day, and installation of escape ramps so that animals that fall in the trench could escape. Implementation of this measure would mitigate adverse impacts to wildlife from entrapment.

Common birds could nest in the ornamental plantings, on facilities and equipment, or on the ground within the AEC site. Many adult birds would flee from equipment during project construction. However, nestlings and eggs of ground-nesting birds or birds nesting on ornamental trees, other landscaping, or equipment and facilities would be vulnerable to impacts during project construction. Nests, nestlings, and eggs of native birds are protected by the MBTA and Fish and Game Code Sections 3503 and 3513. Construction and demolition activities during nesting season could destroy bird nests, including eggs or nestling birds.

The applicant proposes to conduct a preconstruction active nest survey and, if determined necessary, monitor active nests during construction and demolition activities (AEC 2015f; p. 5.2-17). Staff agrees with the need for preconstruction nest surveys and has incorporated the applicant’s proposed measure into Condition of Certification **BIO-8** (Preconstruction Nest Surveys and Impacts Avoidance and Minimization Measures for Breeding Birds). This condition would require a survey for birds in advance of work conducted between January 1 and August 31, on the project site and the wastewater pipeline route, and establishment of a no-disturbance buffer if a nest is identified. Additionally, general measures presented in Condition of Certification **BIO-7** (Impact Avoidance and Minimization Measures) (e.g., limited disturbance areas) would avoid and minimize impacts to nesting birds. With implementation of Conditions of Certification **BIO-7** and **BIO-8**, no significant impacts to nesting birds would result from proposed project construction and demolition activities and the project would comply with MBTA and California Fish and Game Code.

Wildlife habitat in the project region has been significantly fragmented by urban development. The AEC site does not provide biological connectivity or wildlife movement routes among local habitat areas; therefore, there would be no significant impacts to wildlife movement or habitat fragmentation. An analysis of impacts to wildlife from noise and lighting is presented under "General Construction and Demolition Impacts," below.

Construction and Demolition Impacts to Special-Status Plants

Southern tarplant (CRPR 1B.1; see **Biological Resources Table 2**) is the only special-status plant with moderate or higher probability of occurring in the project area. It is not expected on the AEC generator site itself, but has a high probability of occurring along the proposed wastewater pipeline. Southern tarplant may occur in disturbed soils around the margins of marshlands and former marshlands, possibly including ruderal sites along the proposed pipeline alignment at Studebaker Road and Loynes Drive. Loss of southern tarplant or occupied habitat from construction of the proposed wastewater line could be a significant impact if the project affected a substantial proportion of the local occurrences. Staff recommends Condition of Certification **BIO-9** (Southern Tarplant Survey and Mitigation), to (1) determine whether southern tarplant occurs on the proposed alignment; (2) if so, to evaluate the on-site occurrence in terms of its significance; and (3) if impacts would be significant, to mitigate them by creating or restoring a southern tarplant occurrence at the temporarily disturbed pipeline alignment or an off-site location such as within the Los Cerritos Wetlands. Significant impacts to southern tarplant that would require mitigation are considered to be loss of 10 percent of the local southern tarplant population (i.e., within 0.25 mile from the pipeline alignment), or 10 percent of the occupied habitat within the same radius. With implementation of **BIO-9**, the project's potential impacts to southern tarplant would be reduced below a level of significance.

Other special-status plants occur in the marshes adjacent to the AEC site; however, recruitment into the project site would be unlikely and limited to landscaped or unpaved areas. Ongoing maintenance and weed control would prevent any rare plants from persisting. The project is not expected to have direct impacts to other special-status plants .

Special-status plants that inhabit the Los Cerritos Wetlands, such as Lewis' evening primrose, southern tarplant, southwestern spiny rush, Coulter's goldfields, California box-thorn, estuary seablight, and wooly seablight, could be indirectly impacted from runoff of sediment or toxic substances from the project site, dust, or spread of invasive weeds during construction and demolition. These potential impacts are discussed under "General Construction and Demolition Impacts," below.

Construction and Demolition Impacts to Special-Status Wildlife

Although most special-status wildlife species are not expected to occur at the project site (except during casual flyover or resting), several may forage, roost, or breed in nearby marshes. These species include the wandering saltmarsh skipper, silver-haired bat, western yellow bat, and several bird species. The federally listed green sea turtle occupies the lower San Gabriel River adjacent to the AEC site, and surrounding bays and inlet areas. Project demolition and construction could affect special-status wildlife in the marshes and river near the AEC site by causing noise and lighting disturbance, and habitat degradation from invasive weeds, stormwater runoff, or groundwater contamination. These impacts are discussed under “General Construction and Demolition Impacts,” below.

Nesting special-status birds in the nearby Los Cerritos Wetland complex could be disturbed by construction and demolition detailed in the following subsections. The state-listed Belding’s savannah sparrow breeds in the Los Cerritos Wetlands, and the local breeding populations of light-footed clapper rail (federally and state-listed), western snowy plover (federally listed), and California least tern (federally and state-listed) may expand their ranges into the Los Cerritos Wetlands during the 56-month project construction and demolition period. The Los Cerritos Wetlands are approximately 700 feet from the nearest construction and demolition activities on the AEC site, and general construction and demolition disturbance would not affect birds that far away. Impacts from construction and demolition noise are analyzed below.

Condition of Certification **BIO-8** would require pre-construction surveys for all breeding birds, including special-status birds, within 300 feet of construction and demolition activities on the project site and the wastewater pipeline route. Where pre-construction surveys identify breeding birds, **BIO-8** would require a no-disturbance buffer around the nest site(s). Implementation of **BIO-8** would reduce impacts to special-status breeding birds in the project vicinity to less than significant.

The monarch butterfly (*Danaus plexippus*) is notable for its long-distance multiple-generational annual migration. The International Union for Conservation of Nature (IUCN) recognizes the monarch butterfly migration as an Endangered Phenomenon. On the west coast, monarchs overwinter in coastal California. They migrate over multiple generations northward, and possibly south into Mexico, during spring and summer, and then return to coastal overwintering areas. Well known roost sites are also found on the central California coast. These roost sites are important to the larger migration phenomenon. Monarch butterflies have been reported in the vicinity of the project site, but there are no known overwintering trees or forests in the vicinity. Any potential project impacts to monarch butterflies would be less than significant and no mitigation is recommended.

Construction and Demolition Impacts to Jurisdictional Wetlands and Waters

The proposed AEC project would not result in direct loss or fill of jurisdictional wetlands or waters, as there are none present within the project area.

The AEC site is near the Los Cerritos wetlands which includes estuarine and marine wetland habitats. These areas appear to meet criteria as jurisdictional waters of the state and waters of the U.S. Indirect impacts to wetlands may result if construction contaminants, sediment, or untreated stormwater effluent from the AEC project enter these sensitive areas. The applicant has committed to implementing Best Management Practices (BMPs) to control site runoff during construction and demolition activities in accordance with the project's Stormwater Pollution Prevention Plan (SWPPP) (AEC 2015f, p. 5.2-13); this requirement is subsumed as a requirement of Condition of Certification **SOIL&WATER-1**. With implementation of these measures, indirect water quality impacts to adjacent wetland habitats would be less than significant.

General Construction and Demolition Impacts

Noise

Noise from construction and demolition activities could discourage special-status wildlife from foraging and nesting near the proposed project area, due to interference with communication, disturbance or disruption of activities, or startling from loud noises. Noise may affect birds in several ways, including reducing reproductive success; raising the level of stress hormones; interfering with sleep; causing permanent injury to the auditory system; and interfering with acoustic communication by masking important sounds, such as an approaching predator (Halfwerk et al 2011; Dooling 2006; Kight and Swaddle 2011). Many bird species rely on vocalizations to communicate with mates or offspring, or defend territories. Loud noise from surrounding areas can "mask" these vocalizations. However, most demolition and construction noise is at lower frequencies than bird vocalizations, or is intermittent (e.g., pile driving). These project-related noises are not expected to mask bird vocalizations. If birds are startled by loud noises, they may flush from their nests, leaving eggs or young unattended. Or an adult bird delivering food may avoid the nest area due to disturbance. These effects could adversely affect nesting success. Special-status species present in the Los Cerritos Wetlands complex may be affected by construction and demolition noise. Special-status birds that may be affected include the Belding's savannah sparrow (state-listed endangered), California least tern (federally and state-listed endangered), burrowing owl (California Species of Special Concern [CSC]), short-eared owl (CSC), northern harrier (CSC), yellow-breasted chat (CSC), loggerhead shrike (CSC), black skimmer (CSC), and California brown pelican (state fully protected). Of these, only Belding's savannah sparrow is known to nest in the marshes. Loggerhead shrike and black skimmer are year-round residents in the marshes and may breed there. The remaining special-status species only occur seasonally, or forage but do not nest in the marshes.

Construction and demolition noise would occur over 56 months in proximity to the Los Cerritos wetlands complex. Noise staff estimated daytime ambient noise to be approximately 53 dBA in the northeast corner of the Los Cerritos Wetlands west of the AEC site (i.e., the marsh location nearest to project construction and demolition activities). The loudest noise generated by the proposed project during construction and demolition would be from pile driving; this is also the noise most likely to cause startling effects to birds. Unsilenced pile driving would be approximately 76 dBA at the northeast corner of the Los Cerritos Wetlands (about 1,200 feet from nearest pile driving and based on 104 dBA at 50 feet). However, several methods are available to reduce pile-driving noise; these include 1) use of pads or plywood impact cushions, 2) dampened driving using a blanket or enclosure around the hammer, and 3) use of vibratory pile drivers. These methods reduce noise by about 8 dBA to 15 dBA compared to unsilenced impact drivers.

Human receptors are located closer to the AEC site than the Los Cerritos Wetlands, and include residential neighborhoods to the west, north, and east of the site as well as a school adjacent to the northern boundary of the site. Conditions of certification proposed in the **Noise** section of this PSA would require effective measures to control construction and demolition noise at its source, which benefits all of the surrounding area including the Los Cerritos Wetlands complex. Noise staff's proposed Condition of Certification **NOISE-8** requires noise and vibration minimization measures for pile driving, and Condition of Certification **NOISE-6** requires mitigation measures for all noisy construction activities. With implementation of these conditions of certification, construction and demolition noise impacts to special-status species in the vicinity of the AEC would be less than significant.

Lighting

Construction and demolition activities would typically occur between 7:00 a.m. and 7:00 p.m. Monday through Friday, and between 9:00 a.m. and 6:00 p.m. on Saturday. Overtime and additional shift work may be used to maintain the construction schedule or to complete critical construction activities (for example, pouring concrete at night during hot weather, or working around time-critical shutdowns and constraints). During the commissioning and startup phase of each of the power blocks, some activities may continue 24 hours per day, 7 days per week. Bright lighting at night could disturb the nesting, foraging, or mating activities of wildlife in the nearby marshes and make wildlife more visible to predators. Night lighting could disorient migratory birds and, if placed on tall structures, may attract birds and increase the likelihood of collision. Although local wildlife have presumably acclimated to lighting from the existing operations at the AGS and traffic on adjacent roadways, project-related increased night lighting could significantly increase these effects to special-status wildlife.

If night construction were required, the applicant proposes to use task-specific lighting to the extent practicable and shield and direct lighting onsite (AEC 2015f, p. 5.13-15). These measures are incorporated into Condition of Certification **VIS-1** (refer to the **Visual Resources** section for the full text of this condition). With implementation of these measures, impacts to wildlife from construction night lighting would be less than significant.

Construction Dust

Fugitive dust would result from operating vehicles and equipment on unpaved surfaces on the AEC site, including grading and bulldozing during construction and demolition. Demolition activities such as the top-down removal of the boilers and stacks, and loading waste haul trucks with materials and debris could also generate dust. Dust can have deleterious physiological effects on plants and may affect their productivity and nutritional qualities for feeding wildlife.

The applicant has proposed mitigation measures to reduce fugitive dust emissions during demolition and construction (AEC 2015f, p. 5.1-44 to 5.1-45). Staff proposes conditions of certification to avoid and minimize impacts of dust generated by construction and demolition activities. Condition of Certification **AQ-SC3** requires specific measures to minimize fugitive dust, and Condition of Certification **AQ-SC4** requires construction monitoring for visible dust plumes and remediation measures in the event visible dust plumes are observed. With implementation of these conditions of certification, impacts to plants and habitat in the Los Cerritos Wetlands from project-related dust would be less than significant.

Invasive Weeds

The spread of invasive weeds degrades or destroys wildlife habitat and forage, threatens native plants, including special-status species, and often increases soil erosion and groundwater loss. Demolition and construction activities and related soil disturbance could further spread weeds already present in the project vicinity, introduce new invasive weeds to the area, and perhaps lead to weed infestation in the Los Cerritos Wetlands. Invasive weeds can easily colonize areas of ground disturbance. Special-status plants and wildlife in the Los Cerritos Wetlands could be adversely affected by new or worsened weed infestations. In addition, portions of the wetlands are undergoing restoration, or will be restored over the 56-month demolition and construction period. Early phase restoration sites will be particularly vulnerable to weed infestations.

No substantial invasive weed populations are known within the proposed project area. However, to avoid or minimize the spread of existing weeds and the introduction of new ones, staff proposes weed management measures in Condition of Certification **BIO-7** (Impact Avoidance and Minimization Measures). This condition would require limiting vegetation and ground disturbance to the minimum required for safe project completion, and limiting ingress/egress to defined routes. Staff also proposes Condition of Certification **SOIL&WATER-1,** which would require a site-specific construction SWPPP to manage runoff. Stormwater runoff would be contained and prevented from draining to adjacent sensitive habitats; therefore weed propagules would be prevented from washing into the wetlands. Further, straw bales and other sediment control features would be weed free, and invasive non-native species would be prohibited from use as landscape plantings. Implementation of these recommended conditions of certification would reduce potential impacts from introduction and spread of invasive weeds into sensitive habitat to less than significant.

Stormwater Runoff

There are no creeks, drainages, wetlands, or other aquatic resources on the project site or pipeline alignment. However, the San Gabriel River is adjacent to the proposed AEC site. There is a tall berm separating the project site from the river, and during construction and demolition all stormwater on site will be routed into the existing stormwater collection system. Toxic materials, if allowed to wash from the site into the river or nearby marshes, can injure or kill wildlife and vegetation, and degrade habitat. During construction and demolition, the existing stormwater collection system would collect stormwater from the project site and route it to the oil/water separator before discharge to the San Gabriel River via existing permitted outfalls. The applicant has committed to the following measures to avoid, minimize, and mitigate potential impacts from construction and operational stormwater runoff (AEC 2015f, p. 5.15-14):

- Implement Best Management Practices designed to minimize soil erosion and sediment transport during construction of the AEC in compliance with the statewide General Construction Permit.
- Design appropriate erosion and sediment controls for slopes, catch basins, culverts, stream channels, and other areas prone to erosion in compliance with both the statewide General Construction Permit and General Industrial Permit.

In addition, staff's proposed Condition of Certification **SOIL&WATER-1**, would require the project owner to prepare and implement a site-specific construction SWPPP. With implementation of this measure and the applicant's commitment to the impact minimization measures listed above, project impacts to biological resources from stormwater runoff would be less than significant.

Groundwater Contamination

Construction materials could contaminate groundwater if not properly used and stored. If the proposed project caused groundwater contamination (including spills of toxic materials from equipment leakage), adverse effects to vegetation and wildlife at the Los Cerritos Wetlands could occur. Such construction impacts would be minimized or avoided through implementation of a SWPPP and associated BMPs (pursuant to Condition of Certification **SOIL&WATER-1)**. Implementation of Condition of Certification **SOIL&WATER-1** would minimize or avoid the potential for adverse impacts to vegetation and wildlife in nearby marshes from groundwater contamination and this impact would be less than significant.

OPERATION IMPACTS AND MITIGATION

Noise

The proposed AEC is on an industrial site that is currently occupied by the operating AGS and is near other industrial and commercial land uses and heavily travelled roadways. However, it is also located adjacent to the Los Cerritos Wetlands, which support sensitive biological resources including special-status birds. The existing AGS, urban development, and roadways in the area contribute to ambient noise. Potential noise effects to wildlife are described above under "Construction Impacts and Mitigation." Operational noise from the AEC also has the potential to affect wildlife.

The anticipated steady-state operational sound level from the AEC would be 55 dBA at noise monitoring location M1, a residence approximately 500 feet west of the project site (AEC 2015f, p. 5.7-12). At the nearest point, the Los Cerritos Wetlands are more than twice that distance from the AEC site. Operational noise levels in the wetlands would be similar to existing conditions, including noise from the existing AGS. Therefore, operational noise impacts to wildlife at the Los Cerritos Wetlands would be less than significant.

Lighting

Potential lighting effects to wildlife are described above under "Construction Impacts and Mitigation". The applicant states that operational lighting for the proposed AEC would minimally increase the current light from the project site, as the existing AGS is brightly lit at night and the new AEC facility would conform to current night lighting standards, which require minimal lighting, directional lights, and switched lighting circuits for areas where lighting is not required for normal operation or safety. The AEC would also have enclosed stairwells, so lighting from these areas would not be visible. Once the existing AGS generating units are retired (expected by the end of 2010), the amount of lighting at the site, even with the lighting required by the AEC, would be less than under existing conditions (AEC 2015f; p 5.13-14). To minimize backscatter of light to the sky and ensure that lighting does not obtrude beyond the project site, staff proposes Condition of Certification **VIS-4** (refer to the **Visual Resources** section for the full text of this condition). To minimize potential for birds to be attracted to any aviation lighting on tall structures, Condition of Certification **BIO-7** requires blinking lights with the minimum intensity allowed, as feasible. Impacts to wildlife from proposed operation night lighting are potentially adverse, but less than significant.

Bird Collision and Electrocution

The Los Cerritos Wetlands and other regional wetlands attract resident and migratory birds for foraging, resting, and breeding. Birds moving among these habitats could be subject to collision or electrocution with proposed AEC facilities and appurtenant structures including transmission lines and transmission support structures.

Birds can collide with transmission lines, exhaust stacks, and other project structures, causing injury or mortality. Bird collisions with power lines and structures generally occur when a power line or structure transects a daily flight path used by a concentration of birds and these birds are traveling at reduced altitudes (Brown 1993). Collision rates generally increase in low light conditions, during inclement weather, during strong winds, and during panic flushes when birds are startled by a disturbance or are fleeing danger. Collisions are more probable near wetlands, within valleys that are bisected by power lines, and within narrow passes where power lines run perpendicular to flight paths (APLIC 2012).

Although collision may occur, it is not likely that the frequency of bird injury or mortality due to collision with AEC transmission lines and facilities would significantly increase from existing levels, or significantly affect populations of any bird species. The AEC would not present significant new collision hazards and would remove or reduce some collision risk of the existing AGS, once that facility is retired. The proposed AEC exhaust stacks for the CCGT generators would be 140 feet tall and the stacks for the SCGT generator would be 80 feet tall, much shorter than 350 feet (the height above which is considered dangerous to migrating birds), and shorter than the existing AGS stacks which are over 200 feet tall. When the AGS facility is retired, the reduction would lower bird collision risk compared with existing conditions.

AEC would connect to the regional electrical grid using the existing SCE 230-kV switchyard located on a parcel owned by SCE within the existing AGS site. No new offsite transmission lines are proposed. The AEC power blocks would connect into the existing SCE switchyard via new double-circuit or single-circuit 230-kV generation tie lines. Direct and indirect impacts to birds from collision with structures are expected to be minimal and consistent with baseline conditions, given the project location and existing power lines, tall structures, and facilities on the site.

Osprey and other large birds, including those afforded state or federal protection, are susceptible to transmission line electrocution. Because raptors and other large birds often perch or build nests on tall structures that offer views of potential prey, the design characteristics of transmission towers and poles are a major factor in raptor electrocutions (APLIC 2012). Electrocution occurs when a bird simultaneously contacts two energized phase conductors or an energized conductor and grounded hardware. This happens most frequently when a bird attempts to perch on a transmission tower or pole with insufficient distance between these elements.

The majority of raptor electrocutions are caused by lines that are energized at voltage levels between 1 kV and 60 kV. The likelihood of electrocutions occurring on transmission lines carrying voltages greater than 60 kV is low because wider phase-to-phase and phase-to-ground clearances for lines greater than 60 kV are typically sufficient to prevent bird electrocution (APLIC 2006). Therefore, the new 230 kV onsite generation tie lines have a low likelihood of causing bird electrocution.

The new onsite generation tie lines, while posing a collision risk to birds, would be entirely within the developed site, near the existing transmission lines and tall generation facility structures. The new AEC generation tie lines would not appreciably increase collision risk over baseline conditions. Nonetheless, because of the large numbers of shorebirds, including listed species, in the nearby Los Cerritos Wetlands and the likelihood that many birds fly over the project site en route to the marshes, staff's proposed Condition of Certification **BIO-7** (Impact Avoidance and Minimization Measures) includes a requirement that the project owner construct the generation tie lines in accordance with Avian Power Line Interaction Committee (APLIC) standards to minimize or avoid bird collisions and electrocutions. With implementation of this component of Condition of Certification **BIO-7**, this impact would be less than significant.

<u>Stormwater Runoff</u>

Potential effects of stormwater runoff to biological resources are described above under Construction Impacts and Mitigation. Similar effects could result from stormwater runoff during operation of the project. Stormwater runoff from the power block areas will be directed to oil/water separators and to an existing retention basin and then ultimately discharged to the Los Cerritos channel via existing stormwater outfalls. Stormwater runoff would be conveyed in accordance with NPDES General Industrial Permit requirements. For more information on water quality impacts, please see the **Soil and Water Resources** section.

The applicant has committed to BMPs to avoid, minimize, and mitigate potential impacts from construction and operational stormwater runoff (AEC 2015f). These measures are described above under "General Construction and Demolition Impacts – Stormwater Runoff." In addition, staff's recommended Condition of Certification **SOIL&WATER-4** would require the project owner to obtain a National Pollutant Discharge Elimination System permit for industrial waste and stormwater discharge to the Pacific Ocean through the existing AGS outfall. With implementation of this measure, potential project impacts from stormwater runoff during operation would be less than significant.

Air Emissions – Nitrogen Deposition

Nitrogen deposition is the input of nitrogen oxide (NO_x) and ammonia (NH_3) derived pollutants from the atmosphere to the biosphere. These pollutants are deposited as "atmospherically derived nitrogen" (ADN), primarily nitric acid (HNO_3). The chemical conversion from NO_x and NH_3 to ADN takes place in the atmosphere over a period of hours after the pollutants are discharged from their sources. Nitrogen deposition sources are primarily vehicle and industrial emissions, including power plants. Nitrogen deposition increases soil fertility for weedy plants, leading in some situations to increased weed growth rates and abundance. As weeds become more dominant, they may outcompete native species (including special-status species), leading to native habitat degradation (Fenn et al. 2003; Weiss 2006). The increased dominance and growth of invasive annual grasses is especially prevalent in low-biomass habitats where growth rates are naturally limited by low nitrogen availability.

Regional Clean Air Incentives Market ("RECLAIM") Trading Credits would offset the AEC's annual NO_x increase in a 1-to-1 ratio so that the proposed project would not result in a net increase in NO_x basin-wide (see the **Air Quality** section of this PSA for more information on the RECLAIM program) (AEC 2014b). This offset would mitigate the project's effects to basin-wide nitrogen deposition. The biological effects of nitrogen deposition analyzed here are distinct from regional basin-wide NO_x effects because the potential effect to biological resources is localized, limited to the area where atmospheric nitrogen pollutants specifically attributed to the project's exhaust plume may be deposited on the soil.

Staff considered occupied habitat of listed threatened or endangered species within a 6-mile radius of the project site to be potentially sensitive to nitrogen deposition from the AEC. The 6-mile radius is based on staff's experience that in-plume nitrogen concentrations are indistinguishable from background concentrations at greater distances. However, staff notes that much of the emitted NO_x and NH_3 would not convert to ADN and deposit to ground within the 6-mile radius due to the time lag from initial emission of nitrogen pollutants through conversion to ADN and subsequent deposition (see **Biological Resources Appendix 1**). Habitats within six miles of the AEC that support listed species are located at the Bolsa Chica Ecological Reserve, Los Cerritos wetlands complex, and Seal Beach National Wildlife Refuge. State- and federally listed species that inhabit these protected areas include the western snowy plover (federally listed threatened), Belding's savannah sparrow (state-listed endangered), light-footed clapper rail (federally and state-listed endangered), California least tern (federally and state-listed endangered), and coastal California gnatcatcher (federally listed threatened). In addition, designated critical habitat for the western snowy plover is located at the Bolsa Chica Ecological Reserve, approximately five miles from the AEC site. Figure 5.2-1 in the AFC (AEC 2013a) shows critical habitat and protected areas in the project vicinity. These habitat areas may be sensitive to nitrogen deposition if it were to cause increased weed abundance.

Adverse effects of nitrogen deposition vary according to habitat type, based on natural availability of soil nitrogen and vulnerability to invasive weeds. "Critical load" (CL) is the threshold nitrogen deposition rate that causes adverse effects to nitrogen-sensitive ecosystems. If a project would cause nitrogen deposition to exceed CL for a sensitive native habitat type, or deposit additional nitrogen in a sensitive habitat where the CL is already exceeded, this impact would meet the CEQA significance criteria for adverse impacts to sensitive habitats.

A given habitat's CL is difficult to determine for a variety of reasons, including limited data or a wide range of values reported in the literature; data from regions that are not comparable to the project region in terms of climate regime, other unrelated disturbance, and stressors on target habitats; and other confounding factors.

The most abundant habitat supporting listed species in the region is coastal salt marsh, where the nitrogen CL ranges from 63 to 400 kg/ha/yr. These habitats are not as sensitive as uplands to atmospheric nitrogen deposition because tidal sea water influx and flushing create open nitrogen cycles (Pardo et al. 2011; Greaver et al. 2012). Small areas of natural and restored coastal dunes, coastal sage scrub, coastal dune scrub, and riparian woodland in the project region may be sensitive to nitrogen deposition (Pardo et al. 2011).

The critical nitrogen load for coastal sand dunes, which includes nesting habitat for federally listed western snowy plover and federally and state-listed California least tern, ranges from 10 to 20 kg/ha/yr. However, western snowy plover and California least tern nest on areas with little to no vegetation, and nesting sites in the project vicinity are managed to maintain appropriate nesting conditions (Knapp and Peterson 2013; USFWS 2006). Very limited coastal sage scrub is located on some upland areas in Bolsa Chica Ecological Reserve; this vegetation has a CL of 7.8 kg/ha/yr.

Air quality staff modeled the estimated nitrogen deposition from the AEC within a six-mile radius of the project site, including the Los Cerritos wetlands complex, Bolsa Chica Ecological Reserve and western snowy plover critical habitat, and the Seal Beach National Wildlife Refuge. An Energy Commission Public Interest Energy Research study modeled total nitrogen deposition throughout California (Tonneson et. al. 2007); results of this study were used to determine baseline nitrogen deposition in the protected areas and critical habitat. **Biological Resources Table 3** presents the results of the modeling exercise along with the primary vegetation in each area and associated CL (Pardo et al. 2011).

Biological Resources Table 3
Modeled AEC Nitrogen Deposition on Listed Species Habitats within Six Miles

Location	Primary Vegetation Type	CL for N Deposition (kg N ha-1 yr-1)[a]	Baseline N Dep (kg N ha-1 yr-1)[b]	AEC Point Source N-Dep (kg N ha-1 yr-1)[c]	Total predicted N-Dep (kg N ha-1 yr-1)
Los Cerritos Wetlands Complex	Intertidal salt marsh	63-400	2.42-13.24	0.2-0.7	2.62-13.94
Seal Beach National Wildlife Refuge	Intertidal salt marsh	63-400	2.42-12.34	0.08-0.14	2.50-12.48
Bolsa Chica Ecological Reserve	Intertidal salt marsh	63-400	2.15-11.10	0.04-0.06	2.19-11.16
Western snowy plover Critical Habitat	Coastal dunes; coastal mud flats	10-20; >34	2.19-11.01	0.04-0.06	2.23-11.07

a – Pardo et al., 2011; Bobbink and Hettelingh, 2011; van Dobben et al., 2013.
b – Tonneson et. al. 2007
c – Values based on CH2 2016o and CH2 2016s, cited in Biological Resources Appendix 1.

Air quality staff prepared a technical analysis of the nitrogen deposition modeling for the project and the baseline data; see **Biological Resources Appendix 1.** Air quality staff determined that, while the AERMOD model used for this analysis is the best available model for estimating nitrogen deposition, its results are likely to be 10-fold higher than actual nitrogen deposition due to several conservative assumptions in the model. Further, baseline values at present are likely to be half of what they were in 2002 (the year of the baseline data reported by Tonneson et. al. 2007; see **Biological Resources Appendix 1**).

Even with the substantial overestimation of modeled nitrogen deposition, the nitrogen deposition rates of the proposed AEC would not approach CL for most sensitive vegetation and habitat in the 6-mile radius of the project site. According to the model, the upper range of baseline nitrogen deposition in coastal dunes exceeds the lower estimate of CL for that habitat. The project's estimated additional nitrogen deposition would be minimal (0.04 to 0.06 kg/ha/year, or less than one percent of the upper baseline estimate). Additionally, staff believes that nitrogen emissions inventory and baseline nitrogen deposition level has decreased since 2002 by more than 50 percent (refer to **Biological Resources Appendix 1** for additional details).

The estimated baseline for coastal salt marsh and mud flat habitats are well below the critical load thresholds, and additional project-related nitrogen deposition would not cause the total to exceed the critical loads. This is due to the naturally high nitrogen availability in these habitats.

Based on (1) the over-estimate of nitrogen deposition inherent to the AERMOD model, (2) the limited area of potentially affected native vegetation, (3) weed management practices at nest sites for listed birds, and (4) the current overestimate and continuing downward trend of baseline NOx and NH_3, staff concludes that nitrogen deposition impacts to listed species and sensitive habitats would be less than significant.

CUMULATIVE EFFECTS

Cumulative effects are those that result from the incremental effects of a proposed action considered with other past, present, and reasonably foreseeable future actions. Cumulative effects can result from individually minor but collectively significant actions taking place over time.

A project may result in a significant adverse cumulative effect if its effects contribute considerably to an overall cumulatively significant impact. The existing operational AGS Units 1 through 6 are nearing the end of their useful life and utilize once-through cooling (OTC). In 2010, the SWRCB approved an OTC policy that includes phasing out the use of OTC in part to protect marine life. Therefore, the existing AGS Units 1 through 6 are expected to be decommissioned within a few years. The demolition of the existing Units 1 through 6 would then be conducted pursuant to a Memorandum of Understanding between the project owner and the city of Long Beach. Therefore, there would be some overlap between the construction and operation phase of the AEC and the operation and then demolition of the AGS Units. In addition, there are currently proposed projects near the AEC that may impact local biological resources, especially those in and near the Los Cerritos wetlands complex and other regional wetlands. These projects include the Alamitos Barrier Improvement Project and a planned retail development at Pacific Coast Highway and 2nd Street. Other cumulative projects identified within six miles of the AEC would be too far from the site to contribute cumulatively to impacts to biological resources.

If operation and demolition of the AGS or construction and demolition activities from the Haynes Generating Station or other nearby projects overlap with those of the AEC, cumulative indirect impacts to wildlife from noise, dust, lighting, spread of invasive weeds, or stormwater runoff could occur. However, implementation of Conditions of Certification **BIO-1** through **BIO-7, SOIL&WATER-1, AQ-SC3, AQ-SC4, NOISE-6, NOISE-8,** and **VIS-1** would minimize these impacts from the proposed AEC, and the AGS demolition, the Haynes Generating Station, and other nearby projects would have similar mitigation requirements to minimize these impacts in the context of human receptors such as residential communities, schools, and other sensitive receptors. These measures would also minimize each project’s impacts to biological resources in the area.

Green Sea Turtles. The Pacific green sea turtles inhabiting the San Gabriel River and surrounding bays and inlets are observed congregating near the warm water outfalls of the existing AGS plant and the adjacent LADWP Haynes power plant on occasion. This area appears to be the warmest location in the river during winter months, although temperatures upstream are warmer during the summer. Turtles are more widely distributed during the summer but appear to congregate near the outfalls in winter. Turtle distribution and movement throughout the area is the subject of ongoing research, and limited data is available for this population.

A population of green sea turtles also inhabits San Diego Bay, where the South Bay Power Plant (SBPP) had discharged warm water effluent from 1960 until it was decommissioned in 2010. The San Diego population has been studied intensively for over two decades, and although the ecological characteristics of the San Diego Bay differ from those at the San Gabriel River, this population's response to power plant decommissioning is useful in considering the effects of the AGS's elimination of warm water discharge on local sea turtles. Following the SBPP's decommissioning, green sea turtles remained in the bay but their distribution is changing. The turtles are more dispersed and no longer congregate at high densities near the plant (Turner-Tomaszewicz and Seminoff 2012). Green sea turtles are behaviorally and physiologically adapted to survive seasonally cool waters in more natural habitats; these adaptations include temporarily leaving cold areas, hibernating, and overwintering (Turner-Tomaszewicz and Seminoff 2012). Artificially warmed water may allow turtles to be active year-round in areas where they would otherwise aestivate or vacate during winter.

The slow transition period for eliminating warm water outfall from the existing AGS plant is expected to allow sea turtles to gradually adapt to the changing temperature regime by adjusting their local activities. In addition to directly affecting the turtles themselves, the changing water temperatures are likely to affect other habitat conditions, such as abundance, productivity, and distribution of food resources (including eelgrass, algae, and invertebrates).

The AGS is not the only source of warm water inputs to the local river and Alamitos Bay. Water treatment plants, urban runoff, the adjacent LADWP Haynes power plant, and physical characteristics of local sea turtle habitats all contribute to warm year-round temperatures. Even in the absence of the existing power plants' warm water outfalls, the river and surrounding bays and inlets are suitable habitat for sea turtles (D. Lawson, pers. comm.). Further, ongoing and planned future restoration of the Los Cerritos Wetlands and San Gabriel River mouth could increase habitat quality and quantity for sea turtles in these areas.

In summary, the San Gabriel River is in a highly urbanized and developed area, with little natural habitat available to sea turtles. The elimination of warm water effluent may cause sea turtles to disperse more widely or decrease activity during colder months. But little is known about the seasonal activity of this population and response to the cessation of warm water discharge from the AGS is difficult to predict. Staff concludes that it is unlikely that elimination of OTC would result in adverse effects to sea turtles because the warm water outfalls are only one of many factors that are likely to contribute to favorable water temperatures. Additionally, the turtles will have the opportunity to adapt local activities to the temperature shifts over a period of several years.

The LADWP's Haynes Generating Station on the east side of the San Gabriel River, opposite the AEC site, is in the process of converting from OTC to dry cooled technology. A portion of the plant has already been replaced over the last nine years, and repowering of Haynes Units 1 and 2 is scheduled for completion at the end of 2023. Haynes Unit 8 repowering is scheduled for completion at the end of 2029 (P. Chua, pers. comm.).

Elimination of OTC from the Haynes Generating Station, combined with decommissioning of the AGS, would eventually eliminate of warm water effluent at this location. However, the elimination of OTC and the associated warm water effluent would occur gradually over more than a decade, and sea turtles in the area will have time to adapt activity and habitat use to the changes in temperature regime. In addition, the AGS and Haynes Generating Station are not the only sources of warm water inputs to the San Gabriel River, and it is unlikely that sea turtles are dependent on these unnatural warm water sources especially during the summer months. The proposed AEC would not directly contribute to impacts to green sea turtles from the cessation of warm water effluent because the AGS units would need to be retired or converted to a differently technology to comply with the OTC policy regardless of whether the AEC is built, and the AEC would not contribute to or eliminate any warm water discharges currently occurring. Therefore, the proposed AEC would not contribute to cumulative effects to sea turtles.

As with the AEC, demolition of existing AGS Units 1 through 6 and the Haynes Generating Station would not be likely to have direct effects to special-status species or other biological resources, as special-status species are unlikely to occur on these industrial brownfield sites.

Once operational, the AEC would not result in a substantial change from baseline conditions for other biological resources. Operational noise and nitrogen deposition impacts would not differ substantially from baseline conditions, and the AEC's contribution to these impacts would not be cumulatively considerable.

In conclusion, the proposed AEC would not contribute considerably to cumulative effects to biological resources.

FACILITY CLOSURE

When the AEC is closed in the future, whether planned or unexpected, it must be done so that closure activities protect the environment and public health and safety. A closure plan would be prepared by the project owner prior to any planned closure. To address unanticipated facility closure, an "on-site contingency plan" would be developed by the project owner and approved by the Energy Commission compliance project manager (CPM). Facility closure requirements are discussed in more detail in the **General Conditions** section. Facility closure mitigation measures would also be included in the Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP) prepared by the project owner and described in staff's proposed Condition of Certification **BIO-6.**

Upon decommissioning and permanent facility closure, reclamation would be necessary to prevent adverse effects such as contamination from hazardous substances, erosion, dust, invasion and spread of weeds, and hazards to wildlife from abandoned project infrastructure. Staff concludes that these potential effects of facility closure and decommissioning would be a significant impact absent mitigation. Decommissioning activities are likely to cause similar indirect impacts to adjacent sensitive biological resources as described above for the construction and demolition phases of the proposed project.

To ensure that public health and safety and the environment are protected during decommissioning, the applicant has committed to developing a decommissioning plan that would be submitted to the Energy Commission for approval prior to decommissioning (AEC 2015f, p. 2-32). If possible, unused chemicals would be sold back to the suppliers or other purchasers or users. All equipment containing chemicals would be drained and shut down to ensure public health and safety and to protect the environment. All nonhazardous wastes would be collected and disposed of in appropriate landfills or waste collection facilities. All hazardous wastes would be disposed of according to all applicable LORS.

Decommissioning and site closure would be likely to result in similar types of impacts to biological resources as construction and demolition. It is anticipated that conditions of certification similar to **BIO-1** through **BIO-9** would minimize or avoid these impacts to biological resources, and impacts to biological resources would be less than significant.

COMPLIANCE WITH LORS

The proposed project must comply with LORS that address state and federally listed species, as well as other sensitive biological resources. Applicable LORS are described in **Biological Resources Table 1**.

With implementation of staff's proposed conditions of certification, the proposed AEC would comply with LORS pertaining to biological resources. No state- or federally listed species occur on the project site or pipeline alignment, and therefore no "take" of listed species would occur.

The proposed project would not result in loss or fill of wetlands or waters of the US (as defined by the US Army Corps of Engineers) or wetlands or waters of the state (as defined by CDFW, California Water Resources Control Board, or California Coastal Commission), as there are none present on the site or pipeline alignment. Indirect impacts resulting from degradation of adjacent wetlands and coastal waters from construction runoff or operational discharges would be less than significant with implementation of Conditions of Certification **SOIL&WATER-1** and **SOIL&WATER-4**. These conditions would ensure compliance with the federal Clean Water Act, California Fish and Game Code 1600 et seq., California Coastal Act, and the Porter Cologne Water Quality Act by requiring control of runoff from the project area and operational discharges to be treated in accordance with NPDES permit requirements.

NOTEWORTHY PUBLIC BENEFITS

The proposed AEC Project would not result in noteworthy public benefits for biological resources.

CONCLUSIONS

Special-status plants and wildlife are not expected to occur on the AEC site, although there is a potential for impacts to one special-status plant species on the proposed wastewater pipeline route. The nearby Los Cerritos wetlands and other natural areas support special-status birds including the Belding's savannah sparrow (state-listed endangered), western snowy plover (federally listed threatened), California least tern (federally and state-listed endangered), and California brown pelican (state fully protected). Project construction and operation could result in the direct and indirect effects presented in **Biological Resources Table 4**. All potential impacts to biological resources can be reduced to less than significant by implementing mitigation measures recommended in this staff assessment.

Biological Resources Table 4
Summary of Impacts to Biological Resources from the AEC

Impact	Condition of Certification	Significance Determination
CONSTRUCTION IMPACTS		
Native vegetation: removal of native vegetation	**None**	Less than significant
Common wildlife: disturbance and injury or mortality to common wildlife, including nesting birds	• **BIO-7** limits disturbance area; • **BIO-8** requires pre-construction nest surveys and impact avoidance.	Less than significant with implementation of conditions of certification
Special-status plants: potential direct impacts on wastewater line; potential off-site impacts from runoff, dust, or invasive weeds	• **BIO-7** controls invasive weeds; • **BIO-9** requires surveys and mitigation for southern tarplant • **SOIL&WATER-1** requires a SWPPP to control runoff and prevent contamination; • **AQ-SC3** requires measures to minimize fugitive dust; • **AQ-SC4** requires construction monitoring and remediation for visible dust plumes.	Less than significant with implementation of conditions of certification
Special-status wildlife: disturbance from noise and lighting, habitat degradation from invasive weeds, stormwater runoff,	• **BIO-7** confines work to delineated areas and controls invasive weeds; • **BIO-8** requires pre-construction nest surveys	Less than significant with implementation of conditions of certification

Impact	Condition of Certification	Significance Determination
groundwater contamination	and impact avoidance; • **NOISE-6** minimizes general construction noise; • **NOISE-8** minimizes noise and vibration from pile driving; • **SOIL&WATER-1** requires a SWPPP to control runoff and prevent contamination; • **VIS-1** minimizes offsite lighting.	
Jurisdictional wetlands and waters: potential degradation from runoff of sediment or toxic substances from the project site	• **SOIL&WATER-1** requires a SWPPP to control runoff and prevent contamination.	Less than significant with implementation of condition of certification
Stormwater runoff: degradation of adjacent habitat	• **SOIL&WATER-1** requires a SWPPP to control runoff.	Less than significant with implementation of conditions of certification
Groundwater contamination: degradation of adjacent habitat	• **SOIL&WATER-1** prevents contamination.	Less than significant with implementation of condition of certification
OPERATION IMPACTS		
Noise: disturbance resulting in mortality or decreased productivity of special-status birds and wildlife	**None**	Less than significant
Lighting: disturbance resulting in altered behavior or increased predation	• **BIO-7** requires any aviation lighting to be configured to minimize attraction of birds; • **VIS-4** minimizes offsite lighting.	Less than significant with implementation of condition of certification
Avian collision and electrocution: injury or mortality	• **BIO-7** minimizes risk by complying with APLIC design standards.	Less than significant with implementation of condition of certification
Stormwater runoff: degradation of adjacent habitat	• **BIO-7** minimizes runoff; • **SOIL&WATER-4** requires compliance with NPDES permit requirements for	Less than significant with implementation of conditions of certification

Impact	Condition of Certification	Significance Determination
	discharge.	
Nitrogen deposition: degradation of habitat by enhancing invasive weeds	**None**	Less than significant

With implementation of proposed conditions of certification, compliance with LORS would be achieved and direct, indirect, and cumulative impacts would be avoided, minimized, or mitigated to less than significant levels.

PROPOSED CONDITIONS OF CERTIFICATION

Staff proposes the following Biological Resources conditions of certification:

DESIGNATED BIOLOGIST SELECTION

BIO-1 The project owner shall assign at least one Designated Biologist to the project. The project owner shall submit the resume of the proposed Designated Biologist, with at least three references and contact information, to the Energy Commission Compliance Project Manager (CPM) for approval.

The Designated Biologist must meet the following minimum qualifications:

1. Bachelor's degree in biological sciences, zoology, botany, ecology, or a closely related field;
2. Three years of experience in field biology or current certification of a nationally recognized biological society, such as The Ecological Society of America or The Wildlife Society; and
3. At least one year of field experience with biological resources found in or near the project area.

In lieu of the above requirements, the resume shall demonstrate to the satisfaction of the CPM that the proposed Designated Biologist or alternate has the appropriate training and background to effectively implement the conditions of certification.

Verification: The project owner shall submit the specified information at least 75 days prior to the start of site mobilization or construction-related ground disturbance activities. No pre-construction site mobilization or construction related activities shall commence until a Designated Biologist has been approved by the CPM.

If a Designated Biologist is replaced, the specified information of the proposed replacement must be submitted to the CPM at least ten working days prior to the termination or release of the preceding Designated Biologist. In an emergency, the project owner shall immediately notify the CPM to discuss the qualifications and approval of a short-term replacement while a permanent Designated Biologist is proposed to the CPM for consideration.

DESIGNATED BIOLOGIST DUTIES

BIO-2 The project owner shall ensure that the Designated Biologist performs the following during any site (or related facilities) mobilization, ground disturbance, grading, demolition, and construction activities. At the direction of the CPM, the project owner may terminate the Designated Biologist’s function during plant operation. However, the project owner shall appoint a replacement Designated Biologist at any time as directed by the CPM, and will ensure the same duties are performed during closure and restoration activities. If no Designated Biologist is available at any time during the life of the project (including operation phase) and the CPM determines that project-related actions may affect biological resources, the CPM may direct the project owner to assign a Biological Monitor or replacement Designated Biologist, for short-term or long-term monitoring and reporting. The Designated Biologist may be assisted by the approved Biological Monitor(s) but remains the contact for the project owner and CPM. The Designated Biologist Duties shall include the following:

1. Advise the project owner's Construction and Operation Managers on the implementation of the biological resources conditions of certification;

2. Consult on the preparation of the Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP) to be submitted by the project owner;

3. Be available to supervise, conduct and coordinate mitigation, monitoring, and other biological resources compliance efforts, particularly in areas requiring avoidance or containing sensitive biological resources, such as special status species or their habitat;

4. Clearly mark sensitive biological resource areas and inspect these areas at appropriate intervals for compliance with regulatory terms and conditions;

5. Inspect or direct the site personnel how to inspect active construction areas where animals may have become trapped prior to construction commencing each day. Inspect or direct the site personnel how to inspect the installation of structures that prevent entrapment or allow escape during periods of construction inactivity. Periodically inspect areas with high vehicle activity (e.g., parking lots) for animals in harm’s way. Inspect soil or spoil stockpiles and dust abatement watering for compliance with Condition of Certification **BIO-7**. Inspect erosion control materials (e.g., hay bales) to confirm weed-free certification. Inspect weed infestations and monitor eradication measures to determine success. Inspect trash receptacles, monitor site personnel compliance with trash handling, pet prohibitions, and all other WEAP components (Condition of Certification **BIO-5**);

6. Notify the project owner and the CPM of any non-compliance with any biological resources condition of certification;

7. Respond directly to inquiries of the CPM regarding biological resource issues;

8. Maintain written records of the tasks specified above and those included in the BRMIMP;

9. Train the Biological Monitors as appropriate, and ensure their familiarity with the BRMIMP, Worker Environmental Awareness Program (WEAP) training, and all permits; and

10. Maintain the ability to be in regular, direct communication with representatives of CDFW, USFWS, and CPM, including notifying these agencies of dead or injured listed species and reporting special status species observations to the California Natural Diversity Database.

Verification: The Designated Biologist will notify the CPM of any non-compliance or special-status species injury or mortality within one (1) working day of the incident. The Designated Biologist shall submit in the monthly compliance report to the CPM copies of all written reports and summaries that document construction activities that have the potential to affect biological resources. The Designated Biologist's written records will be made available for the CPM's inspection on request at any time during normal business hours. During project operation, the Designated Biologist(s) shall submit record summaries in the annual compliance report unless their duties cease, as approved by the CPM.

BIOLOGICAL MONITOR SELECTION

BIO-3 The project owner's CPM-approved Designated Biologist shall submit the resume, at least three references, and contact information of the proposed Biological Monitor(s) to the CPM for approval. The resume shall demonstrate, to the satisfaction of the CPM, the appropriate education and experience to accomplish the assigned biological resource tasks.

Verification: The project owner shall submit the specified information to the CPM for approval at least 30 days prior to the start of any project-related site disturbance activities. Within 10 days of completion of training, the Designated Biologist shall submit a written statement to CPM confirming that 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 at least 10 days prior to their first day of monitoring activities.

DESIGNATED BIOLOGIST AND BIOLOGICAL MONITOR AUTHORITY

BIO-4 The project owner's construction/operation manager shall act on the advice of the Designated Biologist and Biological Monitor(s) to ensure conformance with the biological resources conditions of certification.

If required by the Designated Biologist or Biological Monitor(s), the project owner's construction/operation manager shall halt all site mobilization, ground disturbance, grading, construction, and operation activities in areas specified by the Designated Biologist. The Designated Biologist shall:

1. Require a halt to all activities in any area when determined that there would be an unauthorized adverse impact to biological resources if the activities continued;

2. Inform the project owner and the construction/operation manager when to resume activities;

3. Notify the CPM if there is a halt of any activities and advise the CPM of any corrective actions that have been taken or would be instituted as a result of the work stoppage; and

4. The CPM, in coordination with CDFW or USFWS as appropriate, will determine if corrective action has been effective and will direct the project owner to take further corrective action as needed.

If the Designated Biologist is unavailable for direct consultation, the Biological Monitor shall act on behalf of the Designated Biologist.

Verification: The project owner shall ensure that the Designated Biologist or Biological Monitor notifies the CPM immediately (and no later than the morning following the incident, or Monday morning in the case of a weekend) of any non-compliance or a halt of any site mobilization, ground disturbance, grading, construction, and operation activities. The project owner shall notify the CPM of the circumstances and actions being taken to resolve the problem within one (1) working day of initiating the corrective action.

WORKER ENVIRONMENTAL AWARENESS PROGRAM (WEAP)

BIO-5 The project owner shall develop and implement a project-specific Worker Environmental Awareness Program (WEAP) and shall secure approval for the WEAP from the CPM. The WEAP shall be administered to all onsite personnel including surveyors, construction engineers, employees, contractors, contractor's employees, supervisors, inspectors, and subcontractors. The WEAP shall be implemented during site mobilization, ground disturbance, grading, construction, operation, and closure. The WEAP shall:

1. Be developed by or in consultation with the Designated Biologist and consist of an on-site or training center presentation in which supporting electronic media and written material is made available to all participants;

2. Discuss the locations and types of sensitive biological resources on the project site and adjacent areas, explain the reasons for protecting these resources, and the function of flagging in designating sensitive resources and authorized work areas;

3. Discuss federal and state resource protection laws and explain penalties for violation of applicable laws, ordinances, regulations, and standards (e.g., federal and state endangered species acts);

4. Place special emphasis on the light-footed clapper rail, western snowy plover, California least tern, Belding's savannah sparrow, and southern

tarplant, including information on physical characteristics, distribution, behavior, ecology, sensitivity to human activities, legal protection and status, penalties for violations, reporting requirements, and protection measures;

5. Include a discussion of fire prevention measures to be implemented by workers during project activities; request workers to dispose of cigarettes and cigars appropriately and not leave them on the ground or buried;
6. Include a discussion of the biological resources conditions of certification;
7. Identify whom to contact if there are further comments and questions about the material discussed in the program; and
8. Include a training acknowledgment form to be signed by each worker indicating that they received the WEAP training and shall abide by the guidelines.

The project-specific WEAP shall be administered by a competent individual(s) acceptable to the Designated Biologist.

Verification: At least 45 days prior to the start of any planned project-related site disturbance activities, the project owner shall provide to the CPM a copy of the draft WEAP and all supporting written materials and electronic media prepared or reviewed by the Designated Biologist and a resume of the person(s) administering the program. The Notice to Proceed will not be issued until the WEAP has been revised according to the CPM's direction, and approved by the CPM.

The project owner shall provide in the monthly compliance reports 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.

Throughout the life of the project, the worker education program shall be repeated annually for permanent employees, and shall be routinely administered within one week of arrival to any new personnel, foremen, contractors, subcontractors, and other personnel potentially working within the project area. Upon completion of the orientation, employees shall sign a form stating that they attend the program and understand all protection measures. These forms shall be maintained by the project owner and shall be made available to the CMP upon request. Workers shall receive and be required to visibly display a hardhat sticker or certificate indicating that they have completed the required training.

Training acknowledgement forms signed during construction shall be kept on file by the project owner for at least six months after the completion of all project construction activities. During project operation, signed statements for operational personnel shall be kept on file for six months following the termination of an individual's employment.

BIOLOGICAL RESOURCES MITIGATION IMPLEMENTATION AND MONITORING PLAN (BRMIMP)

BIO-6 The project owner shall develop and implement a BRMIMP. The BRMIMP shall be prepared in consultation with the Designated Biologist and shall include the following:

1. All biological resource mitigation, monitoring, and compliance measures proposed and agreed to by the project owner;
2. All biological resource conditions of certification identified in the Commission Decision as necessary to avoid or mitigate impacts;
3. All biological resource mitigation, monitoring, and compliance measures required in other state agency terms and conditions, such as those provided in the National Pollution Discharge Elimination System (NPDES) Construction Activities Stormwater General Permit;
4. A list or tabulation of all sensitive biological resources to be impacted, avoided, or mitigated by project construction, operation, and closure;
5. All required mitigation measures for each sensitive biological resource;
6. A detailed description of measures that shall be taken to avoid or mitigate disturbances from construction and demolition activities;
7. All locations, shown on a map at an approved scale, of sensitive biological resource areas subject to disturbance and areas requiring temporary protection and avoidance during construction;
8. Aerial photographs, at an approved scale, of all areas to be disturbed during project construction activities *prior* to any site or related facilities mobilization disturbance, for comparison with aerial photographs at the same scale to be provided *subsequent* to completion of project construction (see **Verification**).
9. Duration for each type of monitoring and a description of monitoring methodologies and frequency;
10. Performance standards from each biological resource condition of certification to determine if mitigation and conditions are or are not successful;
11. Remedial measures to be implemented if performance standards are not met;
12. A discussion of biological resources-related facility closure measures including a description of funding mechanism(s);
13. A process for proposing BRMIMP modifications to the CPM and appropriate agencies for review and approval; and

14. A requirement to submit any sightings of any special-status species that are observed on or in proximity to the project site, or during project surveys, to the California Natural Diversity Database (CNDDB) per CDFW requirements.

Verification: No fewer than 45 days prior to planned start of construction, the project owner will submit a draft BRMIMP to the CPM for review and approval. The Notice to Proceed will not be issued until the BRMIMP has been revised according to the CPM's direction, and approved by the CPM.

If there are any federal 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 and submitted to the CPM within 10 days of their receipt by the project owner.

The project owner shall notify the CPM no less than 5 working days before implementing any proposed modifications to the approved BRMIMP and will implement changes only after obtaining CPM approval.

Implementation of all BRMIMP measures shall 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. The Construction Closure Report will include a set of aerial photographs of the site at an approved scale for comparison with the pre-construction set (Item 8 above).

GENERAL IMPACT AVOIDANCE AND MINIMIZATION MEASURES

BIO-7 The project owner shall ensure implementation of the following measures during site mobilization, construction, operation, and closure to manage their project site and related facilities in a manner to avoid or minimize impacts to biological resources:

1. The boundaries of all areas to be temporarily or permanently disturbed (including staging areas, access roads, and sites for temporary placement of spoils) shall be delineated with stakes and flagging prior to demolition or construction activities in consultation with the Designated Biologist. Spoils shall be stockpiled in disturbed areas which do not provide habitat for special-status species. Parking areas, staging and disposal site locations shall similarly be located in areas without native vegetation or special-status species habitat. All disturbances, vehicles, and equipment shall be confined to the flagged areas.

2. At the end of each work day, the Designated Biologist, Biological Monitor, and/or site personnel shall ensure that all potential wildlife pitfalls (trenches, bores, and other excavations) have been backfilled. If site

personnel are inspecting trenches, bores, and other excavations and wildlife is trapped, they will immediately notify the Designated Biologist and/or Biological Monitor. If backfilling is not feasible, all trenches, bores, and other excavations shall be sloped at a 3:1 ratio at the ends to provide wildlife escape ramps, or covered completely to prevent wildlife access. Should wildlife become trapped, the Designated Biologist or Biological Monitor shall remove and relocate the animal to a safe location. Any wildlife encountered during the course of construction shall be allowed to leave the construction area unharmed.

3. Transmission lines and all electrical components shall be designed, installed, and maintained in accordance with the Avian Power Line Interaction Committee's (APLIC's) Suggested P*ractices for Avian Protection on Power Lines* (APLIC 2006) and *Reducing Avian Collisions with Power Lines* (APLIC 2012) to reduce the likelihood of large bird electrocutions and collisions.

4. Spoils shall not be stockpiled adjacent to the southeastern fence line to minimize potential for spoils to enter into adjacent wetlands.

5. Soil bonding and weighting agents used on unpaved surfaces shall be non-toxic to wildlife and plants.

6. To the extent feasible, any aviation warning lighting shall employ only strobed, strobe-like or blinking incandescent lights, preferably with all lights illuminating simultaneously. Minimum intensity, maximum "off-phased" duel strobes are preferred, and no steady burning lights (e.g., L-810s) shall be used.

7. Water applied to dirt roads and construction areas (trenches or spoil piles) for dust abatement shall use the minimal amount needed to meet safety and air quality standards to prevent the formation of puddles, which could attract predators of special-status species to construction sites. During construction, site personnel shall patrol these areas to ensure water does not puddle and attract crows and other wildlife to the site, and shall take appropriate action to reduce water application rates where necessary.

8. Report all inadvertent deaths of special-status species to the appropriate project representative, including road kill. Species name, physical characteristics of the animal (sex, age class, length, weight), and other pertinent information shall be noted and reported in the monthly compliance reports. For special-status species, the Designated Biologist or Biological Monitor shall contact CDFW and USFWS within 1 working day of receipt of the carcass for guidance on disposal or storage of the carcass. Injured animals shall be reported to CDFW and/or USFWS and the CPM, and the project owner shall follow instructions that are provided by CDFW or USFWS. During construction, injured or dead animals detected by personnel in the project area shall be reported immediately to a Biological Monitor or Designated Biologist, who shall remove the

carcass or injured animal promptly. During operations, the Project Environmental Compliance Monitor shall be notified.

9. All vehicles and equipment shall be maintained in proper working condition to minimize the potential for fugitive emissions of motor oil, antifreeze, hydraulic fluid, grease, or other hazardous materials. The Designated Biologist shall be informed immediately of any hazardous spills. Any on-site servicing of vehicles or construction equipment shall take place only at a designated area approved by the Designated Biologist. Service/maintenance vehicles shall carry a bucket and pads to absorb leaks or spills.

10. During construction all trash and food-related waste shall be placed in self-closing containers and removed weekly or more frequently from the site. Workers shall not feed wildlife, or bring pets to the project site.

11. Except for law enforcement personnel, no workers or visitors to the site shall bring firearms or weapons.

12. The project owner shall implement the following measures during construction and operation to prevent the spread and propagation of nonnative, invasive weeds:

    a. Limit the size of any vegetation and/or ground disturbance to the minimum area needed for safe completion of project activities, and limit ingress and egress to defined routes;

    b. Use only weed-free straw, hay bales, and seed for erosion control and sediment barrier installations. Invasive non-native species shall not be used in landscaping plans and erosion control. Monitor and rapidly implement control measures to ensure early detection and eradication of weed invasions.

13. During construction and operation, the project owner shall conduct pesticide management in accordance with standard BMPs. The BMPs shall include non-point source pollution control measures. The project owner shall use a licensed herbicide applicator and obtain recommendations for herbicide use from a licensed Pest Control Advisor. Herbicide applications must follow EPA label instructions. Minimize use of rodenticides and herbicides in the project area and prohibit the use of chemicals and pesticides known to cause harm to non-target plants and wildlife. The project owner shall only use pesticides for which a “no effect” determination has been issued by the EPA’s Endangered Species Protection Program for any species likely to occur within the project area or adjacent wetlands. If rodent control must be conducted, zinc phosphide or an equivalent product shall be used.

Verification: All mitigation measures and their implementation methods shall be included in the BRMIMP and implemented. Implementation of the measures shall be reported in the monthly compliance reports by the Designated Biologist. Within 30 days after completion of project construction, the project owner shall provide to the CPM, for review and approval, a written Construction Completion Report identifying how measures have been completed (see Condition of Certification **BIO-6** verification).

Monthly and annual compliance reports will include results of all regular inspections by the Designated Biologist and Biological Monitor(s), including but not limited to the requirements cited above and in Condition of Certification **BIO-2.**

The project owner will maintain written records of vehicle and equipment inspection and maintenance, and will provide summaries in each monthly and annual compliance report. The complete written vehicle maintenance record will be available for the CPM's inspection during normal business hours.

The BRMIMP (Condition of Certification **BIO-6**) will include affirmation by the project owner that:

- All electrical component design conforms to applicable APLIC guidelines; and
- All soil binders conform to the requirements stated above.

PRE-CONSTRUCTION NEST SURVEYS AND IMPACT AVOIDANCE AND MINIMIZATION MEASURES FOR BREEDING BIRDS

BIO-8 Pre-construction nest surveys shall be conducted if construction or demolition activities on the project site or wastewater pipeline will occur from January 1 through August 31. The Designated Biologist or Biological Monitor shall perform surveys in accordance with the following guidelines:

1. Surveys shall cover all potential nesting habitat and substrate within the project site and areas surrounding the project site within 300 feet of the project boundary.

2. At least two pre-construction surveys shall be conducted, separated by a minimum 10-day interval. Pre-construction surveys shall be conducted no more than 14 days prior to initiation of construction activity. One survey needs to be conducted within the 3-day period preceding initiation of construction activity. Additional follow-up surveys may be required if periods of construction inactivity exceed three weeks during January 1 through August 31 in any given area, an interval during which birds may establish a nesting territory and initiate egg laying and incubation.

3. If active nests are detected during the survey, a no-disturbance buffer zone (protected area surrounding the nest) shall be established around each nest. Specific buffer distances are provided below for applicable avian groups (**Biological Resources Table 5**); these buffers may be modified with the CPM's approval. For special-status species, if an active nest is identified, the size of each buffer zone shall be determined by the Designated Biologist in consultation with the CPM (in coordination with CDFW and USFWS). Nest locations shall be mapped using GPS technology.

Biological Resources Table 5
AEC Construction and Demolition Buffers for Active Nests

Avian Group	Species Potentially Nesting in the Project Vicinity	Buffer for Construction and Demolition Activities (feet)
Bitterns and herons	Black-crowned night heron, great blue heron, great egret, green heron, snowy egret	250
Cormorants	Double-crested cormorant	100
Doves	Mourning dove	25
Geese and ducks	American widgeon, blue-winged teal, cinnamon teal, Canada goose, gadwall, mallard, northern pintail, ruddy duck	100
Grebes	Clark's grebe, eared grebe, horned grebe, pied-billed grebe, western grebe	100
Hummingbirds	Allen's hummingbird, Anna's hummingbird, black-chinned hummingbird	25
Plovers	Black-bellied plover, killdeer	50
Raptors (Category 1)	American kestrel, barn owl, red-tailed hawk	50
Raptors (Category 2)	Cooper's hawk, red-shouldered hawk, sharp-shinned hawk	150
Raptors (Category 3)	Northern harrier, white-tailed kite	These are special-status species; buffer determined in consultation with CPM
Stilts and Avocets	American avocet, black-necked stilt	150
Terns	Elegant tern, Forster's tern, royal tern	100
Passerines (cavity and crevice nesters)	House wren, Say's phoebe, western bluebird	25
Passerines (bridge, culvert, and building nesters)	Black phoebe, cliff swallow, house finch, Say's phoebe	25
Passerines (ground nesters,	Horned lark	100

Avian Group	Species Potentially Nesting in the Project Vicinity	Buffer for Construction and Demolition Activities (feet)
open habitats)		
Passerines (understory and thicket nesters)	American goldfinch, blue-gray gnatcatcher, bushtit, California towhee, common yellowthroat, red-winged blackbird, song sparrow, Swainson's thrush	25
Passerines (scrub and tree nesters)	American crow, American goldfinch, American robin, blue-gray gnatcatcher, Bullock's oriole, bushtit, Cassin's kingbird, common raven, hooded oriole, house finch, lesser goldfinch, northern mockingbird	25
Passerines (tower nesters)	Common raven, house finch	25
Passerines (marsh nesters)	Common yellowthroat, red-winged blackbird	25
Species not covered under MBTA	Domestic waterfowl, including domesticated mallards, feral (rock) pigeon, European starling, and house sparrow	N/A

4. If active nests are detected during the survey, the Designated Biologist or Biological Monitor shall monitor all nests with buffers at least once per week, to determine whether birds are being disturbed. If signs of disturbance or distress are observed, the Designated Biologist or Biological Monitor shall immediately implement adaptive measures to reduce disturbance in coordination with the CPM. These measures could include, but are not limited to, increasing buffer size, halting disruptive construction activities in the vicinity of the nest until fledging is confirmed, or placement of visual screens or sound dampening structures between the nest and construction activity.

5. If active nests are detected during the survey, the Designated Biologist will prepare a Nest Monitoring Plan. The Designated Biologist or Biological Monitor shall monitor the nest until he or she determines that nestlings have fledged and dispersed or the nest is no longer active. Activities that might, in the opinion of the Designated Biologist or Biological Monitor, disturb nesting activities (e.g., exposure to exhaust), shall be prohibited within the buffer zone until such a determination is made.

Verification: Within ten (10) days of completion of the field work, the project owner shall provide the CPM, CDFW, and USFWS a letter-report describing the findings of the preconstruction nest surveys, including a description and representative photographs of habitat; the time, date, methods, and duration of the surveys; identity and qualifications of the surveyor(s); and a list of species observed. If active nests are detected during the surveys, the reports shall include a map or aerial photo identifying the location of the nest(s) and shall depict the boundaries of the proposed no disturbance buffer zone around the nest(s). The CPM will consider any timely comments received from CDFW and USFWS in review of the letter-report.

Additionally, the nest monitoring plan shall be submitted to the CPM for review and approval prior to any planned demolition or construction activities in the vicinity of any active nest. No such demolition or construction activities may proceed without CPM approval of the monitoring plan, in consultation with CDFW and USFWS. All impact avoidance and minimization measures related to nesting birds shall be included in the BRMIMP and implemented. Implementation of the measures shall be reported in the monthly compliance reports by the Designated Biologist.

SOUTHERN TARPLANT SURVEY AND MITIGATION

BIO-9 The project owner shall determine if southern tarplant is present on the wastewater pipeline alignment and, if the project would substantially affect the local population, mitigate or offset the project's impacts as follows:

1. The project owner shall contract with a qualified biologist to conduct a field survey for southern tarplant on the wastewater pipeline alignment and all potential habitat in the surrounding 100-foot buffer area to determine presence or absence of southern tarplant or other special-status plants. The field survey and reporting will conform to current CDFW botanical field survey protocol (CDFG 2009) or more recent updates, if available. The field survey will be conducted at the appropriate time of year to locate the target species and the report will describe any conditions that may have prevented the target species from being located or identified, even if it could be present as dormant seed (e.g., poor rainfall).

2. If southern tarplant is present, the qualified biologist will inventory the number of plants and area of occupied habitat on the alignment and nearby habitat within 0.25 mile of the occurrence(s). The qualified biologist will prepare a report and maps indicating locations and numbers of all southern tarplants inventoried within the survey area.

3. If pipeline construction would affect 10 percent or more of the plants or occupied habitat within the 0.25-mile survey area, then the project owner will mitigate the impact by reintroducing southern tarplant to the site following construction, or to another suitable local site.

Verification: No fewer than 45 days prior to planned start of wastewater pipeline construction, the project owner will submit the results of the southern tarplant field surveys and, if the species would be substantially affected by pipeline construction (per Item 3 above), a reintroduction plan to mitigate impacts. Documentation will be submitted to the CPM, CDFW, and USFWS. The CPM will consider any timely comments received from CDFW and USFWS in review of the documents. The Notice to Proceed will not be issued until the reports and reintroduction plan have been revised according to the CPM's direction, and approved by the CPM.

If southern tarplant occurs on the pipeline alignment or within the 100-foot buffer, the survey report will include a full inventory of all southern tarplant occurrences (including numbers of plants and occupied acres) within a 0.25-mile radius of the location(s). If project activities would affect 10 percent or more of the plants, or 10 percent or more of occupied habitat within the survey area, then the project owner will also submit a Draft Southern Tarplant Reintroduction Plan, for the CPM's review and approval on the schedule outlined above.

The Southern Tarplant Reintroduction Plan will specify location(s) for reintroduction, to be either on the disturbed site or at another suitable site selected in coordination with the CPM and local wetlands management authorities. In addition, the Plan will specify methods for evaluating specific habitat suitability; obtaining seed or other propagules; site preparation for the reintroduction site(s); weeding, irrigation, or other maintenance; and monitoring methods and reporting.

Success criteria for the Reintroduction Plan shall be: achievement of a self-sustaining southern tarplant occurrence at the reintroduction site(s), consisting of as many or more plants and acres of occupied habitat as are lost during pipeline construction, and persisting over a minimum verification period of 5 years. The Reintroduction Plan shall specify methods for quantitative monitoring and reporting of reintroduction success. In addition, the Plan will specify remedial measures to be implemented if reintroduction success is not achieved.

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BIOLOGICAL RESOURCES-APPENDIX-1
NITROGEN DEPOSITION ANALYSIS

Wenjun Qian, Ph.D., P.E.

INTRODUCTION

The following provides a technical description of the nitrogen deposition analysis for the Alamitos Energy Center (AEC) project.

PROJECT DESCRIPTION

The AEC would be a natural-gas-fired, air-cooled, combined-cycle and simple-cycle, electrical generating facility with a nominal generating capacity of 1,040 megawatts (MW). The AEC would have two power blocks. The combined-cycle power block would consist of two natural gas-fired combustion turbine generators (CTGs) in a combined-cycle configuration, two unfired heat recovery steam generators (HRSGs), one steam turbine generator, one air-cooled condenser, one auxiliary boiler, and related ancillary equipment. The simple-cycle power block would consist of four simple-cycle LMS-100 CTGs with fin-fan coolers and their ancillary facilities (AEC 2015f).

NITROGEN DEPOSITION

Nitrogen deposition is the term used to describe the input of reactive nitrogen species from the atmosphere to the biosphere. The pollutants that contribute to nitrogen deposition derive mainly from oxides of nitrogen (NOx) and ammonia (NH_3) emissions. NOx emissions (a term used for nitric oxide [NO] and nitrogen dioxide [NO_2]), generally the result of industrial or combustion processes, are much more widely distributed than NH_3. Reduced forms of nitrogen (NHx) are primarily emitted from intensive animal operations (e.g., dairies) and vehicles with catalytic converters.

In the atmosphere NOx is transformed to a range of secondary pollutants, including nitric acid (HNO_3), nitrates (NO_3) and organic compounds, such as peroxyacetyle nitrate (PAN), while NH_3 is readily absorbed by surfaces such as water and soil as well as being rapidly transformed to ammonium (NH4+) by reaction with acidic compounds. Both the primary and secondary nitrogen-based pollutants may be removed by wet deposition (scavenging of gases and aerosols by precipitation) and by dry deposition (direct turbulent deposition of gases and aerosols) on the earth’s surface.

NITROGEN DEPOSITION MODELS

Staff used the American Meteorological Society/Environmental Protection Agency Regulatory Model known as AERMOD to evaluate the potential nitrogen deposition impacts of this power plant project. AERMOD is a steady-state Gaussian plume model that incorporates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, including treatment of both surface and elevated sources, and is applicable for use in both simple and complex terrain.

AERMOD is used for chemically inert pollutants and cannot account for transformation of the nitrogen species which are time and reaction dependent. When using AERMOD, the analysis must assume these transformations have already occurred at the exit of the stack. Therefore, it is a conservative model that overestimates transformation rates and deposition impacts. But, it is also approved for regulatory purposes for near-field impacts analyses (used by the Energy Commission and the air district), is most familiar to users and regulatory agencies, and it is generally used to estimate nitrogen deposition.

Staff used several assumptions with regard to nitrogen formation and deposition, all of which tend to overestimate impacts. These assumptions include:

- One hundred percent conversion of oxides of nitrogen (NOx) and ammonia (NH_3) into atmospherically derived nitrogen (ADN) within the exhaust stacks rather than allowing the conversion of NOx and NH_3 to occur over distance and time within the plume and atmosphere, which is beyond the scope of AERMOD as noted above;

- Maximum settling velocities derived from the parameters for nitric acid (HNO_3, which, of all the depositional species, has the most affinity for soils and vegetation and the tendency to adhere to what it is deposited on) to produce maximum, or conservatively estimated, deposition rates;

- Emissions rates based upon the proposed project's maximum potential to emit as required by local air district rules, rather than annually averaged likely emissions based on previous equipment performance and expected actual operations; and

- Ammonia emissions are modeled at a conservatively averaged level of 2.5 ppm, which is half of the permitted level of 5 ppm. In reality, ammonia emissions are generally less than 1 ppm until near the end of the catalyst life. Plant operators have an extraordinary impetus to avoid exceedances of their NOx permit limits, because they can be fined. Owners keep their catalyst clean and active, which keeps NOx level low and limits unreacted ammonia in the exhaust. The permit would require the catalyst to be replaced or cleaned whenever the ammonia emissions exceed 5 ppm.

Assuming 100 percent of the NOx and NH_3 conversion to ADN within the exhaust stacks ignores the fact that the conversion process requires sunlight, moisture, and time. Since staff analyzes habitat areas within a 6-mile radius of the project, it is unlikely that there would be sufficient time for all of the emitted nitrogen to convert to ADN. Therefore, it is likely that a less than significant amount of the project's nitrogen emissions would actually deposit on these habitat areas. However, at this time staff does not have refined data on the amount of time needed for this conversion to occur. Therefore, staff conservatively assumes total conversion at the stack. The project could contribute to annual nitrogen deposition, but not at the levels predicted by AERMOD due to the limited time it takes for the plumes to travel to the habitat areas and the conservative assumptions used for nitrogen formation and deposition.

Appendix Bio-1Table Ndep-1 shows the emission rates of NOx and NH_3 from the proposed AEC that staff used to model nitrogen deposition impacts.

Appendix Bio-1Table Ndep-1
AEC, Modeled Nitrogen Species Emissions (tons per year [tpy]) [a]

Source	NOx	NH_3	Depositional Nitrogen from NOx	Depositional Nitrogen from NH_3	Total Depositional Nitrogen
Facility Total	135.8	49.4	41.3	40.7	82.0

Source: CH2 2016o, CH2 2016s, and Energy Commission staff analysis
Note: [a.] Nitrogen emissions are calculated based on the ratios between the molecular weight of nitrogen (14), the molecular weight of NOx as NO_2 (46), and molecular weight of NH_3 (17).

For average meteorological conditions, it would take the AEC plumes less than 2 hours to reach the furthest habitat of interest. However, in urban atmospheres, the oxidation rate of NOx to nitric acid (HNO_3) is approximately 20 percent per hour, with a range of 10 to 30 percent per hour (ARB 1986). Nighttime NOx oxidation rates are generally much lower than typical daytime rates. HNO_3 is readily taken up by soil, vegetation, and water surfaces. HNO_3 also reacts with gaseous NH_3 to form ammonium nitrate (NH_4NO_3), but the reaction is reversible and dependent on temperature, relative humidity, and concentrations of other pollutants. The ambient concentration of nitrate is limited by the availability of NH_3 which is preferentially scavenged by sulfate (Scire et al 2000).

On the other hand, because NH_3 is readily taken up by damp soils and vegetation and by water bodies, a significant portion of the emitted NH_3 can be deposited to vegetation depending on the type of land cover and on meteorological conditions (Hatfield and Follett 2008). NH_3 is also readily taken up by aerosol particles of sulfuric acid (H_2SO_4) to form ammonium sulfate ($(NH_4)_2SO_4$ [Metcalfe et al 1999]). But since most $(NH_4)_2SO_4$ particles deposit to ground by rain (wet deposition), it is likely that less than a significant amount of the $(NH_4)_2SO_4$ particles would actually deposit on the habitat areas within the 6-mile radius of the project (since the average annual rainfall in Long Beach is only about 12 inches, with the majority falling between November and March). Instead, the $(NH_4)_2SO_4$ particles may travel hundreds or even thousands of miles away from the project before they deposit on the earth's surface.

The Energy Commission's 2007 report *Assessment of Nitrogen Deposition: Modeling and Habitat Assessment* (Tonnesen et al 2007) reviewed two other air dispersion models which can represent chemically reactive emissions and formation and deposition of aerosols: CALPUFF and the Community Multiscale Air Quality (CMAQ) model. The CMAQ version used in the Tonnesen report sometimes produced relatively large numerical errors. Thus, the report concluded that CMAQ cannot be used reliably for single point source impact simulations.

CALPUFF is a non-steady-state Lagrangian Gaussian puff dispersion model that simulates the effects of time- and space-varying meteorological conditions on pollution transport, transformation, and removal. It does so by modeling parcels of air as they move along their trajectories. Different from AERMOD, CALPUFF uses simplified chemistry to attempt to represent nitrogen partitioning and transformation with relatively low computational cost compared to CMAQ. The Tonnesen report concluded that the CALPUFF model can be used to simulate nitrogen deposition, and its results were generally similar in magnitude to the CMAQ-simulated nitrogen deposition. However, CALPUFF is more appropriate for long-range transport (i.e., greater than 50 kilometers – at less than 50 km, and for complex terrain, it requires regulatory approval for its use by the relevant reviewing agency). In addition, CALPUFF allows users to define certain parameters in its meteorological processor, which makes it difficult to be standardized for regulatory review purposes at the current time.

Both AERMOD and CALPUFF have strengths and weaknesses in modeling nitrogen deposition as mentioned above. Based on staff's modeling experience and U.S. Fish and Wildlife Service's analysis on the Russell City Energy Center Project (USFWS 2010), nitrogen deposition rates at habitat areas within 6 miles of the project predicted from CALPUFF are usually an order of magnitude lower (i.e., $1/10^{th}$) than those from AERMOD. At this time, staff continues to believe AERMOD, with the overlay of conservative assumptions mentioned above, is the most conservative model to use for nitrogen deposition modeling.

NITROGEN DEPOSITION IMPACTS AND MITIGATION CALCULATIONS

Staff used AERMOD with the assumptions mentioned above to conservatively estimate nitrogen deposition incremental impacts from AEC. Staff's analysis covers the habitat areas within the 6-mile radius from the project (see details in the **Biological Resources** section of this staff assessment).

The analysis does not account for the net benefit from discontinued operation of the existing boilers at the Alamitos Generating Station (AGS). At its current capacity factors, AGS produces only a fraction of the maximum annual nitrogenous emissions that the proposed project would be permitted to produce. But the comparison of past actual emissions to future permitted emissions is another conservative assumption, as it is unlikely that the AEC units would ever approach their permitted level of operation as California moves to a high renewable, low carbon (greenhouse gas or GHG) electricity generation system.

Staff emphasizes that its modeling provides an overestimation of nitrogen deposition of the project, based on conservatisms layered upon conservatisms. However, it is the best tool we currently have that is accepted to provide a consistent, albeit extremely conservative result.

Staff used the conservatively modeled project nitrogen deposition impact and baseline nitrogen deposition (see more descriptions regarding baseline below) to compute the total nitrogen deposition rates on habitat areas. Staff calculated nitrogen deposition rates from the project in the surrounding area (**Appendix Bio-1 Figure Ndep-1**), however staff believes the modeling tools and background deposition rates identify a much higher rate of nitrogen deposition than is reasonably expected to occur.

The results could be used to assess the extent of affected habitat to include areas where the total nitrogen deposition exceeds the critical load for each vegetation type. Staff considers that vegetation types below critical load are not significantly impacted by the project and does not require mitigation (see more details in the **Biological Resources** section of this staff assessment). The baseline nitrogen deposition rates used in staff's analysis are based on emission inventory for calendar year 2002 (see more details below). Staff believes that additional conservatisms are introduced by using the 2002 baseline nitrogen deposition rates as discussed below.

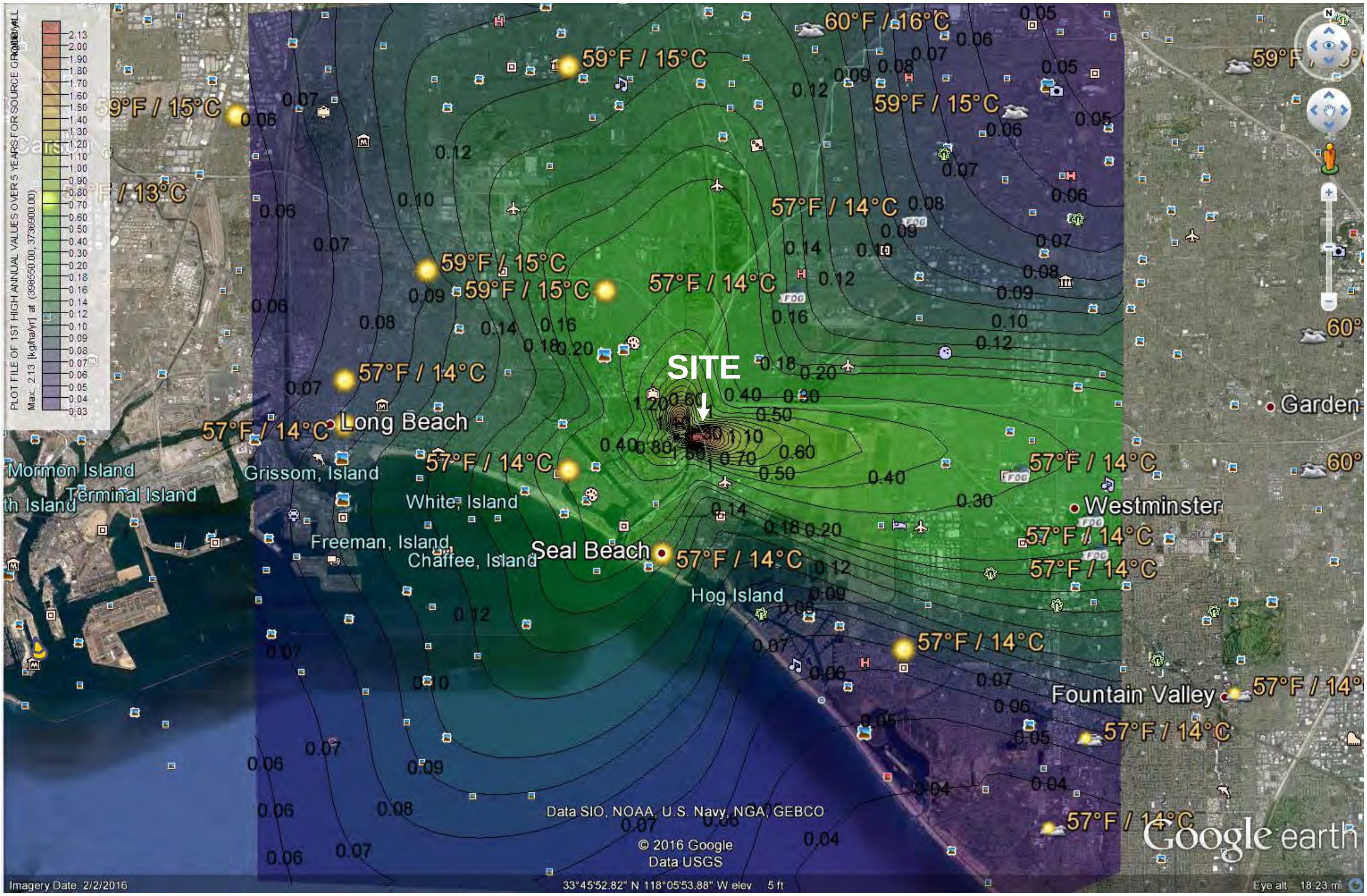
California and South Coast Air Basin Baseline Nitrogen Deposition

The baseline nitrogen deposition rates used in staff's analysis are from the Energy Commission's 2007 report (Tonnesen et al 2007), which provided the total nitrogen deposition on a rather coarse 4-km (2.5-mile) grid (4 km x 4 km, or 16 km^2) throughout California. The report used emission inventory data that were previously developed through the Western Regional Air Partnership (WRAP) to simulate annual air quality and visibility for calendar year 2002. The source categories included for the calendar year 2002 include: area sources, point sources, mobile sources, non-road mobile sources, road dust, off shore sources, Mexico emissions inventory, and biogenic emissions for volatile organic compounds (VOC).

However, the U.S. EPA's enforcement efforts, implemented through the State Implementation Plan (SIP) enforced by the regional air district's Air Quality Management Plan (AQMP, see more details in the **Air Quality** section of this staff assessment), have significantly reduced nitrogen emissions from mobile and stationary sources sectors since 2002, and these downward trends are expected to continue. **Appendix Bio-1 Figures Ndep-1a** and **Ndep-1b** show that both the actual and forecasted nitrogen emissions calculated from the NOx and NH_3 emissions (red solid lines) for all sources in South Coast Air Basin decrease significantly from year 2000 to year 2035. The nitrogen emissions from the NOx and NH_3 emissions are based on the mass fraction of nitrogen in NOx and NH_3. It should be noted that nitrogen constitutes about 82 percent of NH_3 by weight while it only constitutes about 30 percent of NOx by weight.

The emissions from stationary sources, including electric generation facilities, are also presented (green dashed lines) in the figures for comparison. NOx emissions from the stationary sources only account for 8 to 22 percent of those from all sources and also show a steady decrease over the years. Although the NH_3 emissions from the stationary sources, mainly waste disposal and fuel combustion, show a modest increase, they only account for 22 to 47 percent of the total emissions from all sources. The majority of the NOx emissions come from mobile sources and the majority of the NH_3 emissions come from area wide sources such as livestock operations, fertilizer applications, and mobile sources

Appendix Bio-1 Figure Ndep-1



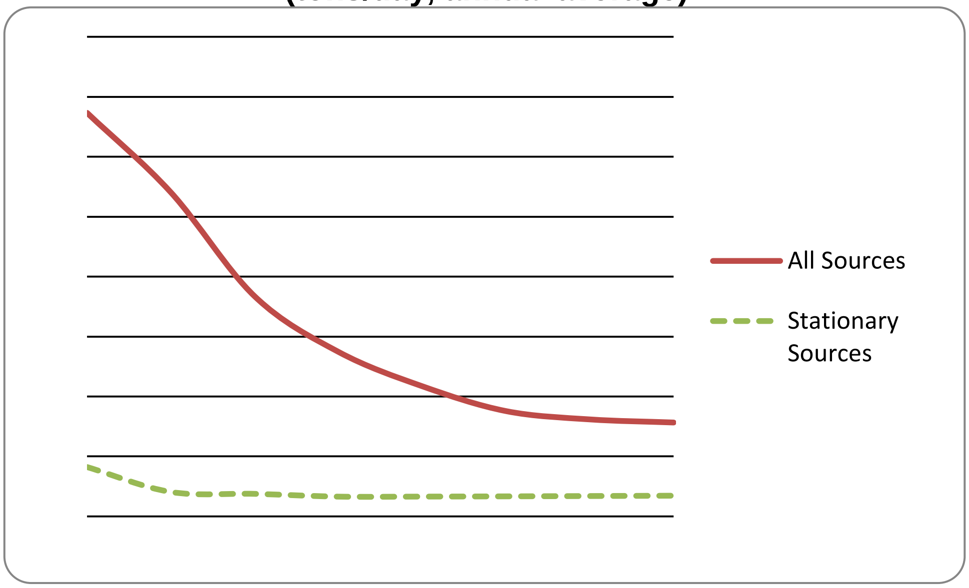
Appendix Bio-1 Figure Ndep-2 shows measured annual averaged nitrates (NO_3) and sulfates (SO_4) concentrations of dry particles at the San Gabriel monitoring station (located in South Coast Air Basin) from the Interagency Monitoring of Protected Visual Environments (IMPROVE) network. This is representative of depositional particles in ambient air at the station. The nitrates (NO_3) concentrations have decreased more than 50 percent from 2002 to 2015, while the sulfates (SO_4) concentrations have decreased more than 30 percent from 2002 to 2015. This indicates that the reductions in the nitrogen emissions shown in **Appendix Bio-1 Figures Ndep-1a** and **Ndep-1b** are effective in reducing the background nitrates and sulfates in the South Coast Air Basin.

Considering the decreasing nitrogen emission inventory trend (an overall reduction of over 50 percent from 2002 to 2015, shown in **Appendix Bio-1 Figures Ndep-1a** and **1b** from the two trends for all sources combined), the relatively small contribution from the stationary sources, and the decreasing nitrates and sulfates concentration measurements, the use of 2002 emissions inventory in the baseline nitrogen deposition rates (as discussed in **Biological Resources** section of this staff assessment) probably overestimates baseline deposition by a factor of 2. Certain map zones that staff considered would be significantly impacted by the project, based on overestimated baseline as well as overestimated project impact, might have total nitrogen deposition below critical load. Thus the acreage of affected habitat is probably overestimated using 2002 baseline and conservatively estimated project impacts. Unfortunately, the 2007 Tonnesen work for the 2002 model year has not been updated and there aren’t any more recent background data to use.

Staff assumes that total nitrogen loading is directly proportional to NOx and ammonia inventories. Since deposition pathways are complex and dependent on components such as time, humidity, sunlight exposure, and uniform mixing of needed reactants, deposition rates at the habitat areas near the project may be reduced more than the percentage change to nitrogen inventories.

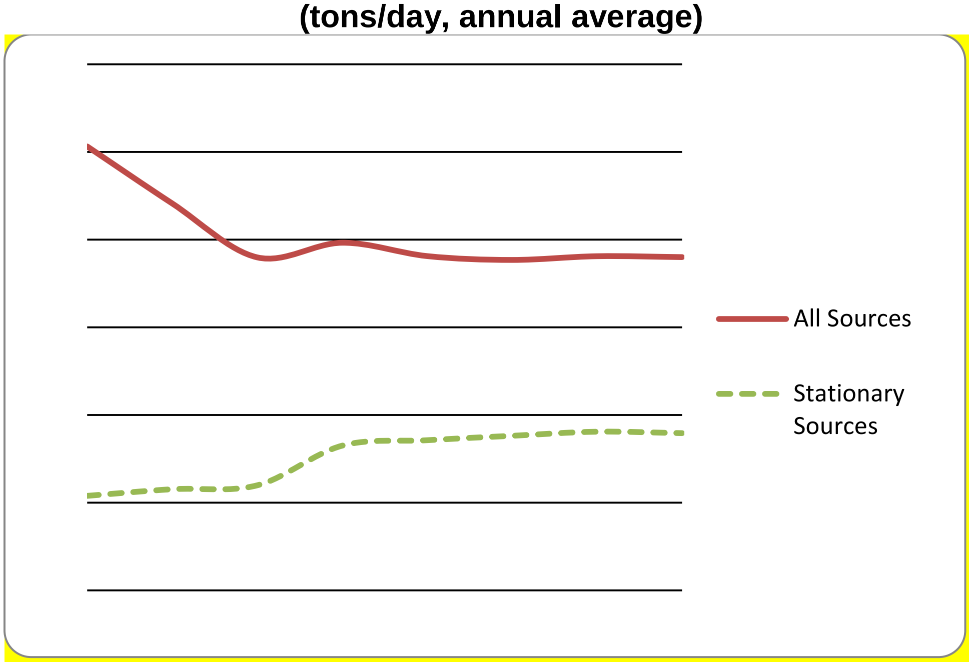
In addition, the South Coast Air Quality Management District (SCAQMD) implemented the Regional Clean Air Incentives Market or RECLAIM program on January 1, 1994. Facilities subject to this program, such as AEC, are required to purchase RECLAIM Trading Credits (RTCs) to offset their annual NOx emission increase in a 1-to-1 offset ratio. As a result, any new stationary source like AEC would not result in a net increase in NOx emissions basin wide (see details in the **Air Quality** section regarding AEC RECLAIM participation and compliance). In addition, since AEC would be located in Zone 1 (South Coast Air Basin coastal zone) RTCs may only be obtained from Zone 1. The resulting new emissions (potential NOx increases) from AEC and the required RTCs (NOx reductions or offsets) would be balanced to zero, or no net increase, annually in the more local coastal zone. So the baseline nitrogen from NOx would not change due to NOx emissions from AEC.

Appendix Bio-1 Figure Ndep-1a
Nitrogen Portion[a] of the NOx Emissions Trends in South Coast Air Basin (tons/day, annual average)



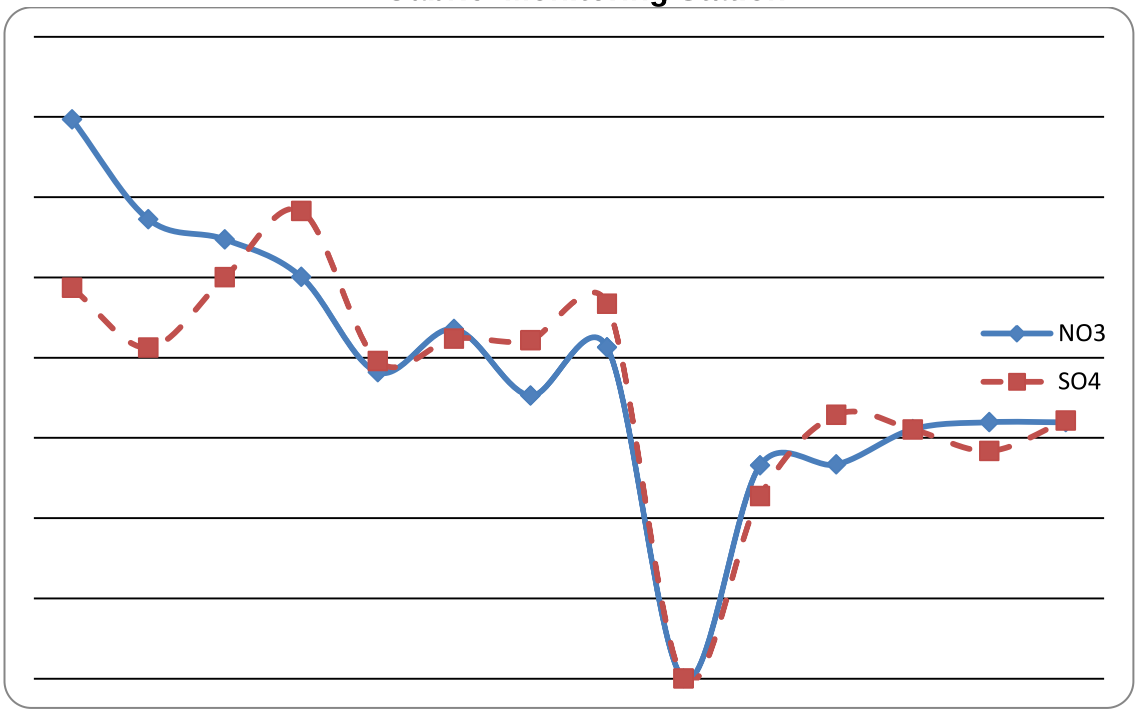
Source: The California Almanac of Emissions and Air Quality - 2013 Edition, Air Resources Board (ARB 2013) and Energy Commission staff analysis
Note: [a] The nitrogen portion of the NOx emissions is calculated based on the ratio between the molecular weight of nitrogen (14) and the molecular weight of NO_2 (46).

Appendix Bio-1 Figure Ndep-1b
Nitrogen Portion[a] of the NH_3 Emission Trends in South Coast Air Basin (tons/day, annual average)



Source: The California Almanac of Emissions and Air Quality - 2013 Edition, Air Resources Board (ARB 2013) and Energy Commission staff analysis
Note: [a] The nitrogen portion of the NH_3 emissions is calculated based on the ratio between the molecular weight of nitrogen (14) and the molecular weight of NH_3 (17).

Appendix Bio-1 Figure Ndep-2
Nitrates (NO_3) and Sulfates (SO_4) Concentrations (µg/m^3) Measured at San Gabriel Monitoring Station



Source: Interagency Monitoring of Protected Visual Environments (IMPROVE) and Energy Commission staff analysis

Note: The gap between the data for 2009 and 2011 means there was no data for 2010.

CONCLUSIONS

Staff believes that because AERMOD does not account for the transformation of the nitrogen species, which is time and reaction dependent, the nitrogen deposition impacts of the project have been overestimated by as much as a factor of 10 using AERMOD. Further, the nitrogen emission inventory in the South Coast Air Basin has decreased more than 50 percent from 2002 to 2015 for oxides of nitrogen and ammonia combined. The use of the 2002 emissions inventory in the baseline nitrogen deposition rates probably overestimates baseline nitrogen deposition by a factor of 2. In addition, AEC is required to purchase RTCs to offset their annual NOx emissions on a 1-to-1 offset ratio. AEC would not result in a net increase in NOx emissions in South Coast Air Basin coastal zone. Lastly, since staff modeled ammonia emissions at their conservatively averaged value, they were modeled at a rate 2.5 times higher than what is reasonably expected.

Staff calculated ~~a~~ nitrogen deposition rates from the project in the surrounding area (**Appendix Bio-1 Figures Ndep-1**), however, staff believes the modeling tools and background deposition rates identify a much higher rate of nitrogen deposition than is reasonably expected to occur. For more information on nitrogen deposition, refer to the **Biological Resources** section of this document.

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CULTURAL RESOURCES

Matthew Braun, Melissa Mourkas, Gabriel Roark, Josh Smallwood, and Victoria Smith[1]

SUMMARY OF CONCLUSIONS

Staff concludes that the proposed Alamitos Energy Center could result in significant, direct impacts on buried archaeological resources, which may qualify as historical or unique archaeological resources under the California Environmental Quality Act. The adoption and implementation of Conditions of Certification **CUL-1** through **CUL-8** would ensure that the applicant would be able to respond quickly and effectively in the event that archaeological resources are found buried beneath the project site during construction-related ground disturbance.

Staff's analysis of the proposed Alamitos Energy Center with regard to historic built environment resources concludes that two historical resources are present in the project area of analysis: the San Gabriel River and Los Cerritos channels. Both are historic-age engineered structures that figured prominently in regional flood control management. Staff concludes, however, that the proposed project would not affect either channel.

Staff's analysis of the proposed Alamitos Energy Center with regard to ethnographic resources concludes that a tribal cultural resource, the Puvunga Ceremonial Site Complex, is present in the project area of analysis. The Puvunga Ceremonial Site Complex is recommended as eligible for the California Register of Historical Resources under criteria 1–3. However, staff's analysis concludes that the construction and operation of the proposed Alamitos Energy Center would not have a direct or indirect impact on this ethnographic tribal cultural resource.

Staff has considered environmental justice populations in its analysis of the proposed project. Staff has not identified significant adverse direct, indirect, or cumulative cultural resources impacts that would affect environmental justice populations.

INTRODUCTION

This cultural resources assessment identifies the potential impacts of the proposed Alamitos Energy Center (AEC) on cultural resources. Cultural resources are defined under state law as buildings, sites, structures, objects, areas, places, records, manuscripts, and historic districts (Cal. Code Regs., tit. 14, §§ 4852a, 5064.5(a)(3); Pub. Resources Code, §§ 5020.1(h, j), 5024.1[e][2, 4]). Three broad classes of cultural resources are considered in this assessment: prehistoric, ethnographic, and historic.

Prehistoric archaeological resources are those materials relating to prehistoric human occupation and use of an area. These resources may include sites and deposits, structures, artifacts, rock art, trails, and other traces of Native American human behavior. In California, the prehistoric period began over 12,000 years ago and

[1] Braun, ethnographic resources; Roark, archaeological resources; Mourkas, Smallwood, and Smith, historic built environment resources.

extended through the eighteenth century until 1769, when the first Europeans settled in California.

Ethnographic resources are those materials important to the heritage of a particular ethnic or cultural group, such as Native Americans or African, European, or Asian immigrants. They may include tribal cultural resources (as defined under Pub. Resources Code, § 21074 (a)), traditional resource collecting areas, ceremonial sites, topographic features, value-imbued landscapes, cemeteries, shrines, or ethnic neighborhoods and structures. Ethnographic resources are variations of natural resources and standard cultural resource types. They are subsistence and ceremonial locales and sites, structures, objects, and rural and urban landscapes assigned cultural significance by traditional users. The decision to call resources "ethnographic" depends on whether associated peoples perceive them as traditionally meaningful to their identity as a group and the survival of their lifeways.[2]

Historic-period resources are those materials, archaeological and architectural, usually associated with Euro-American exploration and settlement of an area and the beginning of a written historical record. They may include archaeological deposits, sites, structures, traveled corridors, artifacts, or other evidence of human activity. Under federal and state requirements, historical cultural resources must be greater than 50 years old to be considered of potential historic importance. A resource less than 50 years of age may be historically important if the resource is of exceptional importance.

For the proposed AEC, staff provides an overview of the environmental setting and history of the project area, an inventory of the cultural resources identified in the project vicinity, and an analysis of the potential impacts from the proposed project using criteria from the California Environmental Quality Act (CEQA).

If cultural resources are identified, staff determines whether there may be a project-related impact to them. If the cultural resources cannot be avoided, staff determines whether any of the impacted resources are eligible for the California Register of Historical Resources (CRHR). If impacted resources are eligible for the CRHR, staff recommends mitigation measures that ensure that impacts to the identified cultural resources are reduced to a less-than-significant level.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Projects proposed before the Energy Commission are reviewed to ensure that the proposed facilities would comply with all applicable laws, ordinances, regulations, and standards (LORS) (Pub. Resources Code, § 25525; Cal. Code Regs., tit. 14, §§ 1702[n], 1744[b]).

See **Cultural Resources Table 1** for a summary of applicable LORS.

[2] A “lifeway,” as used herein, refers to any unique body of behavioral norms, customs, and traditions that structure the way a particular people carry out their daily lives.

Cultural Resources Table 1
Laws, Ordinances, Regulations, and Standards

Applicable Law	Description
State	
Pub. Resources Code, §§ 5097.98(b) and (e)	Requires a landowner on whose property Native American human remains are found to limit further development activity in the vicinity until s/he confers with the Native American Heritage Commission (NAHC)-identified Most Likely Descendents (MLDs) to consider treatment options. In the absence of MLDs or of a treatment acceptable to all parties, the landowner is required to reinter the remains elsewhere on the property in a location not subject to further disturbance.
Pub. Resources Code, § 5097.99	§ 5097.99 prohibits the acquisition, possession, sale, or dissection with malice or wantonness of Native American remains or artifacts taken from a Native American grave or cairn.
Health and Safety Code, § 7050.5	This code prohibits the disturbance or removal of human remains found outside a cemetery. It also requires a project owner to halt construction if human remains are discovered and to contact the county coroner.
Government Code, § 6250.10—California Public Records Act	Provides for non-disclosure of records that relate to archaeological site information and reports maintained by, or in the possession of, the Department of Parks and Recreation (DPR), the State Historical Resources Commission, the State Lands Commission, the NAHC, another state agency, or a local agency, including the records that the agency obtains through a consultation process between a California Native American tribe and a state or local agency.
Local	
City of Long Beach Cultural Heritage Commission Ordinance (Municipal Code: Title 2, Chapter 2.63)	The ordinance contains no requirements that apply to the proposed facility.
City of Long Beach Historical Landmarks Ordinance (Municipal Code: Title 16, Chapter 16.52)	The ordinance contains no requirements that apply to the proposed facility.
City of Long Beach Historic Preservation Element (2010)	The Historic Preservation Element of the city's General Plan Update 2030 (in preparation) contains no requirements that apply to the proposed facility.
Southeast Area Development and Improvement Plan (SEADIP)	The SEADIP contains no cultural resources requirements (City of Long Beach 2006).
Local Coastal Program (LCP)	The City of Long Beach's (1994) LCP contains no cultural resources requirements that pertain to the proposed project.

SETTING

Information provided regarding the setting of the proposed project places it in its geographical and geological contexts. Additionally, the archaeological, ethnographic, and historical backgrounds provide the contexts for the evaluation of the historical significance of any identified cultural resources within the project area of analysis (PAA).

Environmental Setting

Identifying the kinds and distribution of resources necessary to sustain human life in an environment, and the changes in that environment over time is central to understanding whether and how an area was used during prehistory and history. During the time that humans have lived in California, the region in which the proposed project is located has undergone several climatic shifts. These shifts have resulted in variable availability of vital resources, and that variability has influenced the scope and scale of human use of the project vicinity. Consequently, it is important to consider the historical character of local climate change, or the paleoclimate, and the effects of the paleoclimate on the physical development of the area and its ecology. The supplemental application for certification (SAFC) primarily summarizes the regional paleoenvironment (AES 2015a:5.3-3–5.3-6); staff adds brief site-specific information below, with a detailed environmental setting in **Cultural Resources Appendix CR-1**.

Overview

The proposed project site is situated at elevations of 8–15 feet above sea level on fill, paralic[3], and alluvial fan sediments. Current land uses in the project vicinity include residential and commercial development, industrial, wetland preserves, parklands and open space, landfill, and marinas. (AES 2015a:5.4-2, 5.6-3, 5.6-5; USGS 1896.)

The modern climate of the project vicinity is influenced by the adjacent open coastline and its presence in a semi-permanent high-pressure zone. Consequently, the local weather conditions are typically mild, with average daily highs of 63–84 degrees Fahrenheit (° F) and average daily lows of 45–63 ° F. Summers are dry and warm, punctuated by very hot weather, often caused by southeasterly Santa Ana winds. Winters are mild and wet, most precipitation falling between November and April, averaging about 12 inches annually. (AES 2015a:5.1-3; Engstrom 2006:847.)

The geology of the project site has been defined on the basis of four soil borings, four cone penetration tests, and logs from 43 monitoring wells (JA 2011:5; Ninyo & Moore 2011:2). The proposed project site is situated on placed fill, Quaternary[4] (Holocene to late Pleistocene epochs) undivided alluvial fan deposits, and paralic deposits, according to the geologic maps examined by the applicant. The SAFC states that sediments in the

[3] Paralic sediments are "the complex of sedimentary environments associated with the sea shore, and it is intended to include the transitions from wave zone to beach to dune environments, and from there to estuarine and lagoonal habitats as well" (AEC 2015a:5.8-3, fn).

[4] The Quaternary Period encompasses the Pleistocene (2.588 million years ago–11,700 B.P.) and Holocene (11,700 B.P.–present day) epochs (Cohen et al. 2013). Without further description, therefore, Quaternary geologic formations may be taken to date anywhere from 2.588 million years ago to the present day.

PAA are Holocene in age to a depth of at least 15 feet below ground surface. (AES 2015a:5.8-3–5.8-5.)

Geotechnical Boring 2, conducted within proposed Power Block 2, revealed paralic deposits in borings at relatively shallow depth and intergrading with alluvial sediments to about 50 feet below ground surface. Root casts[5] and shell fragments were found in the boring starting at 15 feet below ground surface, in silty clay alluvium that likely is Early Holocene in age. (AES 2015a:5.8-5; Ninyo & Moore 2011:Appendix A.) The presence of root casts suggests the presence of a former land surface (Vogel 2002:14). Jamison and Associates' study on the project site notes that the sand and silty clay layers from 15 to 30 feet below ground surface "are distinguished by the presence of organic material in the form of roots. The silty clay layer appears to trend through the entire section." (JA 2011:5.) It therefore appears likely that a former land surface extends across the project site at approximately 15 feet below ground surface or 4 feet below mean sea level.

Prehistoric Setting

The SAFC's prehistoric setting relies on a recent synthesis of regional prehistory (Byrd and Raab 2007), as well as major local archaeological investigations. The regional prehistoric setting is essentially discussed in four parts: ancient sites (commonly referred to in the archaeological literature as Paleoindian and Paleo-Coastal traditions), Early Holocene (11,500–7550 B.P.), Middle Holocene (7950–1450 B.P.), and Late Holocene (1450 B.P.–present). (AES 2015a:5.3-6–5.3-8.) Staff finds much of the SAFC's prehistoric setting to be correct and will not repeat it at length here. However, staff provides supplementary information in **Cultural Resources Appendix CR-1** in order to analyze the AEC's potential to affect archaeological resources.

Ethnographic Setting

The Gabrielino people and representative tribes are the Native Americans most directly related to the project vicinity. The Gabrielino Tongva have traditionally been split into four subgroups based on the dialect of the Gabrielino Tongva language spoken: those of the Los Angeles Basin/Gabrielino proper, those of the northern mountainous area including the inland San Fernando Valley/Fernandeño, those of Santa Catalina and San Clemente islands, and those of San Nicolas Island (Harrington 1962:viii). Today, the names Gabrielino, Tongva, or Gabrielino Tongva seem to be the preferred references of the indigenous groups from the Los Angeles Basin. The name Gabrielino Tongva will be used for the purposes of this staff assessment, except when referring to specific tribal entities that identify by other names.

The proposed AEC is located in the coastal portion of the Gabrielino Tongva's mainland territory and adjacent to the, now channelized, San Gabriel River, about 1.5 miles north of where the San Gabriel River empties into the Pacific Ocean. Various historians and anthropologists provide maps of Gabrielino Tongva ethnographic village and camp locations (Heizer 1968:Map; Johnston 1962:Map; Kroeber 1976:Plate 57). All of the maps and accompanying text previously mentioned identify a village that is about 0.5 miles north-northeast of the AEC. The village name, provided in the literature variously

[5] Voids in a stratum that filled with soil particles after plant roots decomposed.

as ‘Puvunga’, ‘Pubunga’, ‘Puvú, ‘Pubuna’, ‘Povuu’nga’ and ‘Pubu’ is located on Alamitos Mesa. Additional information concerning this village site is discussed under “Cultural Resource Descriptions and Significance Evaluations” below.

Contemporary Tribal Entities with Ethnographic Affiliations

There are various Gabrielino Tongva tribes, nations and other organizations. Names are very similar and it is difficult at first glance to differentiate between the groups. The Native American Heritage Commission (NAHC) list provided to staff (Singleton 2014) provides additional tribal names that represent Gabrielino Tongva people and culture. Tribal entities are listed below.

- Gabrielino Band of Mission Indians – Kizh (Kitc) Nation
- Gabrielino/Tongva San Gabriel Band of Mission Indians
- Gabrielino/Tongva Nation
- Gabrielino-Tongva Tribe
- Gabrielino/Tongva Indians of the California Tribal Council
- Tongva Ancestral Territorial Tribal Nation
- Ti’at Society/Intertribal Council of Pimu
- Los Angeles City/County Native American Indian Commission

Staff provides additional information about traditional Gabrielino culture and current tribal entities in **Cultural Resources Appendix CR-1**.

Historic Setting

The historic period of the project vicinity can be divided into three major periods: the Spanish (1769–1821), Mexican (1822–1848), and American (1848–present) periods. The Spanish built 21 missions in California and established a series of fortified pueblos. Pasture lands were divided among the missions and beneficiaries who were awarded land grants by the Spanish and Mexican governors of Alta California. These beneficiaries were often former soldiers or others who had served the government. In 1784, Pedro Fages, Spanish governor of California at that time, granted 300,000 acres, which included today’s Long Beach area, to Manuel Nieto, as a reward for his military service. Nieto built an adobe home and raised cattle, sheep, and horses on his Rancho Los Coyotes.

The Mexican Period was characterized by land grants and ranchos awarded by Mexican Governor Juan Bautista Alvarado. In 1822, Mexico achieved independence from Spain, and California became an outpost of the Mexican Republic. In 1834, Nieto’s Rancho Los Coyotes was divided into five smaller ranchos. American settlers in the 1840’s were granted citizenship and some obtained land grants in the greater Long Beach area. War broke out between the United States and Mexico in May 1846. The American victory over Mexico was formalized in February 1848 with the signing of the Treaty of Guadalupe Hidalgo, and Mexico ceded all its land holdings above the Gila and Rio Grande rivers, including California, to the United States.

The early American period was characterized by ranching, providing cattle products to the northern Gold Rush settlers. Two rancheros, Rancho Los Cerritos and Rancho Los Alamitos, were predominant in the Long Beach area. In 1884, the town of Long Beach was laid out to occupy the southwest corner of the Rancho Los Cerritos. The City of Long Beach was incorporated on February 10, 1888. In the early twentieth century, the Long Beach's economy was built upon shipbuilding, the development of a successful harbor and transportation hub, and oil production. Today, the city of Long Beach is the sixth largest city in California, has a population of over 470,000 people and spans 50 square miles.

More detailed historic period information and citations are included in **Cultural Resources Appendix CR-1**.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

Regulatory Context

California Environmental Quality Act

Various laws apply to the evaluation and treatment of cultural resources. CEQA requires the Energy Commission to evaluate resources by determining whether they meet several sets of specified criteria. These evaluations then influence the analysis of potential impacts to the resources and the mitigation that may be required to ameliorate any such impacts.

CEQA and the State CEQA Guidelines define significant cultural resources under two regulatory definitions: historical resources and unique archaeological resources. A historical resource is defined as a "resource listed in, or determined to be eligible by the State Historical Resources Commission, for listing in the CRHR", or "a resource listed in a local register of historical resources or identified as significant in a historical resource survey meeting the requirements of Section 5024.1(g) of the Public Resources Code," or "any object , building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California, provided the agency's determination is supported by substantial evidence in light of the whole record." (Cal. Code Regs., tit. 14, § 15064.5[a].) Historical resources that are automatically listed in the CRHR include California historical resources listed in or formally determined eligible for the National Register of Historic Places (NRHP) and California Registered Historical Landmarks from No. 770 onward (Pub. Resources Code, § 5024.1[d]).

Under CEQA, a resource is generally considered to be historically significant if it meets the criteria for listing in the CRHR. These criteria are essentially the same as the eligibility criteria for the NRHP. In addition to being at least 50 years old,[6] a resource

[6] The Office of Historic Preservation (OHP 1995:2) endorses recording and evaluating resources over 45 years of age to accommodate a five-year lag in the planning process.

must meet at least one (and may meet more than one) of the following four criteria (Pub. Resources Code, § 5024.1):

- Criterion 1, is associated with events that have made a significant contribution to the broad patterns of our history;
- Criterion 2, is associated with the lives of persons significant in our past;
- Criterion 3, embodies the distinctive characteristics of a type, period, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
- Criterion 4, has yielded, or may be likely to yield, information important to history or prehistory.

In addition, historical resources must also possess integrity of location, design, setting, materials, workmanship, feeling, and association (Cal. Code Regs., tit. 14, § 4852[c]).

Even if a resource is not listed or determined to be eligible for listing in the CRHR, CEQA allows the lead agency to make a determination as to whether the resource is a historical resource as defined in Public Resources Code, sections, 5020.1(j) or 5024.1.

In addition to historical resources, archaeological artifacts, objects, or sites can meet CEQA's definition of a unique archaeological resource, even if it does not qualify as a historical resource (Cal. Code Regs., tit. 14, § 15064.5[c][3]). Archaeological artifacts, objects, or sites are considered unique archaeological resources if "it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

1. Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.

2. Has a special and particular quality such as being the oldest of its type or the best available example of its type.

3. Is directly associated with a scientifically recognized important prehistoric or historic event or person." (Pub. Resources Code, § 21083.2[g].)

To determine whether a proposed project may have a significant effect on the [cultural resources] environment, staff analyzes the proposed project's potential to cause a substantial adverse change in the significance of historical or unique archaeological resources. The magnitude of an impact depends on:

- The cultural resource affected;
- The nature of the resource's historical significance;
- How the resource's historical significance is manifested physically and perceptually;
- Appraisals of those aspects of the resource's integrity that figure importantly in the manifestation of the resource's historical significance; and
- How much the impact will change those integrity appraisals.

At Title 14, California Code of Regulations, section 15064.5(b), the State CEQA Guidelines define a substantial adverse change as “physical demolition, destruction, relocation or alteration of the resource or its immediate surroundings such that the significance of an historical resource would be materially impaired.”

California Native American Tribes, Lead Agency Tribal Consultation Responsibilities, and Tribal Cultural Resources

Assembly Bill 52 (AB 52) amended CEQA to define California Native American tribes, lead agency responsibilities to consult with California Native American tribes, and tribal cultural resources. “California Native American tribe” means a “Native American tribe located in California that is on the contact list maintained by the Native American Heritage Commission [NAHC] for the purposes of Chapter 905 of the Statutes of 2004” (Pub. Resources Code, § 21073). Lead agencies implementing CEQA are responsible to conduct tribal consultation with California Native American tribes about tribal cultural resources within specific time frames, observant of tribal confidentiality, and if tribal cultural resources could be impacted by project implementation, are to exhaust the consultation to points of agreement or termination.

Tribal cultural resources, a type of historical resource, are either of the following.

1. Sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are either of the following.
   a. Included or determined to be eligible for inclusion in the CRHR.
   b. Included in a local register of historical resources as defined in the Public Resources Code, section 5020.1(k).
2. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in the Public Resources Code, section 5024.1(c). In applying the aforesaid criteria, the lead agency shall consider the significance of the resource to a California Native American tribe. (Pub. Resources Code, § 21074[a].)

A cultural landscape that meets the criteria of Public Resources Code, section 21074(a), is a tribal cultural resource to the extent that the landscape is geographically defined in terms of its size and scope (Pub. Resources Code, § 21074[b]).

Historical resources, unique archaeological resources, and non-unique archaeological resources, as defined at Public Resources Code, sections 21084.1, 21083.2(g), and 21083.2(h) may also be a tribal cultural resource if they conform to the criteria of Public Resources Code, section 21074[a], two paragraphs above.

This preliminary staff assessment (PSA), therefore, assesses the proposed project’s impacts on all types of historical resources and unique archaeological resources.

AB 52 also amended CEQA to state that a project with an impact that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment (Pub. Resources Code, § 21084.2).

HISTORICAL RESOURCES INVENTORY

The development of the inventory of historical resources in and near the proposed project is the requisite first step in the assessment of whether the project might, under Public Resources Code, section 21084.1, cause a substantial adverse change in the significance of a historical resource, and could, therefore, have a significant effect on the environment. The effort to develop the inventory has involved a sequence of investigatory phases that includes doing background research, consulting with local Native American communities, conducting primary field research, interpreting the results of the inventory effort as a whole, and evaluating whether found cultural resources are historically significant. This section discusses the methods and the results of each inventory phase, develops the historical resources inventory for the analysis of the proposed project, and interprets the inventory to assess how well it represents the cultural resources in the PAA.

Project Area of Analysis

The PAA is a concept that staff uses to define the geographic area in which the proposed project has the potential to affect cultural resources. The effects that a project may have on cultural resources may be immediate, further removed in time, or cumulative. They may be physical, visual, auditory, or olfactory in character. The geographic area that would encompass consideration of all such effects may or may not be one uninterrupted expanse. It may include the project area, which would be the site of the proposed plant (project site), the routes of requisite transmission lines and water and natural gas pipelines, and other offsite ancillary facilities, in addition to one or several discontiguous areas where the project could be argued to potentially affect cultural resources.

Staff defines the PAA as comprising (a) the proposed project site and new process water/sanitary wastewater pipeline, (b) an ethnographic study area, and (c) an architectural study area set one parcel beyond the proposed project site.

Staff defines the archaeological component of the PAA as the proposed project site and the new process water/sanitary wastewater pipeline, with a 200-foot buffer surrounding the project site, a 50-foot buffer around the proposed pipeline. Demolition and excavation are proposed within the project site to variable depths. The applicant expects much of the construction-related excavation to reach as deep as 10–20 feet below the current ground surface, except for the driving of foundation piles, which would require ground disturbance to approximately 50 feet below finished grade (AES 2015a:5.3-24–5.3-25, 5.8-5; Ninyo & Moore 2011:22–23). Other construction activities would involve digging to various depths (see **Cultural Resources Appendix CR-1, Table 1**). This information defines the vertical limits of the PAA. The PAA for archaeological resources is presented in **Cultural Resources Figure 1**.

For ethnographic resources, the area of analysis is expanded to take into account sacred sites, tribal cultural resources, traditional cultural properties (places), and larger areas such as ethnographic landscapes that can be vast and encompassing, including viewsheds that contribute to the historical significance of such historical resources. The NAHC assists project-specific cultural resources consultants and agency staff in identifying these resources, and consultation with Native Americans and other ethnic or community groups may contribute to defining the area of analysis. For the proposed AES, staff identified one ethnographic resource in the area, the Puvungna Ceremonial Site Complex (PCSC), and so defined an area of analysis that includes Puvungna and the related village camp sites on Alamitos Mesa (**Cultural Resources Figure 2**).

In the urban context of the proposed project, the PAA for built environment resources is defined as the proposed project site, any linear facilities, and a buffer of a single parcel around the project site and facilities (**Cultural Resources Figure 3**). The proposed project site at the Alamitos Generating Station (AGS) consists primarily of buildings, structures, pavement, hardscape, and modest landscape elements, most of which date to the historic period. To the north of this area, the PAA includes a vacant lot between the Los Cerritos Channel and the San Gabriel River, and the existing Southern California Edison (SCE) Switchyard, constructed during the late 1950s concurrent with the AGS. To the east, the PAA includes a segment of the San Gabriel River and the Haynes Generating Station (HGS) property on the east side of the river. To the south of the project site, the PAA includes an industrial parcel, ending at Westminster Boulevard/2nd Street. To the west, the PAA includes a segment of the Los Cerritos Channel and two residential parcels in the southeast corner of the University Park Estates subdivision.

Background Research

The background research for the present analysis employs information that the applicant and Energy Commission staff gathered from literature and record searches, and information that staff obtained as a result of consultation with affiliated Native American entities. The purpose of the background information is to help formulate the initial cultural resources inventory for the present analysis, to identify information gaps, and to inform the design and the interpretation of the field research that will serve to complete the inventory.

Literature Review and Records Search

The literature review and records search portion of the background research attempts to gather and interpret documentary evidence of the known cultural resources in the PAA. The source for the present search was the South Central Coastal Information Center (SCCIC) of the California Historical Resources Information System.

CH2M Hill archaeologist, Gloriella Cardenas, requested a records search from the SCCIC for the proposed project on August 30, 2011 (Noyes 2011:1). The records search covered the proposed project site and a 1-mile buffer around it (AES 2013:5.3-20; AES 2015a:5.3-18). The records search, conducted by SCCIC staff on August 31, 2011 (SCCIC # 11786.8528), included examinations of the SCCIC's base maps of previous cultural resource studies and known cultural resources as well as:

- The NRHP listings.
- The CRHR listings.
- California Historical Landmarks listings.
- California Points of Historical Interest listings.

- Historic Property Data File (Noyes 2011:1; OHP 2011:204; OHP 2012:256–269).
- Archeological Determinations of Eligibility (COHP 2011:98, 2012a:101, 2012b:154, 156).
- Historic maps (COE 1942; USGS 1896). (Noyes 2011.)

CH2M Hill also conducted a records search at the SCCIC on July 2, 2013 to ensure coverage of the proposed process/sanitary wastewater pipeline. This records search covered the proposed pipeline and a 0.5-mile buffer surrounding it. The same sources were consulted as for the project site. (AES 2014a:5.3-4; AES 2015a:5.3-18.) CH2M Hill conducted additional records searches on February 25, 2014 to answer staff data requests during the data adequacy review and discovery period.

In addition, staff pursued its own avenues of research, including supplementary records searches at the SCCIC and online searches of local municipalities' websites.

Staff conducted an online search for proposed projects and environmental impact analyses using the websites of the cities of Long Beach and Seal Beach, Seal Beach Naval Weapons Station, Los Angeles Department of Water and Power, and County of Orange. The purpose of this search was to identify cultural resource analyses that might not have been submitted to the SCCIC or were submitted after August 31, 2011 or July 2, 2013.

The literature review and records search indicate that 80 previous cultural resource studies have been conducted in the PAA. Of these, 11 cultural resource studies have been conducted within or adjacent to the archaeological and historic built environment portion of the PAA and 80 in the ethnographic portion of the PAA. These studies are tabulated and bibliographic information provided in **Cultural Resources Appendix CR-1, Tables 2–3**.

Including the applicant's recent cultural resources inventory (AES 2013:Section 5.3; Cardenas et al. 2013), a total of 11 cultural resource studies have been conducted in the archaeological resources and historic built environment portions of the PAA (**Cultural Resources Appendix CR-1, Table 2**). These previous cultural resource studies include a historic preservation element/context statement for the city of Long Beach (CLB, with Rincon 2010), a cultural resources overview of the city of Seal Beach (Stickel 1991), an archaeological resources protection plan for the Seal Beach Naval Weapons Station (Davy 1997a), four negative-findings cultural resource inventories (Billat 2003; Cardenas et al. 2012; McKenna 1990, 2001), a survey and NRHP evaluation of the Bixby Ranch Oil Field Office[7] (Strudwick et al. 1996), a salvage excavation at CA-LAN-306/H (Zahniser 1974), an inventory and CEQA evaluation of the AGS Fuel Oil Tank Farm[8] (Strudwick 2004), and an inventory and CEQA evaluation of the project site (AES 2015a:Section 5.3; Cardenas et al. 2013).

The literature review and records search indicate that a total of 99 cultural resources have been previously recorded in the records search area (**Cultural Resources**

[7] P-19-187657.

[8] P-19-186880.

Appendix CR-1, Table 4). Of these, thirty-two are located in the PAA (**Cultural Resources Table 2**).

Cultural Resources Table 2
Literature Review Results: Previously Recorded Cultural Resources in the PAA

Resource Designation	Type	Description	Location	Significance	Source
Archaeological Resources					
P-19-000234 (CA-LAN-234/H)	Prehistoric and historic	Shell, lithic debitage, human remains	Records search area	NRHP/CRHR listed	Dixon 1960a, 1973; Leonard 1974; Mellon 1981; Noguchi and Wilson 1979; Sutherland 1981
P-19-000235 (CA-LAN-235/H)	Prehistoric and historic	Human remains, shell, lithic debitage	Records search area	NRHP/CRHR listed	Dixon 1960b, 1973; Noguchi and Wilson 1979
P-19-000272 (CA-LAN-272)	Prehistoric human remains	Deeply buried human skull	Records search area	Unevaluated	Brooks et al. 1965
P-19-000274 (CA-LAN-274)	Prehistoric archaeological site	Shell fragments	Records search area	Unevaluated	Dixon 1961
P-19-000306 (CA-LAN-306)	Prehistoric archaeological site	Puvunga Indian Village: midden, shell, manos, pestles, metate fragments, steatite bowls, bifaces, projectile points, debitage, shell ornaments, asphaltum, stone disc and shell beads	Records search area	NRHP/CRHR listed	Dixon 1964, 1973; Milliken et al. 1997; Noguchi and Wilson 1979
P-19-100485	Prehistoric archaeological site	Shell bead scatter	Records search area		Mason 2009a:Table 1
P-19-120038 (Trace A)	Prehistoric archaeological site	Midden	Records search area	Unevaluated	CSULB 1977a
P-19-120045 (Trace H)	Prehistoric archaeological site	Redeposited or disturbed shell scatter	Records search area	Unevaluated	CSULB 1977b; Mason 2009a:Table 1
P-19-120048 (Trace K)	Prehistoric archaeological site	Redeposited or disturbed shell scatter	Records search area	Unevaluated	CSULB 1977c; Mason 2009a:Table 1; Underwood 1993
P-19-120049	Prehistoric	Redeposited or	Records	Unevaluated	CSULB 1977d;

Resource Designation	Type	Description	Location	Significance	Source
(Trace L)	archaeological site	disturbed shell scatter	search area		Mason 2009a:Table 1; Underwood 1993
P-19-120050 (Trace B – second location)	Prehistoric archaeological site	Redeposited or disturbed shell scatter	Records search area	Unevaluated	CSULB 1977e; Mason 2009a:Table 1
P-30-000143 (CA-ORA-143)/P-30-000265 (CA-ORA-265), Landing Hill #10	Prehistoric archaeological site/historic ranch house and structures (the latter not formally recorded)	Shell midden, burials, steatite bowl fragments, hammerstone, bone, scrapers, siltstone charmstone, fossil bone, rubbing stones, obsidian and CCS debitage, shell bead, effigy, points, manos, pestles, drills, bowl mortars, metates, maul, shell; buildings and structures	Records search area	Destroyed in 1960s	Brotman 1965a, 1965b; Davy 1997b; McKinney 1964, 1969a; Redwine 1958; Singer 1965
P-30-000256 (CA-ORA-256), Landing Hill #1	Prehistoric archaeological site	Midden, shell,	Records search area	Destroyed about 1958	McKinney 1969b; Redwine 1958; SRS 1981; Stickel 1996a, 1996b
P-30-000257 (CA-ORA-256), Landing Hill #2	Prehistoric archaeological site	Two manos, two metate fragments, two pieces of worked stone	Records search area	Destroyed about 1958	McKinney 1969c; Redwine 1958; SRS 1981; Stickel 1996a, 1996c
P-30-000258 (CA-ORA-258), Landing Hill #3	Prehistoric archaeological site	Possible hearth, shell, metates, manos, hammerstones, mortars, pestles, polishing stones, projectile points, grooved axe	Records search area	Destroyed about 1958	PCAS 1969; Redwine 1958; SRS 1981; Stickel 1996a, 1996d
P-30-000259 (CA-ORA-259), Landing Hill #4	Prehistoric archaeological site	Shell midden, metates, manos, mortars,	Records search area	Unevaluated	McKinney 1969d; Redwine 1958; Stickel 1996a,

Resource Designation	Type	Description	Location	Significance	Source
		hammerstone, polishing stone, projectile point, blade, chert debitage, worked stone, faunal bone			1996e
P-30-000260 (CA-ORA-260), Landing Hill #11	Prehistoric archaeological site, possible ceremonial site	Domestic habitation (Millingstone–Intermediate period occupation), shell, metate, net weight, burnt bone, manos, mortars, stone fragments, ground flakes	Records search area	Significant, regulatory criteria unstated	Cleland et al. 2007; Flaherty and Stickel 1996; McKinney 1996e; Redwine 1958; SRS 1981; Stickel 1996a, 1996f; York et al. 1997
P-30-000261	Prehistoric archaeological site	Shell midden, metate, human remains; Late Intermediate Period occupation	Records search area	Significant, regulatory criteria unstated	Cleland et al. 2007; SRS 1981; York et al. 1997
P-30-000262 (CA-ORA-262), Landing Hill #7	Prehistoric archaeological site	Campsite, shell midden, mano, hammerstones, pestle, human remains; Millingstone and Late Prehistoric–Protohistoric occupations	Records search area	Significant, regulatory criteria unstated	Cleland et al. 2007; McKinney 1969f; Redwine 1958; SRS 1981; Stickel 1996a, 1996g; York et al. 1997
P-30-000263 (CA-ORA-263), Landing Hill #8 and P-30-000852 (CA-ORA-852), Area 5	Prehistoric archaeological site	Shell midden, manos, pestle chopper, bone awl, human burials & cremations; Millingstone and Intermediate period occupations; Late Prehistoric ceremonial use	Records search area	Significant, regulatory criteria unstated	Cleland et al. 2007; Colquehoun n.d.c; McKinney 1969g; Redwine 1958; SRS 1981; Stickel 1996a, 1996h, 1996k; York et al. 1997
P-30-000264 (CA-ORA-264), Landing Hill #9	Prehistoric archaeological site	Occupation site with human remains, shell, metates, manos, mortars, pestles,	Records search area	Significant, regulatory criteria unstated	Cleland et al. 2007; McKinney 1969h; Redwine 1958; York et al. 1997

Resource Designation	Type	Description	Location	Significance	Source
		hammerstones, pelican stone, cog stone, medicine tube; Millingstone–Late Prehistoric			
P-30-000298 (CA-ORA-298), Hog Island	Prehistoric archaeological site	Shell scatter, metate	Records search area	Recommended NRHP-eligible (Criterion D)	Clevenger et al. 1993
P-30-000322 (CA-ORA-322) and P-30-001118 (CA-ORA-1118)	Prehistoric archaeological site	Midden, shell midden, shell, bone tool, bone fragments core, CCS debitage, potsherd	Records search area	Recommended NRHP-eligible (Criterion D)	Clevenger and Crawford 1997; Clevenger et al. 1993
P-30-000850 (CA-ORA-850), Area 3	Prehistoric archaeological site	Shell scatter	Records search area	Not evaluated	Colquehoun n.d.a; Stickel 1996a, 1996i; York et al. 1997
P-30-000851 (CA-ORA-851), Area 4	Prehistoric archaeological site	Shell scatter, CCS flake or core	Records search area	Not evaluated	Colquehoun n.d.b; Stickel 1996a, 1996j; York et al. 1997
P-30-001352 (CA-ORA-1352)	Prehistoric archaeological site	Redeposited shell scatter	Records search area	Capped by building	Mason 2009a:Table 1
P-30-001455			Records search area		
P-30-001502 (CA-ORA-1502)	Prehistoric archaeological site	Shell midden, human remains, stone disk, manos, mortars, cores, debitage	Records search area	Recommended eligible for NRHP	Mason 2009a, 2009b
P-30-001505	Prehistoric archaeological site	Shell, debitage	Records search area		Mason 2009a:Table 1
P-30-001568 (CA-ORA-1568)	Prehistoric archaeological site	Shell, burned animal bone, debitage	Records search area		Mason 2009a:Table 1
Historic Built Environment Resources					
P-19-186880	Historic industrial structures	AGS Fuel Tank Farm	PAA (1-parcel buffer): 609 N. Studebaker Rd	NRHP/CRHR-ineligible, 2004 (demolished 2010)	AES 2013:5.3-25; Cardenas et al. 2013; Strudwick 2004
P-30-176752	Historic building	Parasol Restaurant	Records search area	Unknown	Mason 2009a:Table 1
Notes: AGS = Alamitos Generating Station; CA = California; CCS = cryptocrystalline silicate stone (chert, jasper, etc.); CRHR = California Register of Historical Resources; CSULB = California State University, Long Beach; LAN = Los Angeles County; NRHP = National Register of Historic Places; ORA = Orange County; PAA = project area of analysis; Rd = Road					

The records search and literature review results indicate that 88 archaeological resources have been identified within the 1-mile buffer surrounding the proposed project site. None of these archaeological resources has been found in the archaeological component of the PAA. Thirteen of the previously recorded archaeological resources were identified in buried contexts, with no surface indication of their presence (P-19-000272, P-19-000705, P-19-001000, P-19-002616, P-19-002629, P-19-002630, P-30-001542, P-30-001644, Burial 4, Burial 23, Burial 25, Burial 31, and Prehistoric Trash Pit). The previously recorded archaeological resources consist of 79 prehistoric archaeological resources, two historic archaeological resources, six archaeological resources containing prehistoric and historic materials, and one archaeological resource of unknown properties. Prehistoric archaeological resources in the records search area include shell middens, middens, lithic scatters, human remains (including isolated human remains), ochre deposits, villages (including an NRHP-eligible district), ceremonial locations, redeposited and redistributed middens, and refuse pits. Archaeological resources with both prehistoric and historic archaeological components consist of glass and ceramic scatter among shell scatters, and human remains. Historic archaeological resources consist of refuse deposits. (**Cultural Resources Table 2; Cultural Resources Appendix CR-1, Table 4**.)

Within the 1-mile literature review and records search area, the applicant identified eight previously recorded built environment resources of historic age (AES 2015a:Table 5.3-2). The resources include residential, commercial, industrial, civic, and military properties. Three of these resources have not been previously evaluated; one is listed on the NRHP and is, therefore, automatically listed in the CRHR, one is a California Historical Landmark (CHL) and is also automatically listed in the CRHR; two have been determined ineligible for the NRHP; and one was determined ineligible for the NRHP and CRHR and subsequently demolished. These resources, along with a brief description and location of each, are included in **Cultural Resources Table 2** and **Cultural Resources Appendix CR-1**, **Table 4**.

The applicant's literature review identified one previously recorded built environment resource of historic age (45 years or older as of the date of the survey) within the PAA: the AGS Fuel Tank Farm (P-19-186880). The large-capacity petroleum storage tank farm was built in 1955 as part of the original AGS. The resource consisted of four large-capacity storage tanks, each 40 feet in height and 60 feet in diameter (Strudwick 2004). The tank farm, located adjacent to the project site, was recorded by Ivan Strudwick in 2004 and determined ineligible for both the NRHP and CRHR. The tanks were removed in 2010. Since all of the associated structures have been removed, the tank farm is no longer considered a historic built environment resource by the applicant or staff and is not included in staff's analysis of potential impacts.

CH2M Hill contacted the County of Los Angeles Department of Regional Planning and the City of Long Beach Development services as part of their literature search efforts (AES 2015a:5.3-18; Cardenas et al. 2013:3-1; Hungerford 2011).

Staff consulted the City of Long Beach Planning website[9] and Long Beach Heritage website[10] for a map and list of designated historic districts and historic landmarks. Staff

[9] http://www.lbds.info/planning/historic_preservation/historic_landmarks.asp

confirmed through those sources that no designated historic districts are present within a 1-mile radius of the proposed project. However, one City of Long Beach Historic Landmark—the Rancho Los Alamitos adobe ranch house and gardens and site of Puvunga Village at 6400 Bixby Hill Road—is located less than 0.5 mile northwest of the proposed project. This resource was identified by the applicant as listed on the NRHP and is included in **Cultural Resources Appendix CR-1**, **Table 4**.

Additional Literature Review

Staff also consulted the California Office of Historic Preservation website (http://ohp.parks.ca.gov/ListedResources/) for the status of the listing of resources on the NRHP, CRHR, California Points of Historical Interest, and CHL. No additional historic built environment resources within the review area were identified through that search. The City of Seal Beach in Orange County, located within the 1-mile literature search radius, established a Historic Preservation Committee on August 10, 2015 with the adoption of Resolution 6591. The purpose of the Committee is to advise the City Council in the protection and preservation of certain archaeological, paleontological, and historical resources. The City of Seal Beach General Plan of December 2003 calls for the establishment of a City Inventory of Historic and Cultural Landmarks (City of Seal Beach 2003). However, the City of Seal Beach does not currently maintain a list of designated historical resources.

Staff also consulted the California Department of Transportation's (Caltrans) Bridge Inventory regarding bridges within the PAA. That research identified three previously evaluated bridges within the PAA dating to the historic period that were not identified by the applicant in their literature review in the AFC (AES 2013), Data Adequacy Supplement (AES 2014a), or SAFC (AES 2015a). These three historic built environment resources are summarized in **Cultural Resources Table 3** below.

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[10] http://www.lbheritage.org

Cultural Resources Table 3
Built Environment Resources in the Literature Search Area Not Summarized by Applicant

No.	Resource Designation	Type & Description	Location	Year Built	Local/NRHP/CRHR Status
Long Beach					
1	Bridge 1563 (Caltrans' Bridge 53C0801L and R).	Transportation: concrete vehicular bridge	*PAA (1-parcel buffer)*; over AGS's North Intake Channel on Studebaker Road	1966	Determined ineligible for NRHP by Caltrans (2015)
2	Bridge 3460 (Caltrans' Bridge 53C0802L and R).	Transportation: concrete vehicular bridge	*PAA (1-parcel buffer)*; over AGS's South Intake Channel on Studebaker Road	1966	Determined ineligible for NRHP by Caltrans (2015)
3	Bridge 2750 (Caltrans' Bridge 53C0730).	Transportation: concrete vehicular bridge	*PAA (1-parcel buffer)*; over Los Cerritos Channel on Loynes Drive	1966	Determined ineligible for NRHP by Caltrans (2015)
Abbreviations: AGS = Alamitos Generating Station; Caltrans = California Department of Transportation; CRHR = California Register of Historical Resources; NRHP = National Register of Historic Places; PAA = project area of analysis					

Staff conducted additional research at the Energy Commission library through inter-library loans services, California History Room of the California State Library in Sacramento, and online sources, as well as consulted the reports contained in the applicant's records searches to improve the historic map coverage acquired by the applicant (AES 2015a; Cardenas et al. 2013:3-1, Appendix 5.3C). The purpose of this research was to obtain a visual understanding of the natural and cultural development of the land in and around the PAA, identify locations of potential historic built environment and archaeological resources, and have a partial, chronological record of disturbances in the PAA. To this end, staff attempted to locate a detailed map of the PAA at 10-year intervals[11], beginning about A.D. 1769 and moving toward the present. All consulted historic maps are presented in **Cultural Resources Table 4**.

Staff conducted ethnographic research at Loyola Marymount University's Special Collections in Los Angeles, and also retrieved additional cultural resources technical reports and DPR forms from the SCCIC at California State University, Fullerton.

[11] Five- to 10-year intervals are widely regarded as a reasonable basis on which to observe mapped changes in landscapes and settlement patterns in historical research (Conzen 1990:189).

Cultural Resources Table 4
Historic Maps Consulted

Map Name	Scale	Survey Date	Reference
Plat of Rancho Los Alamitos	1 inch = 40 chains	About 1873	GLO 1873
Downey Sheet	1 inch = 1 mile	1893–1894	USGS 1896
Southern California, Sheet 1	1:250,000	About 1901	EDR 2011b
Downey Quadrangle	1 inch = 5,208 feet	About 1902	EDR 2011b
Plat of Township 5 South Range 12 West	1 inch = 40 chains	1914	GLO 1914
Long Beach	1 inch = 2,000 feet	About 1925	EDR 2011b
Aerial Photograph	1 inch = 500 feet	1928	EDR 2011a
Aerial Photograph	1 inch = 555 feet	1938	EDR 2011a
Downey Quadrangle	1 inch = 1 mile	Surveyed 1923, aerial photographs taken 1941	COE 1942
Aerial Photograph	1 inch = 666 feet	1947	EDR 2011a
Downey Quadrangle	1:50,000	About 1947	EDR 2011b
Los Alamitos Quadrangle	1 inch = 2,000 feet	About 1950	EDR 2011b
Long Beach Vicinity Quadrangle	1 inch = 2,000 feet	About 1951	EDR 2011a
Aerial Photograph	1 inch = 400 feet	1956	EDR 2011a
Los Alamitos	1 inch = 2,000 feet	About 1964	EDR 2011b
Aerial Photograph	1 inch = 480 feet	1968	EDR 2011a
Los Alamitos Quadrangle	1 inch = 2,000 feet	About 1972	EDR 2011b
Aerial Photograph	1 inch = 666 feet	1976	EDR 2011a
Los Alamitos Quadrangle	1 inch = 2,000 feet	About 1981	EDR 2011b
Aerial Photograph	1 inch = 666 feet	1989	EDR 2011a
Aerial Photograph	1 inch = 500 feet	1994	EDR 2011a
Aerial Photograph	1 inch = 500 feet	2005	EDR 2011a
Abbreviations: COE = Corps of Engineers; EDR = Environmental Data Resources; GLO = General Land Office; USGS = U.S. Geological Survey			

Native American Consultation

The Governor's Executive Order B-10-11, executed on September 19, 2011, directs state agencies to engage in meaningful consultation with California Indian Tribes on matters that may affect tribal communities. The California Resources Agency has adopted a Final Tribal Consultation Policy on November 20, 2012. The adopted policy exhorts informed decision making by collaboratively working with tribes to seek positive, achievable, and durable outcomes. The Energy Commission tribal consultation policy, adopted in December 2014, furthers the Energy Commission's effort to engage in effective dialogue concerning proposed power facility potential impacts to cultural resources of concern to tribes. Because the AES application was submitted prior to July

1, 2015, the AB52 CEQA consultation procedures do not apply to this proceeding. In addition to agency requirements to consult tribes, the Energy Commission Siting Regulations require applicants to contact the NAHC for information on Native American sacred sites and a list of Native Americans interested in the project vicinity. The applicant is then required to notify those Native Americans on the NAHC's list about the project and include a copy of all correspondence with the NAHC and Native Americans, including any written responses received, as well as a written summary of any oral responses in the SAFC (Cal. Code Regs., tit. 20, § 1704[b][2], Appendix B[g][2][D]).

The NAHC is the primary California government agency responsible for identifying and cataloging Native American cultural resources, providing protection to Native American human burials and skeletal remains from vandalism and inadvertent destruction, and preventing irreparable damage to designated sacred sites and interference with the expression of Native American religion in California. It also provides a legal means by which Native American descendents can make known their concerns regarding the need for sensitive treatment and disposition of Native American burials, skeletal remains, and items associated with Native American burials.

The NAHC maintains two databases to assist cultural resources specialists in identifying cultural resources of concern to California Native Americans, referred to by staff as Native American ethnographic resources. The NAHC's Sacred Lands database has records for areas, places, sites, and objects that Native Americans consider sacred or otherwise important, such as cemeteries and gathering places for traditional foods and materials. The NAHC Contacts database has the names and contact information for individuals, representing a group or themselves, who have expressed an interest in being contacted about development projects in specific areas.

Applicant's Methods

The applicant's consultant, CH2M Hill, contacted the NAHC on August 26, 2011 and requested a search of the Sacred Lands File and a list of Native American contacts in the area of the project. The NAHC responded on August 31, 2011 that no Native American cultural resources were identified in the project area and provided a list of Native American representatives for CH2M Hill to contact. CH2M Hill archaeologist, Gloriella Cardenas, sent letters to the representatives on this list on September 2, 2011, and follow-up telephone calls were made on September 21 and 23, 2011 (to the Gabrielino/Tongva San Gabriel Band of Mission Indians), as well as March 16, 2012 (to all other NAHC-listed contacts). (AES 2013:5.3-30, Appendix 5.3A; AES 2015a:5.3-27; Cardenas et al. 2013:3-3.)

Staff's Methods

In an effort to conduct an independent analysis of ethnographic resources, staff requested information from the NAHC on the presence of sacred lands in the vicinity of the proposed project, as well as a list of Native Americans to whom inquiries should be sent to identify both additional cultural resources and any concerns the Native Americans may have about the proposed project.

Staff contacted the NAHC on March 10, 2014 and requested a search of the Sacred Lands File and a Native American contacts list. The NAHC responded on March 11, 2014 with a list of Native Americans interested in consulting on development projects in the project area. A check of the NAHC sacred lands files resulted in negative findings within the project site. Staff sent letters to all of the NAHC-listed tribes on April 1, 2014 inviting them to comment on the proposed project and offered to hold face-to-face consultation meetings if any tribal entities so requested. Follow-up phone calls were made by staff on April 30 and May 1, 2014. Subsequent email and phone conversations also occurred on May 6 and 16, 2014. Staff met with Gabrielino Tongva individuals and groups on June 6 and 7, 2014.

In November of 2014, the applicant obtained a power purchase agreement which necessitated the submission of a supplemental AFC, filed in October of 2015. Staff contacted interested tribes with updates during the 11 month period, and again formally contacted them in November of 2015 regarding the supplemental AFC. No responses have been received.

Results

The tribes and organizations contacted by the applicant's consultant did not reply with any comments regarding potential impacts from the proposed project (AES 2015a:5.3-27; Cardenas et al. 2013:3-3).

Staff received several comments from tribal entities that because the project region is highly sensitive for cultural resources (specifically, the sites and burials at Landing Hill south of the project area and at LeisureWorld, east of the project area, were mentioned) tribal monitors should be required during project ground-disturbing activities, and that the project should proceed with caution. Additionally, several responses were received that expressed concern regarding potential impacts to the ceremonial site of Puvungna, which was the focus of meetings held on June 6–7, 2014.

Consultation with Others

The applicant contacted the Los Alamitos Museum Association, Historical Society of Long Beach, Long Beach Heritage Coalition, Historical Society of Southern California, County of Los Angeles Department of Regional Planning, and City of Long Beach Development Services (AES 2015a:5.3-27–5.3-28; Cardenas et al. 2013:3-4). That consultation was performed via written correspondence and, in the case of the City of Long Beach, via phone calls. The consultation performed by the applicant sought information regarding historical resources or values within the project area or concerns regarding issues related to the overall project. Documentation of agency consultation performed by the applicant is provided as Appendix 5.3A of the SAFC (AES 2015). The documentation provided indicates that only the City of Long Beach Development Services responded to the applicant's consultation efforts, informing the applicant that the City's Historic Landmark List of significant properties was located online.

Staff consulted with the Los Angeles County Department of Public Works (LACDPW) and Los Angeles District of the U.S. Army Corps of Engineers by phone on June 23, 2014. The purpose of the calls was to identify whether staff at either of the two agencies responsible for management of the San Gabriel River were aware of prior inventory and evaluations of the engineered portions of the river as a historic built environment resource. Both agencies responded that they were unaware of any prior inventory studies or CRHR/NRHP evaluations or determinations of eligibility for the San Gabriel River.

Staff visited the Rancho Los Alamitos and consulted with rancho personnel. Rancho Los Alamitos staff gave Energy Commission staff documents, briefed them regarding contemporary Native American use of the Rancho, and gave staff a valuable tour of the grounds.

Environmental Justice/Socioeconomic Methods

In accordance with federal and state law, regulations, policies, and guidance, staff considered the proposed project's potential to cause significant adverse impacts to environmental justice (EJ) populations (E.O. 12898; 40 C.F.R. §§ 1508.8, 1508.14; Cal. Code Regs., tit. 14, §§ 15064(e), 15131, 15382; Cal. Code Regs., tit. 14, § 1704(b)(2), App. B(g)(7); CEQ 1997). **Socioeconomics Figure 1** shows the presence of an EJ population based on race and ethnicity within the 6-mile radius; **Socioeconomics Table 5** shows that the cities of Long Beach and Hawaiian Gardens have below-poverty-level populations large enough to be considered EJ populations. Please refer to the **Socioeconomics** section of this document for a full explanation of how staff determines the presence of EJ populations. In addition, staff reviewed the ethnographic and historical literature, and corresponded with Native American tribes, to determine whether any additional EJ populations use or reside in the project area. These efforts are documented in the "Ethnographic Setting" and "Native American Consultation" subsections of this PSA. Based upon additional review staff concludes that there is not an environmental justice impact to Native Americans.

Cultural Resources Distribution Models

One critical use of the background research is to inform the design and the interpretation of the field investigation that will complete the cultural resources inventory for the analysis. A further role of background research is to help develop predictive or anticipatory models of the distribution of cultural resources across the PAA. Such models of the types and patterns of archaeological, ethnographic, and built-environment resources, distributed across and beneath the surface of the landforms of the PAA, provide the means to tailor more appropriate research designs for the field investigations that will complete a cultural resources inventory, and help gauge the degree to which the results of those investigations may reflect the actual population of archaeological, ethnographic, and built-environment resources in the PAA. Such models also provide important contexts for the ultimate interpretation of the results of those investigations.

Models of the distribution of prehistoric archaeological sites, ethnographic resources, and historical archaeological resources are developed here and draw on information in the "Environmental Setting," "Prehistoric Setting," "Ethnographic Setting," "Historic Setting," and "Background Research" subsections (this section and **Cultural Resources Appendix CR-1**). Staff formulated data requests during the discovery phase of the present certification process on the basis of these models to ensure the collection of enough information to factually support the conclusions of this analysis. The discussions in the "Interpretation of Results" subsection below also employ the models.

Model of Prehistoric Archaeological Resources

The analysis of the information in the "Environmental Setting," "Prehistoric Setting," and "Background Research" leads to the hypotheses that the likelihood of prehistoric archaeological deposits across the surface of the PAA is low, and subsurface prehistoric archaeological deposits might be present in the archaeological component of the PAA.

Staff expects that the potential to encounter prehistoric archaeological resources on the surface of the archaeological portion of the PAA is low because most of it is paved.

Despite the low potential to identify prehistoric archaeological resources on the surface of the archaeological component of the PAA, staff hypothesizes that prehistoric archaeological resources might be found below the present ground surface. The archaeological component of the PAA is located primarily on an alluvial fan of the now-channelized San Gabriel River and partially on land that was marsh or wetland at the beginning of the twentieth century (Mesmer 1903:Soil Map). Fourteen previously recorded archaeological resources are identified in settings similar to the archaeological portion of the PAA, three of which are buried under 3–32 feet of fill and natural sediments (P-19-000272, P-30-001542, and P-30-001644). Prior to 5000–4500 B.P., mean sea level was lower than today and watercourses and other aquatic features were positioned differently than in modern times, altering the suitability of the archaeological resources PAA for human habitation. Since pre-5000–4500-B.P. landforms in the project vicinity are buried under the present land surface (unless eroded), the potential to encounter buried prehistoric archaeological resources during construction must be assessed.

The SAFC points out that construction of the existing AGS resulted in ground disturbance and placement of fill on the AEC project site. The SAFC also discloses that proposed construction would extend 1–4 feet below engineered fill at the project site, while another section of the SAFC states that construction of the AEC could require excavations up to 20 feet below current grade (disturbing 10–14 feet of natural soils or sediments). Pile-driving for certain project components would disturb soils and sediments up to 50 feet below current grade. (AES 2015a:5.3-24–5.3-25, 5.8-5.)

Whether the applicant would encounter buried prehistoric archaeological deposits during construction depends on several factors, including the depositional character and the ages of the sedimentary deposits that construction would disturb, the presence of buried land surfaces or buried surfaces of paleosols[12], the duration or stability of any paleosols, the post-depositional character of geomorphic processes in the PAA, and the nature of past human activities in the area. Given the character of the archaeological resources PAA, staff concludes that the archaeological resources PAA might contain buried archaeological resources.

[12] A term used in geology and geoarchaeology to refer to a former soil or stable surface preserved by burial underneath either natural or cultural deposits (Vogel 2002:29).

Model of Ethnographic Resources

Ethnography fulfills a supporting role for other anthropological disciplines as well as providing contributions on its own merits. For example, ethnography provides a supporting role to the discipline of archaeology by providing a cultural and historic context for understanding the people associated with the material remains of the past. By understanding the cultural milieu in which archaeological sites and artifacts were manufactured, used, or cherished, this ethnographic information can provide greater understanding for identification efforts, making significance determinations per the National Historic Preservation Act (NHPA) or CEQA, as applicable; eligibility determinations for the NRHP or the CRHR, as applicable; and for assessing if and how artifacts are subject to other cultural resources laws, such as the Native American Graves Protection and Repatriation Act.

In addition, ethnography has merits of its own by providing information concerning ethnographic resources that tend to encompass physical places, areas, or elements or attributes of a place or area. Ethnographic resources have overlap and affinity to historic preservation property types referred to as cultural landscapes, traditional cultural properties (TCPs), sacred sites, heritage resources, historic properties, or historical resources that are areas or places, and specific historic property or historical resource types of sites, objects, buildings, structures, districts, areas or places. There is notable overlap in terminology when referring to ethnographic resources. Studies that focus on specific ethnographic resource types may also take on names such as ethnogeography, ethnobotany, ethnozoology, ethnosemantics, ethnomusicology, etc. In general, the ethnographic endeavor attempts to minimize human conflict by facilitating an iterative cross-cultural understanding and, by extension, self-awareness.

Ethnographic Resources

While several definitions of ethnographic resources can be found in historic preservation literature, the National Park Service (NPS) provides the most succinct and commonly used definition (NPS 2007:Chapter 10):

> Ethnographic resources are variations of natural resources and standard cultural resource types. They are subsistence and ceremonial locales and sites, structures, objects, and rural and urban landscapes assigned cultural significance by traditional users. The decision to call resources “ethnographic” depends on whether associated peoples perceive them as traditionally meaningful to their identity as a group and the survival of their life ways.

The term ethnographic resources can also include resources that are also referred to as tribal cultural resources, traditional cultural properties, sacred sites, cultural or ethnographic landscapes, heritage resources, historic properties, or historical resources that are sites, areas or places.

Traditional Cultural Properties/Places

TCPs were defined in order to provide a layer of meaning, relevancy, and significance from a communal or localized perspective to the cultural resources profession that is otherwise dominated by archaeology and the knowledge and perspectives that archaeologists promote (King 2003:21–33). An explanation of “traditional cultural significance" is provided in the following quote from NPS Bulletin 38 (Parker and King 1998:1):

> One kind of cultural significance a property may possess, and that may make it eligible for inclusion in the Register, is traditional cultural significance. "Traditional" in this context refers to those beliefs, customs, and practices of a living community of people that have been passed down through the generations, usually orally or through practice. The traditional cultural significance of a historic property, then, is significance derived from the role the property plays in a community's historically rooted beliefs, customs, and practices.

Such places of traditional cultural significance can include: a location that a Native American group associates with their traditional beliefs concerning their origins, cultural history, or nature of the world; the buildings, structures, or patterns of land use that reflect the cultural tradition valued by the long-term residents of a rural community; a cultural group's traditional home in an urban environment that reflects its beliefs and practices; a location where ceremonial activities conducted by Native American practitioners have historically, or are known or thought to have occurred; or, a location where the economic, artistic, or other cultural practices that are important in maintaining a community's historic identity have traditionally been carried out (Parker and King 1998:1).

Thus, a property that is eligible for inclusion in the NRHP or CRHR because of its association with cultural practices or beliefs of a living community that "(a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community" is a traditional cultural property (Parker and King 1998:1).

While the TCP definition provided in NPS Bulletin 38 addresses many types of special places, some confusion exists with language added during the 1992 amendments to the NHPA at Section 101(d)6. This section states that "properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization may be determined eligible for inclusion on the National Register." The section further extols agencies to consult with Indian tribes and Native Hawaiians concerning the values that their communities may attach to special places. This has led some to erroneously interpret the Act's Section 101 language to limit TCPs to only Native Americans and Native Hawaiians. However, the specific language of the act does not prohibit diversity beyond the two specific ethnicities called out; but rather, affirms that Native Americans asserting TCPs during the consultation process must be considered.

Staff considers the terms "sacred site" to be different than the term TCP, although they are often used interchangeably, even when it is erroneous to do so. The term sacred site is derived from the American Indian Religious Freedom Act, Religious Freedom Restoration Act, and E.O. 13007. Without elaborating further on information concerning the history and resulting inter-relation of the acts and the order, suffice to say that E.O. 13007 provides the best guidance and definition of the term "sacred site". E.O. 13007 calls for the federal government to accommodate access to, and ceremonial use of, sacred sites by Indian religious practitioners and to avoid adversely affecting the integrity of sacred sites through federal land manager actions (ACHP 2002). The definition is as follows:

> Any specific, discrete, narrowly delineated location on Federal land that is identified by an Indian tribe, an Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site.

Therefore, these two terms are not interchangeable because sacred sites can only be located on federal lands and the definition calls out the limited geographic extent of sacred sites as "specific, discrete [and] narrowly delineated." However, TCPs are often identified as a result of federal undertakings and tend to be geographically more expansive than "specific, discrete [and] narrowly delineated sacred sites." TCPs tend to be larger because aspects such as viewshed and changes through time need to be considered when defining the boundaries of a TCP (Parker and King 1998:20).For the purposes of this analysis, the research focus is with Native American sites, places, and areas otherwise referred to as ethnographic resources, located in and around the proposed project area. Having said this, and based upon the discussion provided above, the reader should be aware that there are multiple overlaps of terminology. Staff will primarily use the term "places" or "areas" in reference to the type of historical resources discussed in this report; however, where applicable, staff will use the term that a source document or tribal participant uses.

Ethnographic Methods

Ethnographic methods, when applied to projects of limited size and scope involve four steps.[13]

Step 1 involves reviewing the project description and mapped project location and, based upon the geographic and environmental setting, formulating preliminary guiding questions that may be asked of people with cultural affiliation to the project area.

Step 2 involves contacting, informally discussing with, or formally interviewing people who might have a cultural relationship or affiliation to a given area.

As Step 2 is being conducted, a parallel Step 3 involves an archival "search, retrieve, and assess" process that should be undertaken to provide supporting or conflicting information to what is being discovered through the discussion process. In addition to archives, book stores, and other informational repositories (e.g., the internet), the people themselves or other ethnographers with previous experiences with the same people, may provide source materials. Findings in Step 3 may require a repetition of Step 2.

Step 4 involves field visit(s) that are intended to help the ethnographer triangulate between what people currently say, what people have written in the past, and what is actually or perceived to be in the project vicinity as a potential ethnographic resource.

[13] See Pelto 2013, Chapter 16 for an overview of applied ethnographic methods for conducting focused inquiry conducted in limited timeframes.

Preliminary Guiding Topics

Based upon the project description and project location maps three preliminary Guiding Questions were developed.

- Research contemporary Gabrielino Tongva connections with the Puvungna site and Alamitos Mesa.
- Research the role of *Chingichngish* in traditional Gabrielino Tongva society and the importance of the religion associated with *Chingichngish* to the Puvungna settlement.
- Research the role that Puvungna played in the long distance trade/trail network for which the project region was one of the trade network hubs the western end of one of the most extensive trade/trail networks of western North America.

As documented previously in this cultural resources section (*Native American Consultation*), staff contacted Native Americans affiliated with the project area.

Several meetings were held around the proposed project area in June 2014. One meeting was held with a representative of the Gabrielino/Tongva Nation on June 6, who expressed a need to have Native American monitors present during ground disturbing activities, and noted that the tribe would also be submitting written comments regarding the project.

A meeting on June 7, 2014 was held with some of the members of the Ti'at Society/Intertribal Council of Pimu and a representative of the Gabrielino Tongva Indians of California Tribal Council. These Native Americans urged a landscape approach to the analysis of cultural resources in the project area of analysis, provided knowledge concerning this landscape and the site of Puvungna, and the high potential for buried cultural resources in the vicinity of the project area. Staff and these members also travelled to the Rancho Los Alamitos to examine the Puvungna site and to get a view of the project area from the Alamitos Mesa. A desire to see the project area more closely was also expressed, and a site visit was requested.

A meeting on June 21, 2014 was held with some members of the Ti'at Society/Intertribal Council of Pimu and a representative of the Gabrielino Tongva Indians of California Tribal Council at the existing AGS. A representative of AES Southland provided a PowerPoint presentation of the proposed project and led the group on a tour of the area proposed for reconstruction. Later that day, staff was invited to and attended a semi-annual song fest and summer solstice ceremony held at the site of Puvungna on the California State University, Long Beach (CSULB) campus.

Interviews

Staff completed limited ethnographic interviews and consultation while conducting archival research. The conversations that were undertaken were productive and informative concerning the Native American values related to the Puvungna Ceremonial Site Complex (PCSC).

Archival Research

Staff made efforts to seek, obtain, and assess culturally relevant information from various archival sources. Information specifically sought related to the relationship between Puvungna and the Gabrielino Tongva, as well as the relationship between *Chingichngish* and the Puvungna settlement. The California History Room of the California State Library, located in Sacramento, was also used for retrieving ethnographic information, in addition to the Special Collections at Loyola Marymount University in Los Angeles.

Field Visit

Ethnographic staff visited the project area and its surroundings on June 6–7 and 20–21, 2014. Staff's visual observation of the project site and vicinity did not result in the field identification of ethnographic resources because of the paved character and industrial nature of the area.

Ethnographic Method Constraints

Listed below are two constraints on the ethnographic methods described above.

1. There has been a significant amount of loss of traditional cultural knowledge on the part of the Gabrielino Tongva and only recently have they felt comfortable expressing their understandings of the Long Beach region during the environmental review process.

2. There has been debate within the archaeological and anthropological community regarding the location of the PCSC (see Boxt and Raab 2000; Dixon 2000; Lightfoot 2000; Milliken et al. 1997; Ruyle 2000), and while this debate has not influenced the Native American's understanding of this place, the debate does act as a constraint in that it provides contradictory lines of scientifically-based evidence.

Model of Historic Archaeological Resources

The analysis of the information in the "Environmental Setting," "Historic Setting," and "Background Research" (**Cultural Resources Appendix CR-1**) leads to the hypotheses that historic archaeological deposits are unlikely to occur on the surface of the archaeological resources PAA, but might be present below ground surface.

Staff expects that the potential to encounter historic archaeological resources on the surface of the archaeological portion of the PAA is low because most of it is paved.

Historic maps show that the archaeological resources PAA occupies land that primarily sat on an alluvial fan of the now-channelized San Gabriel River. In addition, historic aerial photographs dating to 1928, 1938, and 1947 show a residence, numerous associated structures, and roads adjacent to the AEC project site, in the vicinity of existing generating units 3–4 (compare AES 2015a:Figures 2.1-1, 2.1-2; EDR 2011a). McCormick and Ferraro (2002:15–16) also report buried historic archaeological features in a setting similar to the project site, about 1 mile to the west.

Cultural Resources Inventory Fieldwork

This section discusses the methods and the results of each field inventory phase and interprets the resultant inventory relative to the cultural resources distribution models above to assess how well the inventory represents the archaeology of the project area. Descriptions of each cultural resource in the inventory, evaluations of the eligibility of each resource for inclusion in the CRHR, assessments of project impacts on each known historical resource, consideration of and potential impacts on archaeological resources that may lie buried on the project site, and proposed mitigation measures for significant impacts may be found in the "Cultural Resource Descriptions and Significance Evaluations" subsection below.

The field efforts to identify cultural resources in the PAA consist of the applicant's pedestrian archaeological and historic built-environment surveys, and staff's field visits to the proposed project site. Six newly identified cultural resources have been found in the PAA as a result of the applicant's and staff's efforts. On the basis of research by staff and the applicant for the present analysis and the results of the field efforts that are presently available, the total number of cultural resources within the PAA includes a Gabrielino Tongva traditional cultural place (also containing archaeological and ethnographic components), and nine built-environment resources.

Pedestrian Archaeological Surveys

Methods

As stated in the AFC and SAFC, CH2M Hill archaeologists, Gloriella Cardenas and Natalie Lawson, surveyed the proposed project site on September 28–29, 2011, April 15, 2015, and October 5, 2015. The proposed project site was covered by buildings, structures, roads, and other paved surfaces constituting the AGS, rendering ground surface visibility to zero except in a few areas of broken pavement or sparse gravel. These areas were visually inspected as they were encountered. Within the 200-foot survey buffer, the archaeologist encountered exposed soil where fuel oil tanks had been removed, streets, sidewalks, Los Cerritos Channel, San Gabriel River, an open area in the southeastern corner of the proposed project site (a proposed parking/laydown area), and an open area in the northwestern corner of the project site. The open areas were landscaped or covered with fill. The archaeologist surveyed the open areas by walking transects spaced 30 feet apart. (AES 2013:5.3-26–5.3-27, Figure 5.3-1; AES 2015a:5.3-24; AES 2015b:Figure 5.3-1R; Cardenas et al. 2013:iii, 4-7–4-8, Figures 1–2.)

Ms. Lawson surveyed the proposed process water/sanitary wastewater pipeline corridor on July 2, 2012. The archaeologist surveyed a 50-foot buffer on both sides of the proposed pipeline. The proposed pipeline route intersects the former site of fuel oils tanks adjacent to the project site, a portion of Los Cerritos Wetlands, sidewalks, Studebaker Road, Loynes Drive and the bridge carrying it over Los Cerritos Channel, and a portion of E. Vista Street. The majority of the proposed route is paved. (AES 2013:5.3-26–5.3-27, Figures 5.2-5f, 5.3-1; AES 2015a:5.3-24; AES 2015b:Figure 5.3-1R; Cardenas et al. 2013:iii, 4-7–4-8, Figures 1–2.)

Results

The applicant did not identify any archaeological resources in the PAA as a result of the archaeological surveys (AES 2013:5.3-27, 5.3-29; AES 2015a:5.3-24; Cardenas et al. 2013:iii, 1-3, 4-8, 4-10).

Results of Ethnographic Resources Investigations

Staff research and site visits leads staff to suggest that an ethnographic resource, the PCSC is present in the PAA.

Historic Built Environment Survey

Methods

The built-environment inventory by the applicant consisted of a pedestrian inventory survey of the proposed project site and properties within a one-parcel extent of its boundary and a reconnaissance (windshield) survey covering a one parcel extent from the originally proposed offsite linear alignment of the proposed process/sanitary wastewater pipeline (AES 2015a:5.3-25). The applicant's coverage of the windshield survey for the offsite linear alignment for the pipeline consisted of 42 parcels along East Vista Street located within the University Park Estates residential subdivision, which was developed between 1960 and 1962. The windshield survey was performed to assess the potential for the presence of historic resources that could be impacted by the proposed project. As mentioned above, the length of the proposed pipeline was reduced to 1,000 linear feet since the time of the applicant's windshield survey, such that only two residential parcels within the University Park Estates remain within staff's PAA.

The applicant's survey area, as defined by the PAA, encompassed a mix of industrial, water control/distribution, transportation, and residential properties. The applicant's historic built environment survey was performed by an architectural historian meeting the Secretary of the Interior's professional qualifications for that discipline (AES 2013:5.3-27). The applicant recorded and evaluated extant buildings and structures that had been built within the past 45 years (i.e., constructed before 1969) within the survey area. Fieldwork was conducted by the applicant in September 2011, and resulted in the identification of two historic-period built environment resources: the Alamitos Generating Station and the University Park Estates residential subdivision.

Staff's review of the applicant's documentation of the historic built environment and preliminary review of historic maps of the project area concluded that the historic built environment survey did not inventory and evaluate all historic period built environment resources within the required survey area (CEC 2014a:20).

At staff's request, additional architectural survey was performed by the applicant in February 2014. Two additional historic-period built environment resources were recorded as a result: the San Gabriel River and HGS. The applicant submitted the results of the inventory survey and evaluation of those resources along with corresponding DPR 523 forms on February 17, 2014 (AES 2014a:Appendix 5.3).

On March 25, 2014, staff performed a reconnaissance survey of the PAA, including the project site and offsite linear alignment, properties within a one-parcel extent of those areas, and the immediate surrounding area. Staff's reconnaissance survey was performed to identify potential impacts of the proposed project on historic built-environment resources and any cultural resources present within the PAA that may not have been recorded and evaluated by the applicant in the AFC (AES 2013) or Data Adequacy Supplement (AES 2014a). In addition to the four historic built environment resources identified by the applicant, staff identified five more built environment resources within the PAA, for a total of nine. The five additional resources identified include Los Cerritos Channel, Studebaker Road, and three bridges (Bridge #s 1563, 3460, and 2750).

Through staff's background research and reconnaissance survey, the results of the applicant's survey and evaluations presented in the AFC (AES 2013) and the Data Adequacy Supplement (AES 2014a) were found by staff to be incomplete and inconclusive. As mentioned, staff identified five additional historic-period built environment resources within the PAA that were not recorded or evaluated by the applicant. Additionally, the recording and evaluations of the AGS, HGS, and San Gabriel River submitted by the applicant as part of the AFC (AES 2013) and the Data Adequacy Supplement (AES 2014a) were missing key information and were found insufficient for staff's analytic needs for assessing potential impacts to historical resources.

The AGS and HGS were not evaluated by the applicant under CRHR eligibility Criterion 3 in the AFC (AES 2013) or Data Adequacy Supplement (AES 2014a). Five structures that appeared to be historic in age at the AGS—three retention basins and two intake channels—were not recorded or included in the eligibility evaluation of the resource. The San Gabriel River was not adequately defined or recorded as an engineered historic-period structure and was not evaluated for CRHR eligibility as such; only the levees were recorded by the applicant and considered in their analysis presented in the Data Adequacy Supplement (AES 2014a). Additionally, the records search and literature review performed by the applicant was too narrow in coverage to determine if the San Gabriel River had been previously recorded as a cultural resource and if any previous recommendations or determinations of eligibility were on record for the resource.

Staff cannot assess the potential effects of the proposed project on historical resources if cultural resources within the PAA are absent from the analysis or if staff lacks sufficient information as to whether the cultural resources in the PAA are significant. Consequently, staff submitted Data Requests 44–47 (CEC 2014b) asking the applicant to provide the missing information needed for staff analysis.

On May 15, 2014, the applicant formally objected to staff's Data Requests 44–47, citing them as "burdensome and neither relevant nor reasonably necessary for a Commission decision in this proceeding" (Pottenger and Harris 2014:2). On May 27, 2014, the applicant submitted Data Response Set 1A to Staff Request (AES 2014b). In that document, the applicant responded to Data Request 44, providing the previously missing evaluation of the HGS under CRHR eligibility Criterion 3 and an updated DPR Primary Form with that information incorporated. In response to the applicant's remaining objections, staff prepared a memorandum regarding Data Requests 45–47 for the historic built environment, clarifying the scope and need of the requested information for staff's analysis (Roark and Smith 2014). Staff participated in a conference call with applicant representatives on June 9, 2014 to discuss and further clarify the requirements and scope of Data Requests 45–47. During that call, the applicant's representatives committed to working on Data Request 45 and 46 and indicated they would research and further consider Data Request 47.

The *AEC Data Response Set 1B* (Responses to Data Requests 45 to 47) was docketed on August 12, 2014 (AES 2014c). The applicant provided an adequate response to Data Requests 45 and 46. However, the applicant only responded partially to Data Request 47, which requested survey, formal CRHR eligibility evaluation, and DPR forms for three bridges (1563 over North Intake Channel, 3460 over South Intake Channel, and 2750 over Los Cerritos Channel on Loynes Drive), Studebaker Road, and Los Cerritos Channel. Of the five resources identified in Data Request 47, the applicant only complied with the full request for information for Los Cerritos Channel. Staff conducted an independent analysis and evaluation for the three bridges and Studebaker Road, included later in this section.

Results

The inventory of cultural resources in the PAA is the collective result of archival and literature research, discussions with local governments and public interest groups, and field investigations conducted both by staff and the applicant. For the proposed AEC, these efforts have led to the identification of nine extant built-environment cultural resources in the PAA dating to the historic period (45 years of age or older). Descriptions of the resources, staff conclusions regarding historical significance, and recommendations as to whether the resource warrants further consideration under CEQA are located below in the *Determining the Historical Significance of Cultural Resources* subsection of the PSA.

Cultural Resource Descriptions and Significance Evaluations

Staff has identified a total of 10 cultural resources in the PAA. Of these, one is an ethnographic resource (PCSC) and nine are historic-period built-environment resources (AGS, HGS, San Gabriel River, the University Park Estates residential subdivision, El Cerritos Channel, Studebaker Road, and three vehicular bridges [California Department of Transportation—Caltrans—bridge #s: 1563, 3460, and 2750]). One previously recorded built environment resource, the AGS Fuel Tank Farm (P-19-186880), was once present immediately south of the project boundary, but was determined ineligible for both the NRHP and CRHR in 2004 and the tanks were removed in 2010. Therefore, it is no longer an extant historic built environment resource and is not considered in this analysis.

Archaeological and Ethnographic Resources

Puvungna Ceremonial Site Complex

The PCSC is an archaeological and ethnographic resource, a traditional cultural place of the Gabrielino Tongva. The archaeological components of the PCSC consist of sites, artifacts, and features related to prehistoric and protohistoric occupation and use of the natural resources on and around Alamitos Mesa. The ethnographic components of the PCSC include associations with the village sites identified as Puvungna located on

Alamitos Mesa, and the natural resources on and around Alamitos Mesa. The archaeological components of the PCSC are discussed first, followed by the ethnographic.

Archaeological Components

The village of Puvungna was first formally recorded by archaeologist Keith Dixon in 1964 as CA-LAN-306, a midden site located at the Rancho Los Alamitos. At the time, Dixon (1964) suggested that the site was an unlikely candidate for Puvungna because he assumed it was of Middle Holocene origin[14], rather than a Late Prehistoric site. Researchers expected Puvungna to be a Late Prehistoric site because of its mention in mission baptismal records as the home rancheria of 35 Indians at Mission San Gabriel and two at Mission San Juan Capistrano (located about 30 miles southeast of the AEC). However, eight years later, Dixon revised his opinion regarding the location of Puvungna, arguing that CA-LAN-306 is likely one of the locations on Alamitos Mesa that corresponded to the village (Dixon 1972). In 1973 Dixon nominated the Puvungna village (and it was subsequently accepted) to the NRHP, including not only CA-LAN-306, but also sites CA-LAN-234/235, which are located about 1 mile west of the rancho, on the CSULB campus. Dixon nominated these sites as a district, and suggested that "[r]emnants of the living areas still exist in at least nine places in an area of about 500 acres. It is probable that the Puvungna village was moved around gradually over time within this small area" (Dixon 1973:2). The "small area" to which Dixon refers is the Alamitos Mesa. Dixon does not mention the site numbers or names of the nine places on the mesa he suggests are also locations of Puvungna, but the sites included in **Cultural Resources Appendix CR-1**, **Table 5** are those recorded prehistoric sites (including isolated finds) located on the mesa that contain (or, in some cases contained) archaeological deposits that indicate prehistoric or protohistoric occupation of the mesa. Some of these sites are recorded as distinct archaeological deposits, but this distinction between sites may simply be a product of modern development which destroyed portions of sites, obscuring the contiguity of the deposits. Some of the sites included in **Cultural Resources Appendix CR-1**, **Table 5** are not located on the mesa itself, but are, according to Hudson's (1971) model of proto-Gabrielino settlement patterns, secondary gathering camps affiliated with the primary Puvungna settlement.

The archaeological evidence also indicates that Puvungna was a locale of trading. The presence of steatite and obsidian, non-local natural resources, at sites in the PCSC suggest that Puvungna was located within the trading network that encompassed the Channel Islands and extended into the Southwestern desert. Several researchers, including staff on other proposed energy projects, have documented and evaluated other portions of this vast trail system, arguably the most extensive trade network in the western United States (e.g. Bean and Smith 1978:547; Davis 1961; Dobyns 1984; Gates et al. 2013; Latta 1936). The ethnographic component of the trail system in the PAA consists of associations with the trail corridors (including those out to the Channel Islands), associations with the site of Puvungna and the spread of the *Chingichnich* religion along the trail corridors, and understanding the trails and movement along trails, and the landscape in which they are situated. For example, a contemporary Gabrielino Tongva woman had a dream that inspired her to build a *ti'at*, a traditional Gabrielino

[14] Test excavations of the site later that year showed the site to be of Late Prehistoric age.

Tongva plank canoe, and make trips to the Channel Islands, harkening back to the prehistoric activities of movement between the mainland and the Channel Islands (Regents of the University of California 2014; Williams 2013). Coupled to this theme are the occupation sites (and for AEC, especially those occupation sites associated with the PCSC; see **Cultural Resources Table 8**) that might have changed over time, where Gabrielino Tongva first dwelt as villagers, perhaps as a place that accommodated long distance traders from neighboring tribes. The archaeological record also suggests that the sites in the PCSC were occupied at least for the past 2,000 years, further indicating the long-term occupation and historical importance of Puvungna.

Archaeologist William McCawley (1994:2-1–2-2) equated Puvungna with the whole of Alamitos Mesa because it was a rancheria, which typically “included a central town (or primary habitation site) as well as hunting and plant-gathering areas, ceremonial sites, workshops, and other special activity areas”. The archaeological sites and features on Alamitos Mesa bear this theory out as seen in **Cultural Resources Appendix CR-1**, **Table 5**, and is reiterated by McCawley (1994:3-14), “The primary settlement (town) of *Povuu’nga* could, in fact, have extended across much of the mesa with scattered clusters of houses, windbreaks, sweathouses, storage structures, ceremonial sites, playing fields, and work areas.” Thirty-two of the 38 archaeological sites in **Cultural Resources Appendix CR-1**, **Table 5** are contributing elements to the PCSC traditional cultural place.

Ethnographic Components

The site of Puvungna is understood by the Gabrielino Tongva, as well as other Southern California indigenous groups, to be the place of emergence of the deities *Ouiot* and *Chingichngish*, and in one version of *Chingichngish’s* death, it is also the place he died. Puvungna is also understood to have been an important location for trading and ceremonies, and continues to be used for ceremonies by Gabrielino Tongva today. The first mention of Puvunga in the written historical record appears in the records of missions San Gabriel and San Juan Capistrano; Puvunga (written as Puvuit and Pububit) was documented as the home of 35 baptized Indians at San Gabriel and two baptized Indians at San Juan Capistrano (Heizer 1968:110). According to mission register analysis, Puvungna likely had a contact-period population of at least 60 to 90 people (Milliken et al. 1997:16).

Franciscan missionary Gerónimo Boscana was the first non-Native American to document the religion associated with *Chingichnich*, and to document Puvungna (written as Pubuna) as the birthplace of *Ouiot* and *Chingichnich*. Boscana’s description of the location of Puvungna is that it is located about 20–24 miles northeast of Mission San Juan Capistrano, somewhere in western Riverside County; however this location does not agree with mission register marriage patterns for Puvungna, and information obtained subsequently suggests that Boscana likely meant northwest, instead of northeast, from Mission San Juan Capistrano (Milliken et al. 1997:18).

Hugo Reid, a Scottish-American immigrant living in the Los Angeles area during the mid nineteenth century, married a Gabrielino Tongva woman, and they worked together to document aspects of Gabrielino Tongva culture. Reid’s letters were subsequently published in the *Los Angeles Star* newspaper in 1852. Reid documented various aspects of Gabrielino Tongva lifeways, but more importantly for the purposes of this analysis, he equated Puvungna (written as Pubug-na) with Alamitos in a list of known Gabrielino Tongva villages (Reid 1968:8).

Alfred Kroeber's work among the Gabrielino Tongva in the early twentieth century was important because he acknowledged that much of the Luiseño and Juaneño religion was derived from the Gabrielino Tongva belief system, providing one of the bases for ethnographic analogy among these groups with regard to understandings of *Chingichngish* and the practices associated thereof. It appears Kroeber followed Reid's lead in equating Puvunga with the Rancho Los Alamitos, and stated that it was northwest of Mission San Juan Capistrano (Kroeber 1976:636). However, he does not provide references for why he contradicted Boscana's northeast designation or why he equated Puvunga with the Rancho.

Another anthropologist in the early part of the twentieth century, J. P. Harrington, worked closely with Juaneño and Luiseño informants who informed him, and physically showed him that Puvunga (written as Puvú') was located at the old Los Alamitos ranch house (Harrington 1933:148–149). Harrington also commented upon the contradiction in Boscana's narrative concerning the distance and direction of Puvunga, and suggests that Boscana was mistaken when describing Puvunga's location relative to the Mission San Juan Capistrano and he meant northwest when he wrote northeast (Harrington 1933:148).

Staff's independent research and consultation efforts with Native American representatives of various Gabrielino Tongva organizations confirm that Puvunga has been, and continues to be, an important traditional cultural place. Contemporary Gabrielino Tongva visit Puvunga regularly, primarily at sites CA-LAN-234/235 on the CSULB campus and CA-LAN-306 at the Rancho Los Alamitos. Tribal members visit Puvunga because they understand it to be a sacred place that provides them the ability to spiritually connect with their ancestors. They understand that this is the location where their ancestors lived, died and were buried, and practiced the *Chingichnich* religion, and where *Ouiot* and *Chingichnich* appeared to their ancestors. Puvunga maintains a strong sense of place for tribal members; ancestor poles are erected at various locations, a fire pit is dug out and used at the site, some tribal members continue the *Chingichnich* religion-related tradition of sand painting here, and members hold regular ceremonies at Puvunga, such as the solstice ceremony that staff attended in June 2014.

In order to evaluate the PCSC as a historical resource under CEQA, one must establish a theme that derives from a historic context, provide a bounded area, define a period of significance, identify significance per at least one of the four criteria, and determine integrity.

The historic context is provided earlier in this staff assessment in the ethnographic section, but also in the present section under the Archaeological and Ethnographic Components. The contextual themes of the PCSC are those of origins, ceremony, trade and travel, and contemporary indigenous connections to the past. The theme of origins is applicable because *Ouiot* and *Chingichnich* emerged at Puvunga, and with the emergence of *Chingichnich* came the beginnings of the traditional religion practiced by the Gabrielino Tongva. Once *Chingichnich* emerged, he taught the Gabrielino Tongva the ways to live in accordance with his rules, and how to properly perform the necessary ceremonies to show him veneration, thus the theme of ceremony is applicable to the PCSC. Trade is an important theme to the PCSC because of the role that trading of physical objects played in the lives of the Gabrielino Tongva, but more importantly for this place, the trading of ideas and cultural dispersion concerning the *Chingichnich* religion. The theme of connections to the past fits hand-in-hand with the themes of origin and ceremony (see **Cultural Resources Appendix Figure 1**). The PCSC is not only a place of emergence of deities and ceremonial beginnings, but was also an important habitation site for the Gabrielino Tongva, thus allowing contemporary tribal members to walk on the same grounds and practice at the same locales as their ancestors.

Periods of significance are comprised of beginning and ending dates. The beginning date for this traditional cultural place is indeterminate because there is little knowledge of how early the place was used or occupied. Native Americans understand that this resource has been used forever, since time immemorial. The limited radiocarbon dating samples from sites in the PCSC suggest that people were living at Puvunga as early as A.D. 100, but were likely living here earlier than this. However, the alluvium from the San Gabriel River likely has covered these older deposits. There is no end date for the period of significance for the PCSC because it is still used and venerated by the Gabrielino Tongva today.

Staff recommends that the PCSC traditional cultural place is eligible for the CRHR under Criterion 1 at the local and state level for the unique historic events that contribute to Native American understandings of their origins and those of *Ouiot* and *Chingichnich,* in addition to the trade and ceremonies which occurred, and ceremonies that still occur at Puvunga.

Staff recommends that the PCSC traditional cultural place is eligible for the CRHR under Criterion 2 at the local and regional level for the association of Puvunga with the deities *Ouiot* and *Chingichnich.* As previously noted, there are Native American oral traditions that tell of the monster chief *Ouiot* and the supreme creator-god *Chingichnich* as both making their initial appearance to the world at Puvunga.

Staff recommends that the PCSC traditional cultural place is also eligible for the CRHR under Criterion 4 at the local, state, and national level for the information concerning habitation and subsistence practices, and radiocarbon dating that the resource has already yielded, but also for the potential of the place to yield additional ethnographic and archaeological information about the Gabrielino Tongva, cultural lifeways in the Los Angeles Basin, and trade with the greater Southwest.

The integrity of the PCSC has been compromised by the historic activities associated with the Rancho Los Alamitos, the construction of numerous buildings and associated infrastructure, including those on the CSULB campus, the Veteran's Affairs Hospital, schools, and surrounding neighborhoods. However, despite the intrusions to this traditional cultural place, the PCSC continues to convey a valuable and important sense of place to the Gabrielino Tongva who continue to visit and celebrate at this significant place. Therefore, the PCSC maintains integrity of location, materials, feeling, and association.

Historic Built Environment Resources

Staff reviewed the built environment resources within the records search area (1-mile radius from the PAA), and did not discover any resources outside of the PAA that had the potential to be impacted by the proposed AEC. Those resources are summarized in **Cultural Resources Appendix CR-1, Table 4.**

The applicant provided inventory and evaluation data for four historic-era built environment resources located within the PAA (the AGS, HGS, San Gabriel River Channel, and Los Cerritos Channel). The applicant also provided the results of a reconnaissance level (windshield) survey covering 42 lots within the University Park Estates residential subdivision (1960–1962) that are located along either side of the originally proposed linear process/sanitary wastewater pipeline alignment (AES 2013:5.3-29). However, since the applicant's original architectural survey was performed, the majority of the pipeline was removed from the proposed project and is now limited to the crossing of Los Cerritos Channel and the southeastern corner of the University Park Estates subdivision. Consequently, only two residential parcels and Bridge 2750 now lie within a one parcel extent of the reduced linear pipeline alignment. Those two residential parcels were included in the applicant's original windshield survey, which found no historical resources present in the University Park Estates subdivision that could be impacted by the proposed installation of the offsite linear process/sanitary wastewater pipeline. Staff concurs with that finding. Therefore, no formal evaluation of the University Park Estates or the two subject parcels within it that border the proposed offsite linear pipeline alignment is required, and the two parcels are not further considered in the following analysis.

Staff identified four other historic built environment resources present within the historic built environment portion of the PAA that the applicant did not identify, inventory, or evaluate as part of their architectural survey efforts for this project. Those four built environment resources include Studebaker Road and three vehicular bridges (Bridge #s 1563, 3460, and 2750).

For this PSA, staff reviewed the four CRHR-eligibility evaluations of historic-period built environment resources provided by the applicant: AGS, HGS, San Gabriel River Channel, and Los Cerritos Channel. None of those resources were previously recorded and, therefore, they are not listed in **Cultural Resources Appendix CR-1, Table 4**. The resources include two industrial properties and two engineered floodwater control/distribution structures. Staff concurs with both the AGS and HGS evaluations provided by the applicant and concludes that neither of these two resources appears eligible for listing on the CRHR under criteria 1–4. Staff also concurs with the applicant's evaluations of both the San Gabriel River Channel and Los Cerritos Channel and concludes that both of these engineered flood control structures appear eligible for the CRHR under Criterion 1. Staff adds that upon further research and investigation, these two flood control structures also appear eligible for the CRHR under Criterion 3 for their high artistic values and engineering merits.

What follows is a descriptive summary based on research performed by the applicant and staff regarding the historic-period built environment resources located within the PAA. A summary of each resource's CRHR-eligibility is presented along with staff conclusions regarding the subject cultural resource as a potential historical resource for the purposes of CEQA.

Alamitos Generating Station, 609 N. Studebaker Road. 1955–1990s

The AGS is a once-through-cooling (OTC), steam-electric power plant built by SCE, encompassing approximately 120 acres located between the San Gabriel River and Los Cerritos Channel. The majority of the facility's buildings and structures date between 1956 and 1969, placing them within the age threshold of 45 years or older for consideration as a potential historical resource (under CRHR guidelines). The historic-period resource is composed of three pairs of power generating units (Units 1–6), a peaker unit (Unit 7), the original main administration building, a separate administration building for Units 5 and 6, a switchyard at the north end of the plant, various warehouses and maintenance facilities, a bag house, transformers, and numerous support facilities such as a circulating water system, retention basins, intake channels, outfalls, a compressor house, and storage house (see **Cultural Resources Table 5**). The SCE switchyard, known historically as the Stadium Substation, was constructed in 1956–1960 concurrently with the AGS as part of the operating system. Therefore, it is a historical component of the AGS. For unknown reasons, the applicant did not identify it as such within their documentation and evaluation of the AGS.

Cultural Resources Table 5
Alamitos Generating Station

No.	Resource Designation	Type & Description	Date	45 Years or Older?	Other
1	Original Administration Building	One-story, Midcentury Modern building	Ca. 1958	Yes	No longer used as administration building. Now leased by charter school.
2	Units 1 and 2	Conventional steam drum, outdoor steam generating units	1956–1957	Yes	Each consists of boiler, turbine, generator, control systems, and associated auxiliary equipment.
3	Units 3 and 4	Conventional steam drum, outdoor steam generating units	1961–1962	Yes	Each consists of boiler, turbine, generator, control systems, and associated auxiliary equipment.
4	Units 5 and 6	Conventional steam drum, outdoor steam generating units	1966	Yes	Each consists of boiler, turbine, generator, control systems, and associated auxiliary equipment.
5	Administration Building for Units 5 and 6	One-story, concrete block Mid-Century Modern building	Ca. 1966	Yes	
6	Unit 7	Concrete	1969	Yes	No longer in use;

No.	Resource Designation	Type & Description	Date	45 Years or Older?	Other
		building housing air-cooled peaker unit with turbine			decommissioned and retired in January 2004.
7	SCE Switchyard (Stadium Substation)		Circa 1956–1960	Yes	Located at north end of plant. The Applicant mentions this feature, but did not include it within the boundaries of the AGS, although it was constructed concurrently as a feature of the AGS system.
8	Guard House	Small concrete building with modest Midcentury Modern features	1965	Yes	Located at main entry to complex.
9	Division Maintenance Storeroom	Concrete block building	1961	Yes	Includes adjacent warehouse and tool storage area. Also known as Division Maintenance Shop.
10	Storeroom Building 1	Industrial concrete block building	1961	Yes	Includes AGS Locker Room.
11	Insulation and Storage Building	Industrial concrete block building with corrugated metal addition	Ca. 1961	Yes	Date of addition unknown.
12	Administration Building	Contemporary Modern-style stuccoed concrete block building with four units, forming horseshoe arrangement around central courtyard.	Ca. 1980s–1990s	No	Built by SCE
13	Weld Shop	Industrial corrugated metal rectangular building	Ca. 1980s–1990s	No	Built by SCE; located in Administration Building complex

No.	Resource Designation	Type & Description	Date	45 Years or Older?	Other
14	Machine Shop	Industrial corrugated metal rectangular building	Ca. 1980s–1990s	No	Built by SCE; located in Administration Building complex
15	Memorial Park	Small landscaped park with benches	Ca. 2005	No	
16	South Intake Channel	Poured-in-place concrete water intake structure	Ca. 1966	Yes	Located south of Loynes Drive, this intake was constructed to draw water from Los Cerritos Channel to provide cooling water to Plants 5 and 6
17	North Intake Channel	Poured-in-place concrete water intake structure	Ca. 1956	Yes	Located north of Loynes Drive, this intake was constructed to draw water from Los Cerritos Channel to provide cooling water to Plants 1–4.
18	South Retention Basin	Rectangular poured in-place concrete water retention basin	Ca. 1960s	Yes	Located northeast of Plants 5 and 6 and west of San Gabriel River levee.
19	Central Retention Basin	Square poured in-place concrete water retention basin	Ca. 1960s	Yes	Located southeast of Plant 4 and west of San Gabriel River levee.
20	North Retention Basin	Square poured in-place concrete water retention basin	Post-1972	No	Located east of Plant 4 and west of San Gabriel River levee.
Notes: AGS = Alamitos Generating Station; SCE = Southern California Edison Company					

Several changes to the AGS property have occurred since the historic period. Three new buildings were added to the facility in the 1980s–1990s, including a new administration building, weld shop, and machine shop. With construction of a new administration building, the original administration building was no longer needed for AGS operations and currently is leased out to a charter school. Based on past aerial imagery analyzed by staff, a small memorial park was added to the AGS property sometime in the past 15 years. It is located south of the main entrance into the facility and adjacent to Studebaker Road. The park contains two concrete picnic tables and benches, a memorial plaque, open lawn surrounded by ornamental shrubs and trees, and a volley ball area.

Located on the AEC project site and historic in age, the AGS is the primary focus of the investigation. The applicant submitted an inventory and CRHR-eligibility evaluation of the AGS as part of the SAFC (AES 2013, 2014c, 2015a:5.3-25–5.3-26; Cardenas et al. 2013:5-3–5-4, Appendix A). Staff reviewed the submitted reports and accompanying DPR 523 forms. The AGS was evaluated by the applicant for historical significance as a historic district and the constituent buildings, structures, and features were also considered for individual significance (AES 2014c:Attachment DR46-1, 2015a:5.3-25–5.3-26). The irregularly shaped district encompasses approximately 63 acres, comprised of two contiguous parcels roughly bounded by the San Gabriel River on the east, Studebaker Road and Los Cerritos Channel on the west, East 7th Street on the north, and Westminster Boulevard on the south. Parcel number 7237019005, located near the center of the AES property, previously contained four fuel oil tanks, which were part of the original AGS facility. The parcel is not owned by AES and the tanks were removed in 2004. Consequently, the parcel is not included within the district boundaries.

The applicant concluded that the AGS is not significant under CRHR eligibility criteria 1–4 and recommended that AGS is not a historical resource for purposes of CEQA (AES 2014c:Attachment DR46-1, 2015a:5.3-25–5.3-26). Staff concurs with the applicant's evaluation of the AGS under the four CRHR eligibility criteria.

The AGS is not significant within the historic context of the SCE, steam generation of electricity, or development of post-World War II steam generation plants (Criterion 1). The AGS was one of several steam generating plants built by SCE in the mid-twentieth century. SCE's new steam plants were part of a larger trend among California electric companies during that time period to meet the rapidly growing post-war energy demands. In 2008, twenty-one examples of the OTC steam generation units from the same general time period remained in southern California alone, including the AGS. Nationwide, in 2008 there were more than 1,200 of these steam generation units remaining that used the OTC process (Tetra Tech 2008, cited in AES 2015a:5.3-26). The AGS is not a precursor or early example of this historic pattern of steam plant generation development and is not unique or significant within the context of the time and other contemporary power plants. Staff concurs with the applicant and concludes that the AGS is not eligible for the CRHR under Criterion 1.

Background research performed both by the applicant and staff did not identify any evidence that the AGS was associated with the life of one or more historically significant individuals. Consequently, staff concurs with the applicant and concludes that the AGS is not eligible for the CRHR under Criterion 2.

The applicant stated in their original AGS DPR 523 form set that "The buildings and structures do not embody characteristics of a type, period, region or method of construction. They are not the work [of] a master and do not have high engineering value (Criterion C and 3)" (Price 2013:2). However, the evaluation summary was only presented on the DPR 523 form and not included within the AFC (AES 2013) or appended cultural report (Cardenas et al. 2013), nor was any justification for that conclusion provided in those documents. Therefore, staff requested the formal evaluation of AGS under CRHR eligibility Criterion 3 as part of Data Request 46 (CEC 2014b:19). The applicant formally objected to Data Request 46 in *Data Responses Set 1A to CEC Staff Request* (AES 2014b:22), but later provided the requested information in *AEC Data Response Set 1B* (AES 2014c:4). The buildings and structures at the AGS are found to be typical components of a mid-century electrical power generating facility, of which there are several similar remaining examples, and that they do not display any architectural style and are unexceptional examples of standard design (Price 2013:6). Staff concurs with the applicant and concludes that the AGS is not eligible for the CRHR under Criterion 3.

The AGS does not appear to hold data potential or informational value that would be important for the understanding of prehistory or history (Criterion 4). The property is well documented in company records and construction documents and it is not a principal source of important information. Staff, therefore, concurs with the applicant and concludes that the AGS does not appear eligible for the CRHR under Criterion 4.

Based on the eligibility evaluation summarized above, staff concludes that the AGS does not appear eligible for the CRHR under criteria 1–4 and it does not qualify as an historical resource for purposes of CEQA.

Haynes Generating Station, 6801 E. 2nd Street. 1962–1970

The HGS was built as an OTC, steam-generating power plant by the LACDPW to replace the 1920s-era Seal Beach Steam Generating Plant. The HGS facility is located on 120 acres on the east side of the San Gabriel River, across from AGS. The HGS historically contained seven power generator units, electrical switchyards, a compressor station, aboveground oil storage tanks, settling basins, an administrative building, and various small storage and support buildings. The property is surrounded by an earthen dike.

Originally cooled via an OTC process, some power generating units were recently converted to a dry cooling system. Alterations to the plant include the addition of Units 8–10 in 2004, the decommissioning of Units 3–4, alterations to Unit 6, and removal of four large aboveground storage tanks in the north end of the property. In 2013, six new natural gas-fired combustion turbine generators (Units 11–16) with dry cooling towers and pollution control systems were added to HGS, along with ancillary facilities. Units 5–6 were decommissioned when those new units began operation (Price 2014a:2). With the exception of Units 11–16, HGS units are cooled using the OTC process, drawing ocean water from a circulating water channel extending south from HGS for approximately 1 mile where it is then piped under the San Gabriel River and then continues onward to an intake structure in the Alamitos Bay Marina. The cooling water, after use, is discharged into the San Gabriel River.

The applicant recommended that the HGS was not significant under CRHR eligibility criteria 1–4 and that HGS was not an historical resource for purposes of CEQA (AES 2014a:5.3-5). However, the applicant did not provide an evaluation of the resource under Criterion 3 with the evaluation under the other eligibility criteria in either the Data Supplement (AES 2014a:5.3-6) or the appended DPR 523 forms (Price 2014a:2). Therefore, staff requested the evaluation of HGS under CRHR eligibility Criterion 3 in Data Request 44 (Roark and Smith 2014:17). The applicant provided the requested information in *Data Responses Set 1A to CEC Staff Request* (AES 2014b:21–21), recommending the HGS as also ineligible for listing on the CRHR under Criterion 3. Staff concurs with the applicant's eligibility evaluation of the HGS and concludes the

HGS does not appear eligible for the CRHR under criteria 1–4 and does not qualify as an historical resource for purposes of CEQA.

The HGS is not significant within the historic context of the LACDPW, steam generation of electricity, or the development of post-World War II steam generation plants (Criterion 1). Like the AGS, the HGS was one of several steam generating plants built in the mid-twentieth century to meet the rapidly growing post-war energy demands. In 2008, 21 examples of the once-through cooling steam generation units from the same general time period remained in southern California alone, including the HGS. Nationwide, in 2008 there were more than 1,200 of these steam generation units remaining that used the once-through cooling process (Tetra Tech 2008, cited in AES 2015a:5.2-26). The HGS is not a precursor or early example of this historic pattern of steam plant generation development and is not unique or significant within the context of the time and other contemporary power plants. Staff concurs with the applicant and concludes that the HGS is not eligible for the CRHR under Criterion 1.

Background research performed on the HGS did not identify any evidence that the facility was associated with the life of a historically significant individual. Staff concurs with the applicant and concludes that the HGS is not eligible for the CRHR under Criterion 2.

The buildings and structures at the HGS do not embody distinctive characteristics of a type, period, region, or method of construction. They do not reflect the work of a master engineer or architect and do not hold high engineering values. The HGS is typical in its constituent buildings, structures, engineering, layout, and execution for a mid-century electrical power generating facility and is not a unique, rare, or significant example of the type. The buildings and structures do not communicate a particular architectural design or stylistic expression and represent unremarkable, standard designs. Additionally, a large proportion of the original units (Units 3–6) have been physically altered through decommissioning or decreased generating capacity. Staff concurs with the applicant and concludes that the HGS is not eligible for the CRHR under Criterion 3.

The HGS does not appear to hold data potential or informational value that would be important for the understanding of prehistory or history (Criterion 4). Information about the facility can be more readily found in the archival record. Staff, therefore, concludes that the HGS does not appear eligible for the CRHR under Criterion 4. Based on the eligibility evaluation summarized above, staff concludes that the HGS is not eligible for the CRHR under criteria 1–4 and it does not qualify as an historical resource for purposes of CEQA.

The San Gabriel River Channel. Circa 1920–1960

A segment of Reach 7 of the engineered San Gabriel River Channel passes through the PAA immediately east of the project site and is part of the AES property on which the AGS is located (**Cultural Resources Figure 3**). The San Gabriel River—from the Whittier Narrows Dam southward to the Pacific Ocean—is considered a cultural resource given that it was modified through human intervention during the historic period such that it is an engineered feature and no longer a natural river. Segments of the river were dammed, channelized (straightened), and their depth increased. The river modifications were accompanied by the construction of levees along the river's banks and other associated features as part of large-scale flood control efforts in the Los Angeles County Drainage Area extending from the early to mid-twentieth century.

Staff recommended that the applicant record and evaluate the San Gabriel River (CEC 2014a). The recording and evaluation of the San Gabriel River provided by the applicant in the *Data Adequacy Supplement* (AES 2014a:5-3.3–5-3.4, Attachment DA5.3-4) was found by staff to be incomplete and inconclusive for determining eligibility of the resource. The applicant only recorded and evaluated the river's levees within the PAA as built environment structures; the channelized river and other associated features that comprise the larger historic built environment resource were not recorded or considered in the applicant's evaluation. As part of Data Request 45, staff requested the applicant provide an updated and complete CRHR-eligibility evaluation of the San Gabriel River as an engineered structure and a corresponding updated assessment of integrity for the portion of Reach 7 that lies within the PAA (CEC 2014b:17). The applicant initially objected to the data request (AES 2014b:21), but later submitted an evaluation and revised DPR forms as part of the *AEC Data Response Set 1B* (AES 2014c:2–3).

Based on additional literature review by the applicant and agency consultation by staff, the overall linear resource of the San Gabriel River Channel does not appear to have been previously evaluated for the NRHP or CRHR. The applicant's evaluation found that the San Gabriel River is likely eligible for the CRHR under Criterion 1 (AES 2014c: Attachment DR45-1). Namely, it appears to be historically significant for its association with events that have made a significant contribution to the broad patterns of California's history and cultural heritage as a part of the greater Los Angeles Basin flood control system (Price 2014b:10). The massive flood control program, which included substantial alteration of the entire length of the San Gabriel River's natural course, allowed for growth, development, and protection of the population and industry in the Los Angeles basin during the middle and late twentieth century. It appears that the segment of the San Gabriel River Channel within the PAA would contribute to the potential eligibility of the overall resource as part of the larger Los Angeles Basin flood control system. The applicant found that the evaluated segment of the San Gabriel River "retains the soft bottom channel, levees, and outfalls much as they were initially constructed in the mid-twentieth century. Although the levees and outfalls have been modified somewhat through ongoing maintenance and upgrades, such as replacing the riprap, the structures retain good integrity" (AES 2014c:3). The applicant found that the evaluated segment of the San Gabriel River channel located within the PAA retains sufficient levels of historical integrity as a built environment resource to convey its significance.

Staff concurs with the applicant's eligibility evaluation and historical integrity assessment of the subject segment of the San Gabriel River Channel under CRHR Criterion 1. However, the applicant did not evaluate the eligibility of the San Gabriel River under CRHR criteria 2–4, leaving staff to develop its own evaluation under these three criteria. Under CRHR Criterion 2, the San Gabriel River Channel does not appear to be directly associated with the productive life of an important historical figure. It was designed and built by the Los Angeles County Flood Control District and U.S. Army Corps of Engineers and has no known direct connection with the productive life of any single person. Under CRHR Criterion 3, the San Gabriel River Channel, as part of the larger Los Angeles Basin flood control system, appears eligible as part of a substantial region-wide, complex engineered flood control system. Under CRHR Criterion 4, the San Gabriel River Channel is unlikely to have any important data potential, as its physical manifestation is not the principal or only definitive source of information on early and mid-twentieth century flood control design and construction.

Los Cerritos Channel, circa 1939–1947

The applicant did not identify, provide inventory data, or include a CRHR-eligibility evaluation of Los Cerritos Channel in the AFC (AES 2013) or Data Adequacy Supplement (AES 2014a). Therefore, as part of Data Request 47, staff asked the applicant to record and evaluate Los Cerritos Channel for CRHR-eligibility and submit the results to CEC for staff review and analysis (CEC 2014b:20–21). The applicant initially objected to the data request (AES 2014b:21), but later submitted an evaluation and DPR forms for Los Cerritos Channel as part of the *AEC Data Response Set 1B* (AES 2014c:7–8).[15]

Los Cerritos Channel is an engineered structure that pre-dates construction of the AGS in 1955 and lies within the PAA. Historic aerial photographs contained in the AFC indicate that the Los Cerritos Channel was constructed sometime after 1938 and by at least 1947 (EDR 2011a).

Based on background research, the applicant found that the overall linear resource of Los Cerritos Channel has not been evaluated for the NRHP or CRHR, but that it is likely eligible for the CRHR under Criterion 1 for its association with events that have made a significant contribution to the broad patterns of California's history and cultural heritage (AES 2014c:Attachment DR47-1). As a part of the greater Los Angeles Basin flood control system, the alteration of the entire length of the Los Cerritos' natural course allowed for growth, development, and protection of the population and industry in the Los Angeles basin during the middle and late twentieth century. It appears that the subject segment of the Los Cerritos Channel would contribute to the potential eligibility of the overall resource as part of the larger Los Angeles Basin flood control system. The applicant found that "Although much of the setting of the channel has been altered by intensive modern development, this segment of the channel appears to have had few physical changes and retains good integrity" (AEC 2014c:7–8). The applicant concluded that the evaluated segment of the Los Cerritos Channel as a built environment resource retains sufficient levels of historical integrity to convey its significance (Price 2014c:2).

Staff concurs with the applicant's finding for the eligibility of the Los Cerritos Channel under CRHR Criterion 1 and the historical integrity of the evaluated segment. However, the applicant did not evaluate the channel under CRHR criteria 2, 3, or 4, leaving Staff to develop its own evaluation under these three criteria. Under CRHR Criterion 2, the Los Cerritos Channel does not appear to be directly associated with the productive life of an important historical figure. It was designed and built by the Los Angeles County Flood Control District and U.S. Army Corps of Engineers and has no known direct connection with the productive life of any single person. Under CRHR Criterion 3, the Los Cerritos Channel, as part of the larger Los Angeles Basin flood control system, appears eligible for its "high artistic values" as part of a substantial region-wide, complex

[15] The SAFC does not discuss the CRHR eligibility of Los Cerritos Channel (AES 2015a:Section 5.3).

engineered flood control system. Under CRHR Criterion 4, the Los Cerritos Channel is unlikely to have any important data potential, as its physical manifestation is not the principal source, nor is it the only definitive source of information on early and mid-twentieth century flood control design and construction.

In summary, the subject segment of Los Cerritos Channel appears to be eligible for the CRHR. As such, staff concludes that the Los Cerritos Channel qualifies as a historical resource for purposes of CEQA.

Studebaker Road, circa 1957–1968

The applicant did not identify, provide inventory data, or a CRHR-eligibility evaluation of Studebaker Road in the AFC (AES 2013) or Data Adequacy Supplement (AES 2014a). Studebaker Road is a historic-period engineered transportation structure that lies within the PAA. Historic aerial photographs contained in the AFC indicate that the segment of Studebaker Road within the PAA was constructed sometime after 1956 and by at least 1968 (EDR 2011a). Therefore, as part of Data Request 47, staff asked the applicant to record and evaluate Studebaker Road for CRHR-eligibility and submit the results to CEC for staff review and analysis (CEC 2014b). The applicant objected to the data request (AES 2014b:24) and did not inventory or formally evaluate Studebaker Road in the SAFC (AES 2015a:Section 5.3).

In *AEC Data Response Set 1B* (AES 2014c:7), the applicant responded that despite their background research, Studebaker Road appears to be a standard public roadway with none of the attributes of a historic road, and no information has been obtained to indicate that it is historically significant. They state, “it does not meet any of the generally accepted historic road criteria—it is not an aesthetic or cultural route, and as an engineered route, it is a basic city roadway that does not possess any outstanding engineering or safety improvements (technology, materials, design, etc.)” (AES 2014c:7). Furthermore, the applicant states, “For Studebaker Road, no DPR form was prepared. Rather than an adjacent parcel, this is merely a public roadway that abuts the site” (AES 2014c:7). For these reasons, the applicant did not feel that DPR 523 recording forms or a formal CRHR evaluation of Studebaker Road were necessary.

Based on staff’s historical research, it appears that this segment of Studebaker Road, as well as Loynes Drive, three Caltrans bridges along Studebaker Road and Loynes Drive, and the AGS south intake channel were all constructed in 1966 when the southern portion of the AGS was expanded with Plants 5–6 and numerous tanks (Caltrans 2015; Teledyne 1968; USGS 1964, 1972). Thus, it is apparent that all of these structures were built around the same time to accommodate the growth and development occurring primarily at the AGS at that time.

Based on this conclusion, staff concludes that the subject segment of Studebaker Road is not eligible for the CRHR under any of the four criteria for eligibility. There is no apparent evidence that the subject segment of road is directly associated with a significant historical event (CRHR Criterion 1), or with the productive life of a prominent historical figure (CRHR Criterion 2). The road appears to be of standard design and construction, lacking any apparent architectural or engineering merits (CRHR Criterion 3). Finally, under CRHR Criterion 4, the road does not contain any important information potential, as it is not the sole source of information for mid-twentieth century road construction and design standards. Thus, staff finds that the subject segment of Studebaker Road does not qualify as a historical resource under CEQA.

Caltrans' Bridges 53C0730, 53C0801L and R, and 53C0802L and R

The applicant did not identify, provide inventory data, or a CRHR-eligibility evaluation of three bridges located within the PAA in the AFC (AES 2013) or Data Adequacy Supplement (AES 2014a): Bridge 2750 over Los Cerritos Channel along Loynes Drive (Caltrans Bridge 53C0730); Bridge 1563 over AGS's North Intake Channel (Caltrans Bridge 53C0801L and R); and Bridge 3460 over AGS's South Intake Channel on Studebaker Road (Caltrans Bridge 53C0802L and R), all of which were built in 1966. Each of these bridges is a historic-period engineered transportation structure. The Project proposes to hang a segment of the offsite process/sanitary wastewater pipeline along the length of Caltrans Bridge 53C0730.

Staff has identified that all three of these bridges was previously evaluated by Caltrans (2010) and found ineligible for the NRHP, but information regarding their CRHR-eligibility is not indicated in Caltrans's (2010) online bridge inventory. As part of Data Request 47 (CEC 2014b), staff requested that the applicant research, record, and evaluate these three bridges for CRHR-eligibility, and submit the results to the Energy Commission. The applicant objected to the data request (AES 2014b:24) and did not inventory or formally evaluate any of these three bridges in the SAFC (AES 2015a:Section 3.5).

In *AEC Data Response Set 1B* (AES 2014c:6–7), the applicant responded that Caltrans policy is that NRHP eligibility criteria are the same as CRHR eligibility criteria, and therefore, because Caltrans has determined the bridge is not eligible for the NRHP, it is automatically not eligible for the CRHR (AES 2014c:6–7).

The basis for Caltrans's (2010) determination of NRHP-ineligibility for the bridges is not indicated in their online bridge inventory, nor was it provided by the applicant. Based on staff's own historical background research, it appears that all three of these bridges, as well as the segment of Studebaker Road adjacent to AGS, and Loynes Drive were all constructed in 1966 when the southern portion of the AGS was expanded with Plants 5–6 and numerous tanks (Caltrans 2015; USGS 1964, 1972). Thus, it is apparent that all of these structures were built around the same time to accommodate the growth and development occurring primarily at the AGS at that time.

Staff concludes that none of these three Caltrans bridges appear to be eligible for the CRHR under any of the four eligibility criteria. There is no evidence that any of these bridges is directly associated with a significant historical event (CRHR Criterion 1), or with the productive life of a prominent historical figure (CRHR Criterion 2). The bridges are all similar in appearance and appear to be of standard design and construction, lacking any apparent architectural or engineering merits (CRHR Criterion 3). Finally, under CRHR Criterion 4, none of these bridges contains any important information potential, as they are not the sole source of information for mid-twentieth century bridge construction and design standards. Thus, staff finds that none of these three bridges qualify as a historical resource for the purposes of CEQA.

Interpretation of Results

Model of Prehistoric Archaeological Resources

The SAFC hypothesized that the PAA has little potential to contain prehistoric archaeological resources on the ground surface because of the degree of surface disturbances and development (AES 2015a:5.3-17). These expectations were borne out by the cultural resources inventory described in this PSA.

The SAFC states that buried archaeological resource potential is low, assuming that most construction-related ground disturbance would occur in imported fill deposits (AES 2015a:5.3-24–5.3-25; Cardenas et al. 2013:4-8, 4-10, 5-5). The applicant's conclusion notwithstanding, the depth of placed fill on the project site is known to range from 6 to 9 feet thick (AES 2015a:5.3-24). The applicant proposes construction excavations up to 10, 20, and 50 feet below ground surface (AES 2015a:5.3-24–5.3-25, 5.8-5), indicating that construction-related digging would intersect natural soils to depths of 1–4, 14–24, and 41–44 feet below ground surface. Staff conducted additional analysis to estimate the depth of fill across the proposed project site; whether and where proposed excavation would penetrate native sediments; and the age, characteristics, and preservation potential of any underlying native sediments.

The SAFC and supporting documentation state that the project site rests atop 6–9 feet of fill dirt, based on mapped geotechnical borings (AES 2015a:5.3-4, 5.3-24, 5.4-3, 5.11-2, 5.11-4; Cardenas et al. 2013:2-1, 4-8; Ninyo & Moore 2011:5, Appendix A, Figure 3). Project-specific borings and cone-penetration tests indicate that the underlying natural sediments are younger alluvium to a depth of 51.5 feet below ground surface (Ninyo & Moore 2011:5). According to the SAFC, the younger alluvium is primarily Holocene in age, potentially with late Pleistocene sediments toward the base of the borings (AES 2015a:Table 5.8-1). Since humans have occupied the southern California coast throughout the Holocene and terminal Pleistocene epochs (AES 2015a:5.3-6–5.3-8; **Cultural Resources Appendix CR-1**), the younger alluvium is of the right age to harbor archaeological remnants of past cultures.

The fill deposits in the PAA are less likely to contain prehistoric archaeological deposits that would retain sufficient integrity to qualify as a historical resource or unique archaeological resource under CEQA, compared to prehistoric archaeological resources found in natural soils or sediments. However, fill deposits could contain archaeological materials with compromised integrity or human remains, depending on where the existing fill material was obtained. Additionally, an archaeologist should not assume that prehistoric archaeological materials—with or without human remains—found in fill or other secondary contexts could not qualify as historical resources or unique archaeological resources for the purposes of CEQA. The significance criteria contained in CEQA *must* still be applied, particularly considering that prehistoric archaeological sites might qualify as historical resources under criteria 1–3 of the CRHR as well as under Criterion 4 for demonstrated or potential ability to contribute information important to resolving pressing research questions (Cal. Code Regs., tit. 14, § 15064.5[a][3]; see also Waters 1992:128 for the information potential of archaeological resources in secondary contexts). Furthermore, archaeological materials—with or without human remains—could qualify as tribal cultural resources under CEQA irrespective of the materials' information potential (see Pub. Resources Code, § 21074).

Naturally occurring soils and sediments, on the other hand, have variable potential to contain archaeological materials in their original depositional context. This potential hinges principally on four factors:

1. the age of the sediments concerned

2. whether humans were likely or known to have inhabited the area concerned

3. the manner in which naturally occurring soils and sediments accumulated in the area of study

4. what disturbances might have occurred after any archaeological resources were deposited. (Butzer 1982:98; Meyer et al. 2009:3; Schiffer 1987:250–251; Waters 1992:138.)

The following paragraphs will demonstrate that the proposed project site's subsurface possesses characteristics favorable to both the presence and preservation of buried archaeological resources.

Not only are the soils and sediments beneath project-site fill of an age contemporary with the broad sweep of human occupation of the coast, archaeological resources P-19-000272 and P-30-001644 are located on a landform similar to the proposed project site, and were found in buried contexts (see **Cultural Resources Appendix CR-1**, **Table 4**). This provides indirect support for the general Holocene age assignment to project-area sediments. Late Pleistocene sediments might be present toward the base of the borings (51.5 feet below ground surface) (AES 2015a:Table 5.8-1). The proposed process/sanitary wastewater pipeline is also situated in fill over a Holocene-aged landform (AES 2015a:Figures 5.4-1A, 5.4-1B; Jennings 1962; Mesmer 1903:1286, Soil Map).

The proposed project site also meets the second criterion for buried archaeological resources potential because it is situated in an area that was desirable for human habitation. **Cultural Resources Appendix CR-1**, **Table 4** shows that 85 archaeological resources containing prehistoric materials are recorded within 1 mile of the archaeological PAA. About 14 of these resources are located on alluvium, alluvium–marsh, or marsh lands similar to the proposed project site. Thirteen of the archaeological resources within 1 mile of the proposed project site are buried sites with no surface indication of their presence. No prehistoric archaeological resources have been identified in the archaeological PAA, but this is likely the result of sample bias: archaeologists did not conduct a surface examination of the AGS property until 2004 and 2011 (AES 2012:5.3-16–5.3-17; AES 2015a:5.3-24; Cardenas et al. 2012:4-3; Cardenas et al. 2013:4-7; Strudwick 2004:16), whereas the AGS was built and paved over beginning about 1955 (see "Historic Setting" in **Cultural Resources Appendix CR-1**)—forty-nine years before archaeologists surveyed the area. *The opportunity to identify any archaeological resources was precluded by the mid-century development of the proposed project site*.

Similarly, archaeologists did not survey the proposed process/sanitary wastewater pipeline until July 2, 2012 or July 2, 2013 (AES 2015a:5.3-24; Cardenas et al. 2013:4-7). Development and alteration of the ground surface in the vicinity of the proposed process/wastewater pipeline began about 1928 with the advent of agricultural activities, although long-term concealment of the natural ground surface did not commence until 1939, when Los Cerritos Channel was built through the proposed pipeline route (EDR 2011a). Additional areas were paved or subject to long-term alteration between 1956 and 1960, an interval in which construction of Studebaker Road and the University Parks Estates neighborhood began (AES 2015a:5.3-26; EDR 2011a). In short, archaeologists did not survey the proposed process/wastewater pipeline route until the natural ground surface was almost completely obscured, and had been for more than 50 years. Therefore, the absence of archaeological finds on the ground surface cannot be taken at face-value as an indication that the archaeological PAA was undesirable for human habitation.

The soil characteristics in the PAA, as described by the SAFC's geotechnical study, suggest that soils beneath the project site possess the potential to preserve any buried archaeological materials present. The four borings reported in Ninyo & Moore (2011:Appendix A) exhibit variable stratigraphy. The native alluvium underneath fill on the project site alternates between interbedded layers of silty sand and clayey silt, sandy clay, and sand, with occasional lenses of gravel. Too, the thickness of fill deposits varies among the borings from 6 to 9 feet thick, and the alternating layers of alluvium underneath do not follow the same texture sequence, such as silty sand to clay to sandy clay (Ninyo & Moore 2011:Appendix A). These alternating textures document changes in how native soils were deposited. Fine-textured sediments, such as clay and silt, are associated with overbank flooding and subsequent settlement of fine particles suspended in floodwaters. Suspended, fine particles are deposited as floodwaters lose energy or flow, and therefore represent environments or locations where archaeological resources existing at the time of flooding would be capped and preserved for future discovery. Broadly speaking, naturally occurring sands and gravels in an alluvial setting such as the proposed project site are deposited during levee breaks and other high-energy water actions. These actions are more apt to scour and damage archaeological resources present during the time of a high-energy event rather than to cap and preserve them. Archaeologists therefore regard deposits of fine particles (silt and clay) as possessing greater archaeological preservation potential than coarse deposits (sand and gravel) (Waters 1992:120–122, Figures 3.4, 3.5.) Layers of fine materials, such as silt and clay, therefore possess higher preservation potential for buried archaeological resources. **Cultural Resources Table 6** identifies the depth of low-energy strata revealed by each of the geotechnical borings reported by Ninyo & Moore (2011:Appendix A). Preservation potential is also improved by the development of paleosols, or former land surfaces (Waters 1992:59–60).

Cultural Resources Table 6
Depth of Low-Energy Strata beneath the Project Site

Boring 1	Boring 2	Boring 3	Boring 4
9–19	10.5–15.0	8–13	9–14
	15–27 (paleosol)	13.0–18.5	30.5–34.0
		35–43	34–39
		50.5–51.0	39.0–41.5
			45–46
Note: All figures are in feet below the current ground surface.			

Boring 2 provides evidence that portions of the proposed project site's substrate have still greater preservation potential for buried archaeology. The boring log reveals root casts and shell fragments beginning about 15 feet below ground surface, in alluvium likely to be of Early Holocene age (AES 2015a:5.8-5; Ninyo & Moore 2011:Appendix A). As stated in the "Environmental Setting" portion of this chapter, the presence of root casts in Boring 2 and monitoring wells suggests that a former land surface is present about 15 feet below ground surface in portions of the proposed project site. Former land surfaces indicate periods of landscape stability, when flooding and other depositional factors were not a deterrent to human habitation or use of the area.

Model of Historical Archaeological Resources

As discussed previously in this cultural resources section, the extent of disturbance and amount of pavement and superstructure covering the archaeological PAA makes it unlikely that historic archaeological resources would be or could be found on the present ground surface. The cultural resources inventory results corroborate this expectation, since no historic archaeological resources were identified on the surface of the archaeological PAA.

The archaeological PAA has the potential to contain buried historic archaeological deposits. Historic artifacts could have been brought to the archaeological PAA within the fill deposits. Such deposits cannot be regarded as unqualified for historical resource or unique archaeological resource status without first being formally evaluated using CEQA criteria; historic archaeological deposits in secondary contexts have yielded information important to the study of history and historical archaeology (see Van Bueren 2009). Fill deposits on industrial sites, however, can also bury historic artifacts and features such as structural remnants—artifact scatters formed of metal, concrete, and glass building fragments (resulting from demolition)—and refuse scatters associated with industrial disposal practices. In addition, historic aerial photographs indicate that domestic archaeological remnants might be preserved under the project site, as a residence and several outlying structures sat adjacent to the proposed project site from 1928 till sometime between 1951 and 1956 (EDR 2011a, 2011b).

Historic Built Environment

Two CRHR-eligible cultural resources have been identified in the PAA. The San Gabriel River Channel and Los Cerritos Channel both appear eligible for listing on the CRHR under criteria 1 and 3, and thus, both appear to qualify as historical resources as defined by CEQA.

Staff concurs with the applicant's recommendation that neither the AGS nor the HGS appears eligible for the CRHR, and that neither appears to qualify as a historical resource for the purposes of CEQA. Staff has reached its own conclusions as to the CRHR eligibility of the subject segment of Studebaker Road and bridges 1563, 3460, and 2750 based on staff's own historical research. Staff concludes that none of these four built-environment resources—all of which were built in 1966 and were associated with the expansion of the AGS—appear to meet any of the criteria of the CRHR, and none appear to qualify as historical resources under CEQA.

DIRECT/INDIRECT IMPACTS AND MITIGATION

In the abstract, direct impacts to cultural resources are those associated with project development, construction, and operation. Construction usually entails surface and subsurface disturbance of the ground, and direct impacts to archaeological resources may result from the immediate disturbance of the deposits, whether from vegetation removal, vehicle travel over the surface, earth-moving activities, excavation, or demolition of overlying structures. Construction can have direct impacts on historic standing structures when those structures must be demolished or removed to make way for new structures or when the vibrations of construction impair the stability of historic structures nearby. New structures can have direct impacts on historic structures when the new structures are stylistically incompatible with their neighbors and the setting, feeling and association. New structures might also produce something harmful to the materials or structural integrity of the historic structures, such as emissions or vibrations.

Generally speaking, indirect impacts to archaeological resources are those which may result from increased erosion due to site clearance and preparation, or from inadvertent damage or outright vandalism to exposed resource components due to improved accessibility. Similarly, historic structures can suffer indirect impacts when project construction creates improved accessibility to resources by non-project-affiliated personnel and the potential for vandalism or greater weather exposure becomes possible.

Ground disturbance accompanying construction at a proposed plant site has the potential to directly affect archaeological resources, unidentified at this time. The potential direct, physical impacts of the proposed construction on unknown archaeological resources are commensurate with the extent of ground disturbance entailed in the particular mode of construction. This varies with each component of the proposed project. Placing the proposed plant into this particular setting could have a direct impact on the integrity of association, setting, and feeling of nearby standing historic structures.

Construction Impacts and Mitigation

Identification and Assessment of Direct Impacts on Archaeological Resources and Proposed Mitigation

Archaeological Resources on the Surface of the Archaeological PAA

No archaeological resources have been identified on the surface of the archaeological PAA. Staff concludes that appropriate methods were employed to identify archaeological resources on the ground surface and therefore construction and operation of the proposed project would not result in direct impacts on this class of cultural resource.

Buried Archaeological Resources in the Archaeological PAA

No positive identification of buried prehistoric archaeological resources has been made by staff or the applicant. The sediments under the proposed project site are of the right age to have supported the formation and preservation of archaeological resources throughout the span of human occupation in the Long Beach area. The proposed project could result in damage to buried archaeological resources, if any are present.

Consulting **Cultural Resources Appendix CR-1**, **Table 1**, the record shows that numerous project elements are known to involve construction to a depth that would intersect non-fill sediments, where archaeological resources could be preserved. These project elements include the (1) proposed combustion turbine generator and heat recovery steam generator foundation slabs and deep piles; (2) foundation pad and deep piles for the generator step-up unit transformers; (3) overhead transmission line pole foundations; (4) ACC deep piles; (5) steam turbine generators foundations and deep piles; (6) deep piles for the clear water storage, water, and ammonia tanks; (7) fuel gas compressor/conditioning structure; (8) fire water piping and hydrants; (9) relocated gas metering station; and (10) process/sanitary wastewater pipeline.

The foundation slabs within the proposed power blocks would require approximately 1–4 feet of excavation into native sediments; excavation would most likely be accomplished via mass soil removal, assisted by an excavator. These excavations would encounter low-energy sediments and therefore have the potential to encounter buried archaeological resources (see **Cultural Resources Table 6**).

Deep-pile foundations would be excavated in excess of 40 feet into native sediments. Unlike the foundation slabs, which require mass excavation, the deep piles would likely be 14 inches in diameter (Ninyo & Moore 2011:23) and driven or hammered into the substrate. Deep piles would intersect as many as five low-energy strata (including the paleosol) (see **Cultural Resources Table 6**). Pile driving therefore would have potential to damage buried archaeological resources. Driven piles, however, preclude the ability to observe the affected sediments and produce little to no spoils to examine.

The proposed fuel gas compressor/conditioning structure and relocated gas metering station would be mechanically excavated 2–4 and 4 feet into native sediments, respectively. Excavation for both proposed structures would intersect low-energy sediments and possibly the paleosol identified in Boring 2; construction of the structures therefore has the potential to encounter buried archaeological resources.

The proposed fire water piping and hydrants would require excavation into native sediments to a depth of 0–1.5 feet. The intersected natural sediments represent low-energy deposits and have the potential to contain buried archaeological resources (see **Cultural Resources Table 6**).

Should the construction activities outlined above encounter buried archaeological resources, and such resources meet the CEQA criteria for historical, unique archaeological, or tribal cultural resources, damage to the resources would pose a significant environmental impact.

Fill placed in previously inhabited or built areas is sometimes used to bury structural remnants and features to facilitate subsequent construction. The presence of fill often precludes the discovery of intact prehistoric archaeological resources within the fill, but might blanket historic or prehistoric archaeology that rests on an earlier land surface. Third and finally, fill is sometimes obtained from properties that contain archaeological materials and human remains; such materials can become incorporated into the fill and be redeposited elsewhere. The CEQA significance criteria must still be applied to any such discoveries and as such pose a resource management consideration. The discovery of human remains—regardless of context—must be handled according to the applicable portions of the Public Resources Code and California Health and Safety Code.

Staff concludes that expectable ground-disturbance impacts on buried archaeological resources would best be mitigated by implementing a comprehensive cultural resources mitigation and monitoring program for the proposed project. Implementation of a well-planned mitigation and monitoring program would reduce the potential project impacts to a less-than-significant level.

The SAFC contains an outline of such a program, consisting of eight parts:

1. Designated Cultural Resources Specialist
2. Construction Worker Training
3. Emergency Discovery
4. Site Recording and Evaluation
5. Mitigation Plan
6. Curation
7. Report of Findings
8. Inadvertent Discovery of Human Burials. (AES 2015a:5.3-29–5.3-32.)

Although staff agrees that these components are important to an effective mitigation and monitoring program, three important elements are missing from it. The first is a cultural resources mitigation and management plan (CRMMP) with an explicit research design and procedures for the treatment of archaeological and human remains discoveries that could occur during construction. The absence of explicit consideration of the resource types expectable in the PAA and the methods required to evaluate any such resources leaves important decision-making to the time least amenable to responsible historic preservation practice—the moment of inadvertent discovery. The second element missing from the SAFC's proposed mitigation and monitoring program is a provision for construction monitoring by local tribal representatives. As described earlier under *Native American Consultation*, a consulted tribal representative urged that tribal monitors be present during construction because archaeological materials encountered in the PAA would likely be related to their Gabrielino culture. The third missing element from the proposed mitigation program is construction monitoring by qualified archaeologists[16]. The SAFC regards the potential for archaeological discoveries during construction to be low, whereas staff's analysis identifies archaeological potential in the archaeological PAA using multiple lines of evidence. Staff therefore proposes Conditions of Certification (Conditions) **CUL-1** through **CUL-8**, incorporating portions of the applicant's proposed mitigation measures, to reduce the AEC's potential impacts to a less-than-significant level.

Identification and Assessment of Direct Impacts on Archaeological and Ethnographic Resources

Staff has identified one ethnographic resource in the PAA that also contain archaeological components: the Puvungna Ceremonial Site Complex (PCSC). This resource was identified in consultation with Gabrielino/Tongva individuals, whose input is partially responsible for staff's conclusion that the PCSC is a historical resource and tribal cultural resource for the purposes of CEQA. The PCSC retains sufficient integrity to convey its significance for associative values to local tribes under CRHR criteria 1 and 2. Staff concludes that despite the presence of the PCSC in the PAA the proposed AEC will not impact the resource. Staff also consulted several other technical areas, i.e., air quality, biology, noise and vibration, and visual resources, to determine if visitors to the PCSC could be subjected to significant impacts from the proposed AEC. Staff concludes that there would not be an impact to visitors to the PCSC from the proposed AEC. However, if any buried archaeological resources are encountered during construction of the proposed AEC, these resources should be evaluated as potential contributing elements to the PCSC, and potential ethnographic/tribal cultural resource that could be valuable to the Gabrielino Tongva.

Identification and Assessment of Direct Impacts on Built-Environment Resources and Proposed Mitigation

Staff concludes that both the San Gabriel River Channel and Los Cerritos Channel are eligible for listing on the CRHR under criteria 1 and 3 and qualify as historical resources under CEQA. Therefore, under the Public Resources Code, section 21084.1, an

[16] The SAFC contains a mitigation measure entitled, "Monitoring," but the discussion therein argues that archaeological monitoring is unnecessary rather than describing appropriate archaeological monitoring methods (see AES 2015a:5.3-30–5.3-31).

assessment of whether or not the proposed project will result in a substantial adverse change in the significance of these two historical resources must be made.

San Gabriel River Channel

Staff has not identified any direct impacts to the San Gabriel River Channel or levees as resulting from the proposed project. The existing AGS outfall gates that expel cooling water into the San Gabriel River Channel will remain intact and will not be removed or altered. Storm water at the AGS will continue to be discharged to the San Gabriel River via the existing storm water outfalls (AES 2015b:3). As such, the project has no potential to alter, destroy, or damage any historical features of the San Gabriel River Channel or otherwise negatively affect the historical integrity of this portion of the San Gabriel River Channel in a way that would diminish its historical significance.

The significance of the San Gabriel River Channel is based on its importance to the residential, commercial, and industrial growth and development of the region, as well as for its high artistic values in regard to the engineering design and planning of the larger Los Angeles Basin flood control system. The AGS is merely one of many examples of industrial use along this channelized waterway. Thus, decommissioning and potential future removal of the AGS itself also would not result in a substantial adverse change in the significance of the San Gabriel River Channel, as the Channel was not created solely for the use of the AGS; rather, the AGS was built at this location to take advantage of the potential for drawing water from nearby Los Cerritos Channel for cooling purposes and discharging it into the adjacent San Gabriel River.

Los Cerritos Channel

Staff has not identified any direct impacts to the Los Cerritos Channel that would result from implementation of the proposed project. The existing AGS intake channels that draw cooling water from the Los Cerritos Channel will remain intact and will not be removed or altered. As such, the project has no potential to alter, destroy, or damage any historical features of the Los Cerritos Channel or otherwise negatively affect the historical integrity of this portion of the Los Cerritos Channel in a way that would diminish its historical significance.

The significance of the Los Cerritos Channel is based on its importance to the residential, commercial, and industrial growth and development of the region, as well as for its high artistic values with regard to the engineering design and planning of the larger Los Angeles Basin flood control system. The decommissioning and potential future removal of the AGS would not result in a substantial adverse change in the significance of the Los Cerritos Channel, as the Channel was not created for the use of the AGS; rather, the AGS was built at this location to take advantage of the potential for drawing water from Los Cerritos Channel for cooling purposes and discharging it into the adjacent San Gabriel River.

Indirect Impacts

A segment of the offsite process/sanitary wastewater pipeline will be hung along Bridge 2750 over Los Cerritos Channel along Loynes Drive as part of this project. While the bridge is not a historical resource, it crosses over Los Cerritos Channel, which is a historical resource. The pipeline, however, will be hung inconspicuously along the outside edge of the bridge and has no potential to have any indirect visual effect on the integrity or significance of the Los Cerritos Channel. Staff concludes that mitigation for indirect impacts is not necessary for the proposed project.

Operation Impacts and Mitigation

During operation of the proposed project, if a leak should develop in buried pipelines within the project site, repair of the buried utility could damage previously unidentified, subsurface archaeological resources in areas unaffected by the original excavation. The measures proposed above and below for the mitigation of impacts to previously unknown archaeological resources found during construction would also mitigate impacts that occur during operation-phase repairs.

Staff has not identified any potential operational impacts to any CRHR-eligible historical built-environment resources qualifying as historical resources under CEQA. Both the San Gabriel River Channel and the Los Cerritos Channel are located outside of the boundaries of the proposed AES, and therefore, future operations within the facility are unlikely to cause any impacts to the significance of these two resources. However, any future operation or maintenance activities of AEC that will result in alteration, modification, or destruction of any part of these two flood control structures will require a project impacts assessment.

Environmental Justice Impacts

Staff has considered environmental justice populations in its analysis of the proposed project. Staff has not identified significant adverse direct, indirect, or cumulative cultural resources impacts that would affect environmental justice populations including Native Americans.

Cumulative Impacts and Mitigation

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. “Cumulatively considerable” means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (Cal. Code Regs., tit. 14, § 15130). Cumulative impacts to cultural resources in the project vicinity could occur if any other existing or proposed projects, in conjunction with the proposed AEC, had or would have impacts on cultural resources that, considered together, would be significant. The previous ground disturbance from prior projects and the ground disturbance related to construction of the proposed AEC and other proposed projects in the vicinity could have a cumulatively considerable effect on subsurface archaeological deposits, both prehistoric and historic. The alteration of the setting which could be caused by the construction and operation of the proposed AEC and other proposed projects in the vicinity could be cumulatively considerable, but may or may not be a significant impact to cultural resources.

Cumulative Archaeological and Ethnographic Impacts and Mitigation

For the purposes of this cumulative impacts analysis, staff has determined that the cumulative area of analysis for archaeological resources comprises a 6-mile-diameter semicircle from the project site and its off-site linear (**Executive Summary Figure 1**).

The cumulative projects area of analysis encompasses the project site and geographic qualities that were likely of concern to the prehistoric inhabitants of the project vicinity. Archaeological research indicates that prehistoric settlement patterns changed over time. Archaeological research in the Los Angeles Basin suggests that the project vicinity hosted one or more gathering camps and at least one major village, from which people moved up to 5–6 miles to obtain nearby resources and return home (Hudson 1971:60–61, Map 2). Doubtlessly, California Indians forayed much further in all directions for resource procurement, socializing, and trading, but day-to-day activities of a settlement would have occurred nearby, over more limited distances. A 6-mile radius from the project site therefore appears to form a geographic unit that was probably meaningful to the prehistoric human inhabitants of the project vicinity, and a useful basis for assessing cumulative impacts on archaeological resources. In selecting projects that could contribute to cumulative impacts, staff identified those projects in the 6-mile radius that would result in ground disturbance because excavation is the primary vehicle for archaeological resource impacts for the proposed project. Staff presents its list of cumulative projects for archaeological resources in **Cultural Resources Appendix CR-1**, **Table 5**. Cumulative projects were identified by consulting planning staff and websites for the municipalities in the 6-mile radius: the cities of Anaheim, Artesia, Buena Park, Cypress, Garden Grove, Hawaiian Gardens, Huntington Beach, Lakewood, Long Beach, Los Alamitos, Seal Beach, Stanton, and Westminster; the community of Rossmoor; ports of Long Beach and Los Angeles; Long Beach Unified School District; California Department of Transportation; and counties of Los Angeles and Orange. In some cases, copies of environmental review documents were not available online for staff's perusal; such projects are listed as yielding "No information" in the Resources Affected/Level of Significance column of **Cultural Resources Appendix CR-1**, **Table 6**.

Staff identified a total of 76 cumulative projects in the 6-mile buffer. Staff was unable to locate environmental impact reviews for 14 of the projects summarized in **Cultural Resources Appendix CR-1**, **Table 6**. These are summarized by type of finding below.

- Seventeen cumulative projects reportedly would result in no impacts on archaeological resources.
- Eleven cumulative projects report less-than-significant impacts on archaeological resources because none were identified in their respective impact areas.
- Two cumulative projects report less-than-significant impacts on archaeological resources because some unknown potential exists to encounter archaeological resources during construction of the proposed projects.
- The Riverwalk Residential Development Project reportedly would have a potentially significant impact on as-yet-unidentified archaeological resources.
- Twenty-eight cumulative projects would result in less-than-significant impacts on archaeological resources with the implementation of mitigation measures; three of these project areas contain known archaeological resources.
- The Parkside Estates project in Huntington Beach would result in significant impacts on archaeological resources.

- Six archaeological sites are recorded in the Los Cerritos Wetlands Conceptual Restoration Plan and Mitigation Bank, but that project is categorically exempt from CEQA.
- The Beach Boulevard/Edinger Corridors Specific Plan environmental assessment concludes that the proposed project would likely affect as-yet-unidentified archaeological resources, and that such effects would be significant and unavoidable. (**Cultural Resources Appendix CR-1**, **Table 6**.)

Although staff concludes that the proposed AEC could result in significant impacts on archaeological resources that qualify as either historical or unique archaeological resources (as defined under CEQA), staff-proposed Conditions **CUL-1** through **CUL-8** would reduce project-specific impacts to a less-than-significant level. Therefore, the proposed project's contribution to cumulative impacts on archeological resources would be less than cumulatively considerable.

Cumulative Built Environment Impacts and Mitigation

Considered in conjunction with the potential removal and reconstruction of nearby steam-generating plants also dating to the historic-period (El Segundo Steam Station, Redondo Beach Generating Station), and Huntington Beach Generating Station, the decommissioning and future removal of the AGS would add to the loss of information relative to the development of electric steam power generation in the twentieth century in California. These post-war power plants have been recorded, their operations and expansion activities documented and evaluated, and through the associated licensing and/or permitting processes, that historical information has been made available to the public. Due to the existence of this recorded historical information, the likelihood of there being a cumulative impact from the AEC is negligible.

There is no overall potential for cumulative impacts to the San Gabriel River Channel and the Los Cerritos Channel, the only two CRHR-eligible historical built-environment resources in the PAA that qualify as historical resources under CEQA. Both Channels are located outside of the boundaries of the proposed AES, and staff has not identified any potential for cumulative impacts that would affect the significance of these two resources.

COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

If the conditions of certification proposed by staff below are properly implemented, the proposed AEC would result in less-than-significant impacts on any archaeological resources identified during construction. The proposed project would therefore be in compliance with the applicable state laws, ordinances, and standards (LORS) listed in **Cultural Resources Table 1**. Staff's conclusions of LORS compliance are detailed in **Cultural Resources Table 7** To summarize applicable LORS, state laws stipulate specific courses of action and notifications in the event that human remains and grave- or cairn-associated artifacts are found during construction (see **Cultural Resources Table 7**; Pub. Resources Code, §§5097.98[b] and [e], 5097.99; Health and Safety Code, §7050.5). Staff's proposed conditions **CUL-3** and **CUL-5** would ensure compliance with these laws through the preparation of a Cultural Resources Mitigation and Monitoring Plan (CRMMP) and implementation of a Workers' Environmental Awareness Program (WEAP).

Cultural Resources Table 7
Compliance with Laws, Ordinances, Regulations, and Standards

Applicable Law	Description	Condition of Certification Demonstrating Compliance
State		
Pub. Resources Code, §§ 5097.98 (b and e)	Requires a landowner on whose property Native American human remains are found to limit further development activity in the vicinity until s/he confers with the NAHC-identified MLDs to consider treatment options. In the absence of MLDs or of a treatment acceptable to all parties, the landowner is required to reinter the remains elsewhere on the property in a location not subject to further disturbance.	**CUL-3** requires the preparation of a CRMMP, which would describe the response and notification procedures described in these sections of the Public Resources Code. **CUL-5**, the WEAP, would inform construction staff of the legal response to discovery of Native American human remains and artifacts.
Pub. Resources Code, § 5097.99	§5097.99 prohibits the acquisition, possession, sale, or dissection with malice or wantonness of Native American remains or artifacts taken from a Native American grave or cairn.	**CUL-3** requires the preparation of a CRMMP, which would contain provisions for the disposition of Native American remains or artifacts. **CUL-5**, the WEAP, would inform construction staff of the legal response to Native American human remains and artifacts.
Health and Safety Code, § 7050.5	This code makes it a misdemeanor to disturb or remove human remains found outside a cemetery. It also requires a project owner to halt construction if human remains are discovered and to contact the county coroner.	**CUL-3** requires the preparation of a CRMMP, which would describe the response and notification procedures described in this section of the Health and Safety Code. Construction staff would be instructed in these matters during the WEAP required by **CUL-5**.
Abbreviations: CRMMP = cultural resources mitigation and monitoring plan; MLD = most likely descendant; NAHC = Native American Heritage Commission; WEAP = workers' environmental awareness program		

CONCLUSIONS AND RECOMMENDATIONS

Staff finds that the proposed project could result in damage to as-yet-unidentified archaeological resources that qualify as historical or unique archaeological resources under CEQA, which is a significant impact under that act. However, staff finds that implementation of Conditions **CUL-1** through **CUL-8** would reduce these impacts to a less-than-significant level.

CUL-1 through **CUL-2** are administrative conditions that set out who will implement the balance of the conditions, what the qualifications and roles of those people will be, and the information that the project owner will supply them to help them fulfill those roles.

CUL-3 requires the project owner to provide a CRMMP to guide construction monitoring and the evaluation and treatment of inadvertently discovered archaeological resources or human remains, in light of what is known about regional prehistoric, ethnography, and history. **CUL-5** provides for training of project owner staff and the construction management/implementation team regarding basic cultural resource identification and compliance with these proposed conditions and the provisions of the CRMMP. **CUL-6** defines the scope of monitoring by qualified archaeologists and Native Americans, required to implement the CRMMP and other proposed Conditions. **CUL-7** defines the protocols, responsibilities, and timeframes involved in responding to inadvertent archaeological or human remains discoveries. **CUL-8** describes the manner in which the project owner is to conduct cultural resources inventory and analysis in the event that procurement of construction materials must occur at off-site, non-commercial properties. **CUL-4** requires that the project owner prepare a final report of all cultural resources activities undertaken during construction of the proposed project and the Energy Commission's responsibility as lead agency to review this document to verify accuracy and complete implementation of the cultural resources mitigation and monitoring program.

PROPOSED CONDITIONS OF CERTIFICATION

CUL-1 APPOINTMENT AND QUALIFICATIONS OF CULTURAL RESOURCES SPECIALIST (CRS)

A. CULTURAL RESOURCE SPECIALIST

1. Appointment and Qualifications

The project owner shall assign a Cultural Resources Specialist (CRS) and at least one Alternate CRS to the project. The project owner shall submit the resumes of the proposed CRS and Alternative CRS(s), with at least three references and contact information, to the Energy Commission Compliance Project Manager (CPM) for review and approval.

The CRS and Alternate CRS(s) shall have training and background that conform to the U.S. Secretary of the Interior's Professional Qualifications Standards, as published in Title 36, Code of Federal Regulations, part 61. In addition, the CRS and Alternate CRS(s) shall have the following qualifications:

1. A background in anthropology, archaeology, history, architectural history, or a related field;

2. At least 10 years of archaeological or historical experience (as appropriate for the project site), with resources mitigation and fieldwork;

3. At least one year of field experience in California; and

4. At least three years of experience in a decision-making capacity on cultural resources projects in California and the appropriate training

and experience to knowledgably make recommendations regarding the significance of cultural resources.

The project owner may replace the CRS by submitting the required resume, references and contact information of the proposed replacement CRS to the CPM.

2. Duties of Cultural Resources Specialist

   The CRS shall manage all cultural resource monitoring, mitigation, curation, and reporting activities, and any pre-construction cultural resource activities, unless management of these is otherwise provided for in accordance with the cultural resource conditions of certification (conditions). The CRS shall serve as the primary point of contact on all cultural resource matters for the Energy Commission. The CRS may elect to obtain the services of Cultural Resource Monitors (CRMs), Native American Monitors (NAMs), and other technical specialists, if needed, to assist in monitoring, mitigation, and curation activities. The project owner shall ensure that the CRS makes recommendations regarding the eligibility for listing in the California Register of Historical Resources (CRHR) of any cultural resources that are newly discovered or that may be affected in an unanticipated manner.

   After all ground disturbances are completed and the CRS has fulfilled all responsibilities specified in these cultural resources conditions, the project owner may discharge the CRS, after receiving approval from the CPM.

   The conditions described in this subsection of the PSA shall continue to apply during operation of the proposed power plant.

B. CULTURAL RESOURCES MONITORS

1. Appointment and Qualifications

   The CRS may assign Cultural Resources Monitors (CRMs). CRMs shall have the following qualifications:

   1. B.S. or B.A. degree in anthropology, archaeology, historical archaeology, or a related field; and one year of archaeological field experience in California; or

   2. A.S. or A.A. degree in anthropology, archaeology, historical archaeology, or a related field, and four years of archaeological field experience in California; or

   3. Enrollment in upper division classes pursuing a degree in the fields of anthropology, archaeology, historical archaeology, or a related field, and two years of archaeological field experience in California.

C. NATIVE AMERICAN MONITORS

1. Appointment and Qualifications:

   Preference in selecting NAMs shall be given to Native Americans with:

   1. traditional ties to the area to be monitored, and

   2. the highest qualifications as described by the Native American Heritage Commission (NAHC) document entitled: *Guidelines for Monitors/Consultants of Native American Cultural, Religious, and Burial Sites* (NAHC 2005).

D. CULTURAL RESOURCES TECHNICAL SPECIALISTS

The resume(s) of any additional technical specialist(s), e.g., geoarchaeologist, historical archaeologist, historian, architectural historian, and/or physical anthropologist, shall be submitted to the CPM for approval. The resume of each proposed specialist shall demonstrate that their training and background meet the U.S. Secretary of Interior's Professional Qualifications Standards for their specialty (if appropriate), as published in Title 36, Code of Federal Regulations, part 61, and show the completion of appropriate graduate-level coursework. The resumes of specialists shall include the names and telephone numbers of contacts familiar with the work of these persons on projects referenced in the resumes and demonstrate to the satisfaction of the CPM that these persons have the appropriate training and experience to undertake the required research. The project owner may name and hire any specialist prior to certification. All specialists are under the supervision of the CRS.

<u>Verification:</u>

1. The project owner shall submit the specified information at least 75 days prior to the start of (1) ground disturbance (as defined in the Compliance Conditions section); (2) post-certification cultural resources activities (including, but not limited to, "survey", "in-field data recording," "surface collection," "testing," "data recovery" or "geoarchaeology"); or (3) site preparation or subsurface soil work during pre-construction activities or site mobilization[17], the project owner shall obtain the services of a CRS and one or more Alternate CRSs.

2. The project owner may replace a CRS by submitting the required resume, references and contact information to the CPM at least 10 working days prior to the termination or release of the then-current CRS. In an emergency, the project owner shall immediately notify the CPM to discuss the qualifications and approval of a short-term replacement while a permanent CRS is proposed to the CPM for consideration.

[17] For purposes of the conditions for Cultural Resources, we refer to these activities as "Cultural Resources Ground Disturbances".

3. At least 20 days prior to Cultural Resources Ground Disturbances, the CRS shall provide proof of qualifications for any anticipated CRMs and additional specialists for the project to the CPM.

4. If efforts to obtain the services of a qualified NAM are unsuccessful, the project owner shall inform the CPM of this situation in writing at least 30 days prior to the beginning of post-certification cultural resources field work or construction-related ground disturbance.

5. At least 5 days prior to additional CRMs or NAMs beginning on-site duties during the project, the CRS shall review the qualifications of the proposed CRMs or NAMs and send approval letters to the CPM, identifying the monitors and attesting to their qualifications.

6. At least 10 days prior to any technical specialists beginning tasks, the resume(s) of the specialists shall be provided to the CPM for review and approval.

7. At least 10 days prior to the start of construction-related ground disturbance, the project owner shall confirm in writing to the CPM that the approved CRS will be available for onsite work and is prepared to implement the cultural resources conditions.

8. No Cultural Resources Ground Disturbances shall occur prior to CPM approval of the CRS and alternates, unless such activities are specifically approved by the CPM.

CUL-2 INFORMATION TO BE PROVIDED TO CRS

Prior to the start of ground disturbance, the project owner shall provide the CRS with copies of the AFC, data responses, confidential cultural resources reports, all supplements, the Energy Commission cultural resources Final Staff Assessment (FSA), and the cultural resources Conditions from the Final Decision for the project, if the CRS does not already possess copies of these materials. The project owner shall also provide the CRS and the CPM with maps and drawings showing the footprints of the power plant, all linear facility routes, all access roads, and all laydown areas. Maps shall include the appropriate USGS quadrangles and a map at an appropriate scale (e.g., 1:24,000 and 1 inch = 200 feet, respectively) for plotting cultural features or materials. If the CRS requests enlargements or strip maps for linear facility routes, the project owner shall provide copies to the CRS and CPM. The CPM shall review map submittals and, in consultation with the CRS, approve those that are appropriate for use in cultural resources planning activities. No ground disturbance shall occur prior to CPM approval of maps and drawings, unless such activities are specifically approved by the CPM.

Maps shall include any NRHP/CRHR-eligible cultural resources, including any historic built environment resources, identified in the project area of analysis.

If construction of the project would proceed in phases, maps and drawings not previously provided shall be provided to the CRS and CPM prior to the start of each phase. Written notice identifying the proposed schedule of each project phase shall be provided to the CRS and CPM.

Weekly, until ground disturbance is completed, the project construction manager shall provide to the CRS and CPM a schedule of project activities for the following week, including the identification of area(s) where ground disturbance will occur during that week.

The project owner shall notify the CRS and CPM of any changes to the scheduling of the construction phases.

The project owner shall provide the documents described in the first paragraph of this condition to new CRSs in the event that the approved CRS is terminated or resigns.

Verification:

1. At least 40 days prior to the start of ground disturbance, the project owner shall provide the CPM notice that the AFC, data responses, confidential cultural resources documents, all supplements, FSA, and Final Commission Decision have been provided to the CRS, if needed, and the subject maps and drawings to the CRS and CPM. The CPM will review submittals in consultation with the CRS and approve maps and drawings suitable for cultural resources planning activities.

2. At least 15 days prior to the start of ground disturbance, if there are changes to any project-related footprint, the project owner shall provide revised maps and drawings for the changes to the CRS and CPM.

3. At least 15 days prior to the start of each phase of a phased project, the project owner shall submit the appropriate maps and drawings, if not previously provided, to the CRS and CPM.

4. Weekly, during ground disturbance, a schedule of the next week’s anticipated project activity shall be provided to the CRS and CPM by letter, e-mail, or fax.

5. Within 5 days of changing the scheduling of phases of a phased project, the project owner shall provide written notice of the changes to the CRS and CPM.

6. If a new CRS is approved by the CPM as provided for in CUL-1, the project owner shall provide the CPM notice that the AFC, data responses, confidential cultural resources documents, all supplements, FSA, Final Commission Decision, and maps and drawings have been provided to the new CRS within 10 days of such approval.

CUL-3 CULTURAL RESOURCES MITIGATION AND MONITORING PLAN (CRMMP)

Prior to the start of ground disturbance, the project owner shall submit the CRMMP, as prepared by or under the direction of the CRS, to the CPM for review and approval. The CRMMP shall follow the content and organization of the draft model CRMMP, provided by the CPM, and the authors' name(s) shall appear on the title page of the CRMMP. The CRMMP shall identify measures to minimize potential impacts to sensitive cultural resources. Implementation of the CRMMP shall be the responsibility of the CRS and the project owner. Copies of the CRMMP shall reside with the CRS, alternate CRS, each CRM, and the project owner's on-site construction manager. No ground disturbance shall occur prior to CPM approval of the CRMMP, unless such activities are specifically approved by the CPM. Portions of the CRMMP that describe or map the location(s) of cultural resources shall be designated as confidential.

The CRMMP shall include the following elements and measures.

1. The following statement included in the Introduction: "Any discussion, summary, or paraphrasing of the Conditions of Certification in this CRMMP is intended as general guidance and as an aid to the user in understanding the Conditions and their implementation. The conditions, as written in the Commission Decision, shall supersede any summarization, description, or interpretation of the conditions in the CRMMP. The Cultural Resources Conditions of Certification from the Commission Decision are contained in Appendix A."

2. A proposed general research design that includes a discussion of archaeological research questions and testable hypotheses specifically applicable to the project area, and a discussion of artifact collection, retention/disposal, and curation policies as related to the research questions formulated in the research design. The research design will specify that the preferred treatment strategy for any buried archaeological deposits is avoidance. A specific mitigation plan shall be prepared for any unavoidable impacts to any CRHR-eligible (as determined by the CPM) resources. A prescriptive treatment plan may be included in the CRMMP for limited data types.

3. Specification of the implementation sequence and the estimated time frames needed to accomplish all project-related tasks during the ground-disturbance and post-ground–disturbance analysis phases of the project.

4. Identification of the person(s) expected to perform each of the tasks, their responsibilities, and the reporting relationships between project construction management and the mitigation and monitoring team.

5. A description of the manner in which Native American observers or monitors will be included, the procedures to be used to select them, and their role and responsibilities.

6. A description of all impact-avoidance measures (such as flagging or fencing) to prohibit or otherwise restrict access to sensitive resource areas that are to be avoided during ground disturbance, construction, and/or operation, and identification of areas where these measures are to be implemented. The description shall address how these measures would be implemented prior to the start of ground disturbance and how long they would be needed to protect the resources from project-related effects.

7. A statement that all encountered cultural resources over 50 years old shall be recorded on Department of Parks and Recreation (DPR) 523 forms and mapped and photographed. In addition, all archaeological materials retained as a result of the archaeological investigations (survey, testing, data recovery) shall be curated in accordance with the California State Historical Resources Commission's (SHRC's) *Guidelines for the Curation of Archaeological Collections* (1993, or future updated guidelines from the SHRC), into a retrievable storage collection in a public repository or museum.

8. A statement that the project owner will pay all curation fees for artifacts recovered and for related documentation produced during cultural resources investigations conducted for the project. The project owner shall identify three possible curation facilities that could accept cultural resources materials resulting from project activities.

9. A statement demonstrating when and how the project owner will comply with Health and Human Safety Code 7050.5(b) and Public Resources Code 5097.98(b) and (e), including the statement that the project owner will notify the CPM and the NAHC of the discovery of human remains.

10. A statement that the CRS has access to equipment and supplies necessary for site mapping, photography, and recovery of any cultural resource materials that are encountered during ground disturbance and cannot be treated prescriptively.

11. A description of the contents, format, and review and approval process of the final Cultural Resource Report (CRR), which shall be prepared according to *Archaeological Resource Management Report (ARMR)* guidelines.

<u>Verification:</u>

1. Upon approval of the CRS proposed by the project owner, the CPM will provide to the project owner an electronic copy of the draft model CRMMP for the CRS.

2. At least 30 days prior to the start of ground disturbance, the project owner shall submit the CRMMP to the CPM for review and approval.

3. At least 30 days prior to the start of ground disturbance, in a letter to the CPM, the project owner shall agree to pay curation fees for any materials generated or collected as a result of the archaeological investigations (survey, testing, data recovery).

4. Within 90 days after completion of ground disturbance (including landscaping), if cultural materials requiring curation were generated or collected, the project owner shall provide to the CPM a copy of an agreement with, or other written commitment from, a curation facility that meets the standards stated in the SHRC's *Guidelines for the Curation of Archaeological Collections* (1993, or future updated guidelines from SHRC), to accept the cultural materials from this project. Any agreements concerning curation will be retained and available for audit for the life of the project.

CUL-4 FINAL CULTURAL RESOURCES REPORT (CRR)

The project owner shall submit the final CRR to the CPM for approval. The final CRR shall be written by or under the direction of the CRS and shall be provided in the ARMR format. The final CRR shall report on all field activities including dates, times and locations, results, samplings, and analyses. All survey reports, DPR 523 forms, data recovery reports, and any additional research reports not previously submitted to the CHRIS shall be included as appendices to the final CRR.

If the project owner requests a suspension of ground disturbance and/or construction activities, then a draft CRR that covers all cultural resources activities associated with the project shall be prepared by the CRS and submitted to the CPM for review and approval on the same day as the suspension/extension request. The draft CRR shall be retained at the project site in a secure facility until ground disturbance and/or construction resumes or the project is withdrawn. If the project is withdrawn, then a final CRR shall be submitted to the CPM for review and approval at the same time as the withdrawal request.

Verification:

1. Within 30 days after requesting a suspension of construction activities, the project owner shall submit a draft CRR to the CPM for review and approval.
2. Within 90 days after completion of ground disturbance (including landscaping), the project owner shall submit the final CRR to the CPM for review and approval. If any reports have previously been sent to the CHRIS, then receipt letters from the CHRIS or other verification of receipt shall be included in an appendix.
3. Within 10 days after CPM approval of the CRR, the project owner shall provide documentation to the CPM confirming that copies of the final CRR have been provided to the CHRIS, the curating institution, if archaeological materials were collected, and to the tribal chairpersons of any Native American groups requesting copies of project-related reports.

CUL-5 CULTURAL RESOURCES WORKER ENVIRONMENTAL AWARENESS PROGRAM (WEAP)

Prior to and for the duration of ground disturbance, the project owner shall provide Worker Environmental Awareness Program (WEAP) training to all new workers within their first week of employment at the project site, along the linear facilities routes, and at laydown areas, roads, and other ancillary areas. The cultural resources part of this training shall be prepared by the CRS, may be conducted by any member of the archaeological team, and may be presented in the form of a video. The CRS is encouraged to include a Native American presenter in the training to contribute the Native American perspective on archaeological and ethnographic resources. During the training and during construction, the CRS shall be available (by telephone or in person) to answer questions posed by employees. The training may be discontinued when ground disturbance is completed or suspended, but must be resumed when ground disturbance, such as landscaping, resumes.

The training shall include:

1. A discussion of applicable laws and penalties under law;
2. Samples or visuals of artifacts that might be found in the project vicinity;
3. A discussion of what such artifacts may look like when partially buried, or wholly buried and then freshly exposed;
4. A discussion of what prehistoric and historical archaeological deposits look like at the surface and when exposed during construction, and the range of variation in the appearance of such deposits;
5. Instruction that the CRS, Alternate CRS, and CRMs have the authority to halt ground disturbance in the area of a discovery to an extent sufficient to ensure that the resource is protected from further impacts, as determined by the CRS;
6. Instruction that employees, if the CRS, Alternate CRS, or CRMs are not present, are to halt work on their own in the vicinity of a potential cultural resources discovery, and shall contact their supervisor and the CRS or CRM, and that redirection of work would be determined by the construction supervisor and the CRS;
7. An informational brochure that identifies reporting procedures in the event of a discovery;
8. An acknowledgement form signed by each worker indicating that they have received the training; and

9. A sticker that shall be placed on hard hats indicating that environmental training has been completed.

No ground disturbance shall occur prior to implementation of the WEAP program, unless such activities are specifically approved by the CPM.

Verification:

1. At least 30 days prior to the beginning of ground disturbance, the CRS shall provide the cultural resources WEAP training program draft text and/or training video, including Native American participation, and graphics and the informational brochure to the CPM for review and approval.

2. At least 15 days prior to the beginning of ground disturbance, the CPM will provide to the project owner a WEAP Training Acknowledgement form for each WEAP-trained worker to sign.

3. Monthly, until ground disturbance is completed, the project owner shall provide in the Monthly Compliance Report (MCR) the WEAP Training Acknowledgement forms of workers who have completed the training in the prior month and a running total of all persons who have completed training to date.

CUL-6 UNDISCOVERED CULTURAL RESOURCES

The project owner shall ensure that a CRS, alternate CRS, or CRMs shall be on site for any ground disturbance that extends into sediments or soils below the artificial fill, which varies from 6 to 9 feet in depth across the AEC project site.

Ground disturbance that occurs in the following areas shall be subject to this condition.

- CCGT/HRSG foundation slabs (Blocks 1, 3, and 4).
- GSU transformer foundation pads (Blocks 1, 3, and 4).
- Overhead transmission line pole foundations.
- STG foundations.
- Fuel gas compressor/conditioning structure.
- Fire water piping and hydrants surrounding Power Block4.
- Relocated gas metering station.
- Process/sanitary wastewater pipeline.

Prior to the start of ground disturbance, the project owner shall notify the CPM and all interested Native Americans of the date on which ground disturbance will ensue. The project owner is not required to monitor construction of other project components (that is, those not listed immediately above) unless the CRS or CPM determine that observable conditions in the field warrant monitoring. Where excavation equipment is actively removing dirt and hauling the excavated material farther than 50 feet from the location of active excavation, full-time archaeological monitoring shall require at least two monitors per excavation area. In this circumstance, one monitor shall observe the location of active excavation and a second monitor shall inspect the dumped material. For excavation areas where the excavated material is dumped no farther than 50 feet from the location of active excavation, one monitor shall observe both the location of active excavation and inspect the dumped material.

In the event that the CRS believes that the required number of monitors is not appropriate in certain locations, a letter or e-mail detailing the justification for changing the number of monitors shall be provided to the CPM for review and approval prior to any change in the number of monitors.

The project owner shall obtain the services of one or more NAMs to monitor construction-related ground disturbance in areas slated for excavation into non-fill (native) sediments, as described in the previous bulleted list. Contact lists of interested Native Americans and guidelines for monitoring shall be obtained from the NAHC. Preference in selecting an NAM shall be given to Native Americans with traditional ties to the area that shall be monitored. If efforts to obtain the services of a qualified NAM are unsuccessful, the project owner shall immediately inform the CPM. The CPM will either identify potential monitors or will allow construction-related ground disturbance to proceed without an NAM.

The research design in the CRMMP shall govern the collection, treatment, retention/disposal, and curation of any archaeological materials encountered. On forms provided by the CPM, CRMs shall keep a daily log of any monitoring and other cultural resources activities and any instances of non-compliance with the Conditions and/or applicable LORS. The daily monitoring logs shall at a minimum include the following information.

- First and last name of the CRM and any accompanying NAM.
- Time in and out.
- Weather. Specify if weather conditions led to work stoppages.
- Work location (project component). Provide specifics—.e.g., power block, landscaping.
- Proximity to site location. Specify if work conducted within 1000 feet of a known cultural resource.
- Work type (machine).
- Work crew (company, operator, and foreman).
- Depth of excavation.
- Description of work.
- Stratigraphy.
- Artifacts, listed with the following identifying features:

- Field artifact #: When recording artifacts in the daily monitoring logs, the CRS shall institute a field numbering system to reduce the likelihood of repeat artifact numbers. A typical numbering system could include a project abbreviation, monitor's initials, and a set of numbers given to that monitor: e.g., HBEP-MB-123.
- Description.
- Measurements.
- Universal Transverse Mercator coordinates.
- Whether artifacts are likely to be isolates or components of larger resources.
- Assessment of significance of any finds.
- Actions taken.
- Plan for the next work day.
- A cover sheet shall be submitted with each day's monitoring logs, and shall at a minimum include the following:
  - Count and list of first and last names of all CRMs and of all NAMs for that day.
  - General description (in paragraph form) of that day's overall monitoring efforts, including monitor names and locations.
  - Any reasons for halting work that day.
  - Count and list of all artifacts found that day: include artifact #, location (i.e., grading in Unit X), measurements, UTMs, and very brief description (i.e., historic can, granitic biface, quartzite flake).
  - Whether any artifacts were found out of context (i.e., in fill, caisson drilling, flood debris, spoils pile).

Copies of the daily monitoring logs and cover sheets shall be provided by email from the CRS to the CPM, as follows:

- Each day's monitoring logs and cover sheet shall be merged into one PDF document
- The PDF title and headings, and emails shall clearly indicate the date of the applicable monitoring logs.
- PDFs for any revised or resubmitted versions shall use the word "revised" in the title.

Daily and/or weekly maps shall be submitted along with the monitoring logs as follows:

- The CRS shall provide daily and/or weekly maps of artifacts at the request of the CPM. A map shall also be provided if artifact locations show complexity, high density, or other unique considerations.

- Maps shall include labeled artifacts, project boundaries, previously recorded sites and isolates, aerial imagery background, and appropriate scales.

From the daily monitoring logs, the CRS shall compile a monthly monitoring summary report to be included in the MCR. If there are no monitoring activities, the summary report shall specify why monitoring has been suspended.

- The Cultural Resources section of the MCR shall be prepared in coordination with the CRS, and shall include a monthly summary report of cultural resources-related monitoring. The summary shall:
- List the number of CRMs and NAMs on a daily basis, as well as provide monthly monitoring-day totals.
- Give an overview of cultural resource monitoring work for that month, and discuss any issues that arose.
- Describe fulfillment of requirements of each cultural mitigation measure.
- Summarize the confidential appendix to the MCR, without disclosing any specific confidential details.
- Include the artifact concordance table (as discussed under the next bullet point), but with removal of UTMs.
- Each MCR, prepared under supervision of the CRS, shall be accompanied by a confidential appendix that contains completed DPR 523A forms for all artifacts recorded or collected in that month. For any artifact without a corresponding DPR form, the CRS shall specify why the DPR form is not applicable or pending (i.e. as part of a larger site update).
- A concordance table that matches field artifact numbers with the artifact numbers used in the DPR forms shall be included. The sortable table shall contain each artifact’s date of collection and UTM numbers, and note if an artifact has been deaccessioned or otherwise does not have a corresponding DPR form. Any post-field log recordation changes to artifact numbers shall also be noted.
- DPR forms shall be submitted as one combined PDF.
- The PDF shall organize DPR forms by site and/or artifact number.
- The PDF shall include an index and bookmarks.
- If artifacts from a given site location (in close proximity of each other or an existing site) are collected month after month, and if agreed upon with the CPM, a final updated DPR for the site may be submitted at the completion of monitoring. The monthly concordance table shall note that the DPR form for the included artifacts is pending.

The CRS or alternate CRS shall report daily to the CPM on the status of the project's cultural resources-related activities, unless reducing or ending daily reporting is requested by the CRS and approved by the CPM.

In the event that the CRS believes that the current level of monitoring is not appropriate in certain locations, a letter or e-mail detailing the justification for changing the level of monitoring shall be provided to the CPM for review and approval prior to any change in the level of monitoring.

The CRS, at his or her discretion, or at the request of the CPM, may informally discuss cultural resources monitoring and mitigation activities with Energy Commission technical staff.

Cultural resources monitoring activities are the responsibility of the CRS. Any interference with monitoring activities, removal of a monitor from duties assigned by the CRS, or direction to a monitor to relocate monitoring activities by anyone other than the CRS shall be considered non-compliance with these Conditions.

Upon becoming aware of any incidents of non-compliance with the Conditions and/or applicable LORS, the CRS and/or the project owner shall notify the CPM.

The CRS shall also recommend corrective action to resolve the problem or achieve compliance with the Conditions. When the issue is resolved, the CRS shall write a report describing the issue, the resolution of the issue, and the effectiveness of the resolution measures. This report shall be provided in the next MCR for the review of the CPM.

Verification:

1. At least 30 days prior to the start of ground disturbance, the CPM will notify all Native Americans with whom the Energy Commission communicated during the project review of the date on which the project's ground disturbance will begin.

2. At least 30 days prior to the start of ground disturbance, the CPM will provide to the CRS an electronic copy of a form to be used as a daily monitoring log and information to be included in the cover sheet for the daily monitoring logs.

3. While monitoring is on-going, the project owner shall submit each day's monitoring logs and cover sheet merged into one PDF document by email within 24 hours.

4. The CRS and/or project owner shall notify the CPM of any incidents of non-compliance with the conditions and/or applicable LORS by telephone or email within 24 hours.

5. The CRS shall provide daily maps of artifacts along with the daily monitoring logs if more than 10 artifacts are found per day, or as requested by the CPM.

6. The CRS shall provide weekly maps of artifacts if there more than 50 artifacts are found per week, or as requested by the CPM. The map shall be submitted within two business days after the end of each week.

7. Within 15 days of receiving from a local Native American group a request that a NAM be employed, the project owner shall submit a copy of the request and a copy of a response letter to the group notifying them that a NAM has been employed and identifying the NAM.

8. While monitoring is on-going, the project owner shall submit monthly MCRs and accompanying weekly summary reports. The project owner shall attach any new DPR 523A forms, under confidential cover, completed for finds treated prescriptively, as specified in the CRMMP.

9. Final updated DPRs with sites (where artifacts are collected month after month) can be submitted at the completion of monitoring, as agreed upon with the CPM.

10. At least 24 hours prior to implementing a proposed change in monitoring level, the project owner shall submit to the CPM, for review and approval, a letter or e-mail (or some other form of communication acceptable to the CPM) detailing the CRS's justification for changing the monitoring level.

11. At least 24 hours prior to reducing or ending daily reporting, the project owner shall submit to the CPM, for review and approval, a letter or e-mail (or some other form of communication acceptable to the CPM) detailing the CRS's justification for reducing or ending daily reporting.

12. Within 15 days of receiving them, the project owner shall submit to the CPM copies of any comments or information provided by Native Americans in response to the project owner's transmittals of information.

CUL-7 POWERS OF CRS

The CRS shall have the authority to halt ground disturbance in the event of a discovery. Redirection of ground disturbance shall be accomplished under the direction of the construction supervisor in consultation with the CRS.

In the event that a cultural resource over 50 years of age is found (or if younger, determined exceptionally significant by the CRS), or impacts to such a resource can be anticipated, ground disturbance shall be halted or redirected in the immediate vicinity of the discovery sufficient to ensure that the resource is protected from further impacts. If the discovery includes human remains, the project owner shall comply with the requirements of Health and Human Safety Code § 7050.5(b) and shall additionally notify the CPM and the NAHC of the discovery of human remains. No action with respect to the disposition of human remains of Native American origin shall be initiated without direction from the CPM. Monitoring, including Native American monitoring, and daily reporting, as provided in other conditions, shall continue during the project's ground-disturbing activities elsewhere, while the halting or redirection of ground disturbance in the vicinity of the discovery shall remain in effect until the CRS has visited the discovery, and all of the following have occurred:

1. The CRS has notified the project owner, and the CPM has been notified within 24 hours of the discovery, or by Monday morning if the cultural resources discovery occurs between 8:00 AM on Friday and 8:00 AM on Sunday morning, including a description of the discovery (or changes in character or attributes), the action taken (i.e., work stoppage or redirection), a recommendation of CRHR eligibility, and recommendations for data recovery from any cultural resources discoveries, whether or not a determination of CRHR eligibility has been made.

2. If the discovery would be of interest to Native Americans, the CRS has notified all Native American groups that expressed a desire to be notified in the event of such a discovery.

3. The CRS has completed field notes, measurements, and photography for a DPR 523 “Primary Record” form. Unless the find can be treated prescriptively, as specified in the CRMMP, the “Description” entry of the DPR 523 “Primary Record” form shall include a recommendation on the CRHR/NRHP eligibility of the discovery. The project owner shall submit completed forms to the CPM.

4. The CRS, the project owner, and the CPM have conferred, and the CPM has concurred with the recommended eligibility of the discovery and approved the CRS’s proposed data recovery, if any, including the curation of the artifacts, or other appropriate mitigation; and any necessary data recovery and mitigation have been completed.

5. Ground disturbance may resume only with the approval of the CPM.

<u>Verification:</u>

1. At least 30 days prior to the start of ground disturbance, the project owner shall provide the CPM and CRS with a letter confirming that the CRS, Alternate CRS, and CRMs have the authority to halt ground disturbance in the vicinity of a cultural resources discovery, and that the project owner shall ensure that the CRS notifies the CPM within 24 hours of a discovery, or by Monday morning if the cultural resources discovery occurs between 8:00 AM on Friday and 8:00 AM on Sunday morning.

2. Unless the discovery can be treated prescriptively, as specified in the CRMMP, completed DPR 523 forms for resources newly discovered during ground disturbance shall be submitted to the CPM for review and approval no later than 24 hours following the notification of the CPM, or 48 hours following the completion of data recordation/recovery, whichever the CRS decides is more appropriate for the subject cultural resource.

3. Within 48 hours of the discovery of a resource of interest to Native Americans, the project owner shall ensure that the CRS notifies all Native American groups that expressed a desire to be notified in the event of such a discovery, and the CRS must inform the CPM when the notifications are complete.

4. No later than 30 days following the discovery of any Native American cultural materials, the project owner shall submit to the CPM copies of the information transmittal letters sent to the Chairpersons of the Native American tribes or groups who requested the information. Additionally, the project owner shall submit to the CPM copies of letters of transmittal for all subsequent responses to Native American requests for notification, consultation, and reports and records.

5. Within 15 days of receiving them, the project owner shall submit to the CPM copies of any comments or information provided by Native Americans in response to the project owner's transmittals of information.

CUL-8 FILL SOILS

If fill soils must be acquired from a non-commercial borrow site or disposed of to a non-commercial disposal site, the CRS shall survey the borrow or disposal site(s) for cultural resources and record on DPR 523 forms any that are identified. This survey shall not be required if there is a survey of the location that is less than five years old and if the site is approved by the CPM.

When any non–commercial borrow site or non-commercial disposal site survey is completed, the CRS shall convey the results and recommendations for further action to the project owner and the CPM. The CPM shall determine, in his/her sole discretion, whether significant archaeological resources that cannot be avoided are present at the borrow or disposal site. If the CPM determines that significant archaeological resources that cannot be avoided are present at the borrow or disposal site, the project owner must either select another borrow or disposal site or implement **CUL-7** prior to any use of the site. The CRS shall report on the methods and results of these surveys in the final CRR.

Verification:

1. As soon as the project owner knows that a non-commercial borrow site and/or disposal site will be used, he/she shall notify the CRS and CPM and provide documentation of previous archaeological survey, if any, dating within the past five years, for CPM approval.

2. In the absence of documentation of recent archaeological survey, at least 30 days prior to any soil borrow or disposal activities on the non-commercial borrow and/or disposal sites, the CRS shall survey the site/s for archaeological resources. The CRS shall notify the project owner and the CPM of the results of the cultural resources survey, with recommendations, if any, for further action.

CULTURAL RESOURCES ABBREVIATION AND ACRONYM GLOSSARY

ACC	air-cooled condenser
ACHP	Advisory Council on Historic Preservation
AEC	Alamitos Energy Center
AFC	Application for Certification
AGS	Alamitos Generating Station
B.P.	Before Present (A.D. 1950)
CA	California
Cal. Code Regs.	California Code of Regulations
Caltrans	California Department of Transportation
CCS	cryptocrystalline silicate stone
CEC	California Energy Commission
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
C.F.R.	Code of Federal Regulations
CHL	California Historical Landmark
CLB	city of Long Beach
COE	Corps of Engineers, U.S. Army
COHP	California Office of Historic Preservation
Conditions	Conditions of Certification
CRHR	California Register of Historical Resources
CRMMP	Cultural Resources Monitoring and Mitigation Plan
CSULB	California State University, Long Beach
DPR	Department of Parks and Recreation (State of California)

DPR 523	Department of Parks and Recreation cultural resources recordation form
EDR	Environmental Data Resources, Inc.
EJ	environmental justice
E.O.	Executive Order (presidential)
° F	degrees Fahrenheit
GLO	General Land Office
HGS	Haynes Generating Station
JA	Jamison and Associates
LACDPW	Los Angeles County Department of Public Works
LAn/LAN	Los Angeles County
LBWD	Long Beach Water District
LCP	Local Coastal Program
LORS	laws, ordinances, regulations, and standards
MLD	Most Likely Descendent
NAHC	Native American Heritage Commission
NHPA	National Historic Preservation Act
NPS	National Park Service
NRHP	National Register of Historic Places
OHP	Office of Historic Preservation
ORA, Ora	Orange County
OTC	once-through cooling
PAA	Project Area of Analysis
PCAS	Pacific Coast Archaeological Society
PCSC	Puvunga Ceremonial Site Complex

PSA	Preliminary Staff Assessment
Pub. Resources Code	Public Resources Code (State of California)
Rd	road
SAFC	supplemental application for certification
SCCIC	South Central Coastal Information Center
SCE	Southern California Edison Company
SEADIP	South East Area Development Improvement Plan
SR	State Route
SRS	Scientific Resource Surveys
Staff	Energy Commission cultural resources technical staff
TCP	traditional cultural property
tit.	title
USGS	U.S. Geological Survey
WEAP	Worker Environmental Awareness Program

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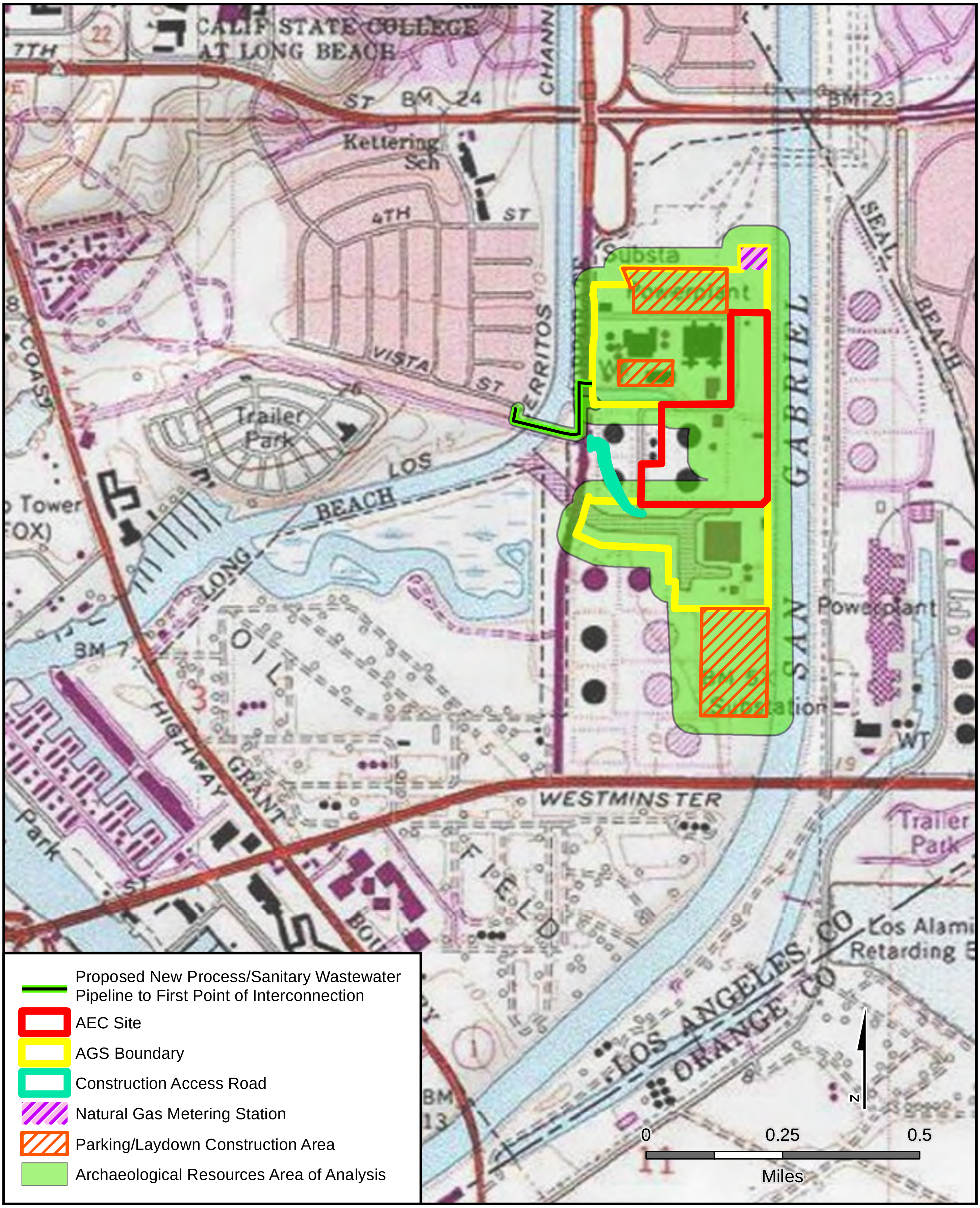
CULTURAL RESOURCES - FIGURE 1

Alamitos Energy Center - Archaeological Resources Project Area of Analysis



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CEC Staff, ESRI, Bing Aerial Image, CH2MHill, Applied Earthworks

CULTURAL RESOURCES - FIGURE 2

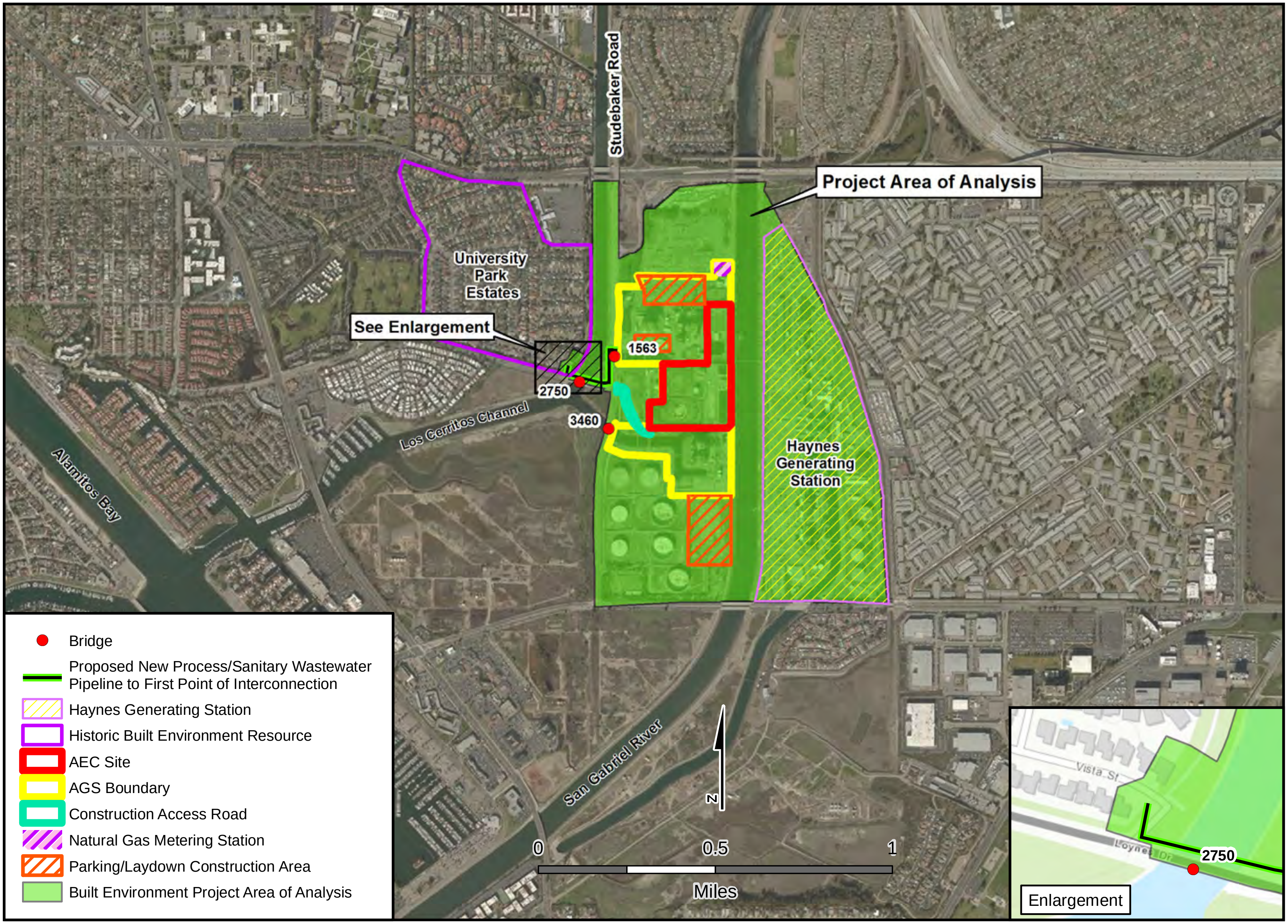
Alamitos Energy Center - Ethnographic Resources Project Areas of Analysis

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CEC Staff, ESRI, Bing Aerial Image, CH2MHill, Applied Earthworks

CULTURAL RESOURCES - FIGURE 3

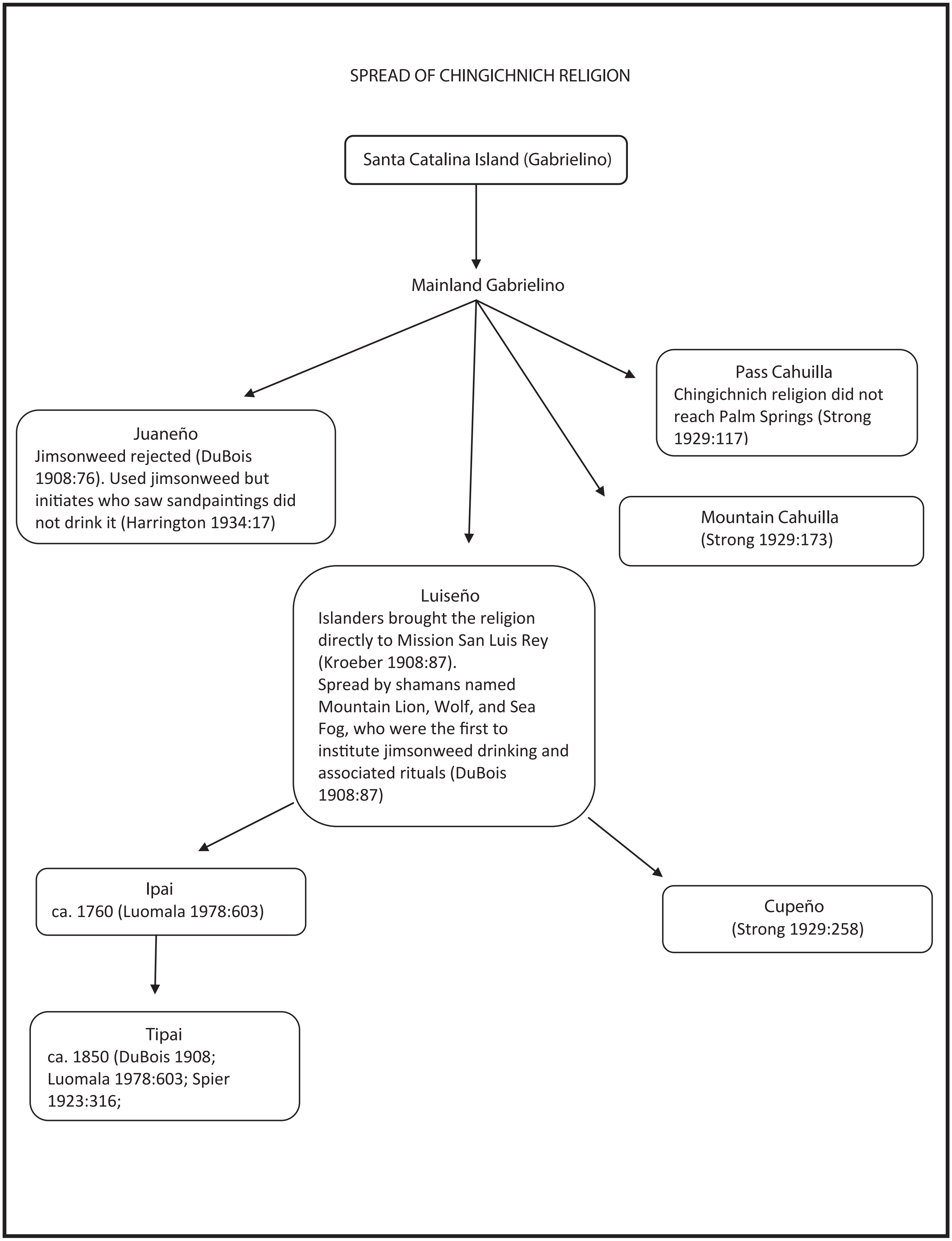
Alamitos Energy Center - Historic Built Environment Resources within Built Environment Project Area of Analysis



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CEC Staff, ESRI, Bing Aerial Image, CH2MHill, Applied Earthworks

Alamitos Energy Center - Spread of Chingichnich Religion



HAZARDOUS MATERIALS MANAGEMENT

Brett Fooks, PE and Geoff Lesh, PE

SUMMARY OF CONCLUSIONS

Staff concludes the proposed Alamitos Energy Center's (AEC) storage and use of hazardous materials at the site would not present a significant impact to the public. The proposed project would comply with all applicable laws, ordinances, regulations, and standards (LORS). In addition, staff's proposed conditions of certification would reduce the potential for impact on the public to less than significant. In response to California Health and Safety Code, section 25531 et seq., AES Southland Development, LLC (AES or applicant) would be required to develop a risk management plan. To ensure the adequacy of this plan, staff's proposed conditions of certification require that the risk management plan be submitted for concurrent review by the Long Beach Environmental Health Bureau (LBEHB) and Energy Commission staff.

In addition, staff's proposed conditions of certification require staff review and approval of the risk management plan prior to delivery of any hazardous materials to the AEC project site. Other proposed conditions of certification address the issue of the transportation, storage, and use of aqueous ammonia and site security.

INTRODUCTION

The purpose of this hazardous materials management analysis is to determine if the proposed AEC has a significant potential to cause impacts on the public as a result of the use, handling, storage, or transportation of hazardous materials at the proposed site. If significant adverse impacts on the public are identified, Energy Commission staff must also evaluate the potential for facility design alternatives and additional mitigation measures to reduce those impacts to the extent feasible.

This analysis does not address the potential exposure of workers to hazardous materials used at the proposed facility. Employers must inform employees of hazards associated with their work, provide them with special personal protective equipment and training, and to provide an injury illness prevention program to reduce the potential for health impacts associated with the handling of hazardous materials. The **Worker Safety and Fire Protection** section of this staff analysis describes applicable requirements for the protection of workers from these risks.

Aqueous ammonia (19 percent ammonia in aqueous solution) would be used to control oxides of nitrogen (NOx) emissions through selective catalytic reduction. Aqueous ammonia provides important benefits to the operation of the facility and public because it reduces air pollution (see the **Air Quality** section for more information). Aqueous ammonia is the safest form of ammonia to use in the reduction of NOx air pollution because spills are easy to contain, reducing potential environmental and public health impacts.

Other hazardous materials, such as mineral and lubricating oils, cleaning detergents, and welding gasses would be present at the proposed AEC project. No acutely toxic hazardous materials would be used on site during construction. None of these materials pose significant potential for off-site impacts as a result of the quantities on site, their relative toxicity, their physical state, and/or their environmental mobility. Handling of hazardous materials during construction would follow best management practices (BMPs) to minimize environmental effects (AEC 2015g, Sections 5.5.3).

Although no natural gas is stored, the project would involve the handling of large amounts of natural gas. Natural gas poses some risk of both fire and explosion. The proposed AEC would connect to a new gas metering station built by Southern California Gas Company (SoCalGas) located on the northeastern side of the site.(AEC 2015g, Sections 2.1.1.1 and 4.0). The AEC project would also require the transportation of aqueous ammonia to the facility. This document addresses all potential impacts associated with the use and handling of hazardous materials.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The following federal, state, and local laws and policies apply to the protection of public health and hazardous materials management. Staff's analysis examines the project's compliance with these requirements.

Hazardous Materials Management Table 1
Laws, Ordinances, Regulations, and Standards

Applicable LORS	Description
Federal	
The Superfund Amendments and Reauthorization Act of 1986 (42 USC §9601 et seq.)	Contains the Emergency Planning and Community Right To Know Act (also known as SARA Title III).
The Clean Air Act (CAA) of 1990 (42 USC 7401 et seq. as amended)	Established a nationwide emergency planning and response program and imposed reporting requirements for businesses that store, handle, or produce significant quantities of extremely hazardous materials.
The CAA section on risk management plans (42 USC §112(r))	Requires states to implement a comprehensive system informing local agencies and the public when a significant quantity of such materials is stored or handled at a facility. The requirements of both SARA Title III and the CAA are reflected in the California Health and Safety Code, section 25531, et seq.
49 CFR 172.800	The U.S. Department of Transportation (DOT) requirement that suppliers of hazardous materials prepare and implement security plans.
49 CFR Part 1572, Subparts A and B	Requires suppliers of hazardous materials to ensure that all their hazardous materials drivers are in compliance with personnel background security checks.
The Clean Water Act (CWA) (40 CFR 112)	Aims to prevent the discharge or threat of discharge of oil into navigable waters or adjoining shorelines. Requires a written spill prevention, control, and countermeasures (SPCC) plan to be prepared for facilities that store oil that could leak into navigable waters.
Title 49, Code of Federal Regulations, Part 190	Outlines gas pipeline safety program procedures.
Title 49, Code of Federal Regulations, Part 191	Addresses transportation of natural and other gas by pipeline: annual reports, incident reports, and safety-related condition reports. Requires operators of pipeline systems to notify the DOT of any reportable incident by telephone and then submit a written report within 30 days.

Applicable LORS	Description
Title 49, Code of Federal Regulations, Part 192	Addresses transportation of natural and other gas by pipeline and minimum federal safety standards, specifies minimum safety requirements for pipelines including material selection, design requirements, and corrosion protection. The safety requirements for pipeline construction vary according to the population density and land use that characterize the surrounding land. This part also contains regulations governing pipeline construction (which must be followed for Class 2 and Class 3 pipelines) and the requirements for preparing a pipeline integrity management program.
Federal Register (6 CFR Part 27) interim final rule	A regulation of the U.S. Department of Homeland Security that requires facilities that use or store certain hazardous materials to submit information to the department so that a vulnerability assessment can be conducted to determine what certain specified security measures shall be implemented.
State	
Title 8, California Code of Regulations, section 5189	Requires facility owners to develop and implement effective safety management plans that ensure that large quantities of hazardous materials are handled safely. While such requirements primarily provide for the protection of workers, they also indirectly improve public safety and are coordinated with the Risk Management Plan (RMP) process.
California Health and Safety Code, section 25531 to 25543.4	The California Accidental Release Program (CalARP) requires the preparation of a Risk Management Plan (RMP) and off-site consequence analysis (OCA) and submittal to the local Certified Unified Program Agency for approval.
California Health and Safety Code, section 41700	Requires that “No person shall discharge from any source whatsoever such quantities of air contaminants or other material which causes injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause injury or damage to business or property.”
Title 19, California Code of Regulations, Division 2, Chapter 4.5, Articles 1-11	Sets forth the list of regulated substances and thresholds, the requirements for owners and operators of stationary sources concerning the prevention of accidental releases, the accidental release prevention programs approved under Section 112 of the federal Clean Air Act (CAA) Amendments of 1990 and mandated under the CalARP Program, and how the CalARP Program relates to the state’s Unified Program.
Title 22, California Code of Regulations, Chapter 14, Article 10	The design requirements set forth for new tank construction and secondary containment requirements for hazardous chemicals and waste.
California Safe Drinking Water and Toxic Enforcement Act (Proposition 65)	Prevents certain chemicals that cause cancer and reproductive toxicity from being discharged into sources of drinking water.
California Public Utilities Commission General Order 112-E and 58-A	Contains standards for gas piping construction and service.
Local (or locally enforced)	
Long Beach Municipal Code Title 18, Chapter 18.48 - Fire Code	The city of Long Beach has adopted the latest California Fire Code with amendments found in Title 18, Chapter 18.48.

The Long Beach Environmental Health Bureau (LBEHB) has responsibility for the Certified Unified Program Agency (CUPA) programs. The LBEHB is responsible for administering the Hazardous Materials Business Plans (HMBP), Risk Management Plan (RMP), and Spill Prevention Control and Countermeasure (SPCC) plan filed by businesses located within the city. In addition, the LBEHB has responsibility for ensuring that businesses and industry store and use hazardous materials safely and in conformance with applicable regulatory codes. In this case because the Commission has the exclusive permitting jurisdiction over power plants like AEC, (Public Resources Code section 25500) commission staff, after consultation with LBEHB, will review and approve the various required plans. The LBEHB does engage the Long Beach Fire Department (LBFD), as a participating agency, to perform inspections at established facilities to verify that hazardous materials are properly stored and handled and that the types and quantities of materials reported in a firm’s HMBP are accurate. Construction and design of the buildings and vessels storing hazardous materials would meet the appropriate seismic requirements of the latest adopted (2013 or later) California Building Code and the latest adopted (2013 or later) California Fire Code.

SETTING

Several factors associated with the area in which a project is to be located affect the potential for an accidental release of a hazardous material that could cause public health impacts. These include:

- local meteorology;
- terrain characteristics; and,
- location of population centers and sensitive receptors relative to the project.

METEOROLOGICAL CONDITIONS

Meteorological conditions, including wind speed, wind direction, and air temperature, affect both the extent to which accidentally released hazardous materials would be dispersed into the air and the direction in which they would be transported. This affects the potential magnitude and extent of public exposure to such materials, as well as their associated health risks. When wind speeds are low and the atmosphere stable, dispersion is severely reduced and can lead to increased localized public exposure.

Recorded wind speeds and directions are described in the **Air Quality** section (5.1) of the Application for Certification (AFC) (AEC 2015i). Staff agrees with the applicant’s proposed meteorological input assumptions for modeling of potential accidental hazardous material releases that would use the U.S. Environmental Protection Agency’s *RMP Offsite Consequence Analysis Guidance* document which assumes environmental conditions of F stability (stagnated air, very little mixing), wind speed of 1.5 meters per second, and the maximum temperature recorded in the area in the last three years is appropriate for conducting the off-site consequence analysis (AEC 2015g, Appendix 5.5A).

TERRAIN CHARACTERISTICS

The location of elevated terrain is often an important factor in assessing potential exposure. An emission plume resulting from an accidental release may impact high elevations before impacting lower elevations. The existing AEC site is located on a gently sloping coastal plain, and the topography of the site ranges approximately from 8 to 15 feet above mean sea level. The AEC site is bounded to the north by Southern California Edison (SCE) switchyard and State Route 22 (East 7th Street); to the east by the San Gabriel River; to the south by the former Plains West Coast Terminals petroleum storage facility and undeveloped property; and to the west by the Los Cerritos channel, AGS cooling-water canals, and the residences west of the channel (AEC 2015i).

LOCATION OF EXPOSED POPULATIONS AND SENSITIVE RECEPTORS

The general population includes many sensitive subgroups that may be at greater risk from exposure to emitted pollutants. These sensitive subgroups include the very young, the elderly, and those with existing illnesses. In addition, the location of the population in the area surrounding a project site may have a major bearing on health risk. Sensitive receptors in the project vicinity are listed and shown in Appendix 5.9A (AEC 2015g). The nearest sensitive receptor would be Rosie the Riveter, a privately owned and operated school located adjacent to the entrance on the existing Alamitos Generating Station (AGS) site. The nearest school off site is the Kettering Elementary School, located 0.8 miles from the AGS entrance to the northwest of the site (AEC 2015i, Section 5.9.2). All sensitive receptors within six miles of the project site are depicted in Figure 5.9A-RECEPTOR MAP (AEC 2015i, Section 5.9A). The nearest residents would be approximately 0.22 miles west of the facility along E. Eliot Street, and additional residences would be approximately 0.39 miles east of the facility along El Dorado Drive (AEC 2015i, Section 5.9.2 and Figure 5.9-1a).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

Staff reviewed and assessed the potential for the transportation, handling, and use of hazardous materials to impact the surrounding community. The chemicals listed in the AFC were evaluated (AEC 2015i, Table 5.5-1 & Table 5.5-2). Staff’s analysis addresses the potential impacts on all members of the population including the young, the elderly, and people with existing medical conditions that may make them more sensitive to the adverse effects of hazardous materials. To accomplish this goal, staff utilized the most current public health exposure levels (both acute and chronic) that are established to protect the public from the effects of an accidental chemical release.

In order to assess the potential for released hazardous materials to travel off site and affect the public, staff analyzed several aspects of the proposed use of these materials at the facility. Staff recognizes that some hazardous materials must be used at power plants. Therefore, staff conducted its analysis by examining the choice and amount of chemicals to be used, and the manner in which the applicant would use the chemicals. Staff also looked at the manner by which they would be transported to the facility and transferred to facility storage tanks, and the way the applicant plans to store the materials on site.

Staff reviewed the applicant’s proposed engineering and administrative controls concerning hazardous materials usage. Engineering controls are the physical or mechanical systems that can prevent the spill of a hazardous material from occurring. They can also limit the spill to a small amount or confine it to a small area. Examples of engineering controls can include storage tanks or automatic shut-off valves. Administrative controls are the rules and procedures that workers at the facility must follow that would help to prevent accidents or to keep them small if they do occur. Both engineering and administrative controls can act as methods of prevention or as methods of response and minimization. In both cases, the goal is to prevent a spill from moving off site and causing harm to the public.

Staff reviewed and evaluated the applicant's proposed use of hazardous materials as described by the applicant (AEC 2015i, Section 5.5). Staff's assessment followed the five steps listed below.

- Step 1: Staff reviewed the chemicals and the amounts proposed for on-site use as listed in Tables 5.5-1 through 5.5-4 of the AFC and determined the need and appropriateness of their use.
- Step 2: Those chemicals proposed for use in small amounts or whose physical state is such that there is virtually no chance that a spill would migrate off site and impact the public were removed from further assessment.
- Step 3: Measures proposed by the applicant to prevent spills were reviewed and evaluated. These included engineering controls such as automatic shut-off valves, different-sized transfer-hose couplings, and administrative controls such as worker training and safety management programs.
- Step 4: Measures proposed by the applicant to respond to accidents were reviewed and evaluated. These measures also included engineering controls such as catchment basins and methods to keep vapors from spreading and administrative controls such as training emergency response crews.
- Step 5: Staff analyzed the theoretical impacts on the public of a worst-case spill of hazardous materials, as reduced by the mitigation measures proposed by the applicant. When mitigation methods proposed by the applicant are sufficient, no further mitigation is recommended. If the proposed mitigation is not sufficient to reduce the potential for adverse impacts to an insignificant level, staff would propose additional prevention and response controls until the potential for causing harm to the public is reduced to an insignificant level. It is only at this point that staff can recommend that the facility be allowed to use hazardous materials.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Small Quantity Hazardous Materials

Staff determined in Steps 1 and 2 through its analysis that some hazardous materials pose a minimal potential for off-site impacts since they would be stored in a solid form or in smaller quantities. In addition, these hazardous materials would have low mobility or low levels of toxicity. These hazardous materials, which were eliminated from further consideration, are briefly discussed below.

During the construction phase of the project, the only hazardous materials proposed for use are paints, paint thinners, cleaners, solvents, sealants, gasoline, diesel fuel, motor oil, hydraulic fluid, lubricants, and welding gases. Any impact of spills or other releases of these materials would be limited to the site because of the small quantities involved, their infrequent use (and therefore reduced chances of release), and/or the temporary containment berms used by contractors. Petroleum hydrocarbon-based motor fuels, mineral oil, lube oil, and diesel fuels all have very low volatility and represent limited off-site hazards even in larger quantities.

During operations, hazardous chemicals such as cleaning agents, lube oil, mineral insulating oil, and other various chemicals (see **APPENDIX B** for a list of all chemicals proposed to be used and stored at AEC) would be used and stored in relatively small amounts and represent limited off-site hazards because of their small quantities, low volatility, and/or low toxicity.

After removing from consideration those chemicals that pose no risk of an off-site impact in Steps 1 and 2, staff continued with Steps 3, 4, and 5 to review the remaining hazardous materials, natural gas and aqueous ammonia. However, the project would be limited to using, storing, and transporting only those hazardous materials listed in **APPENDIX B** of the PSA as per staff's proposed condition of certification **HAZ-1**.

Large Quantity Hazardous Materials

Natural Gas

Natural gas poses a fire and/or possible explosion risk because of its flammability. Natural gas is composed of mostly methane, but also contains ethane, propane, nitrogen, butane, isobutene, and isopentane. Methane is colorless, odorless, tasteless, and lighter than air – odorant is added to the natural gas to make even small quantities easily detected. Natural gas can cause asphyxiation when methane is 90 percent in concentration. Methane is flammable when mixed in air at concentrations of 5-14 percent, which is also the detonation range. Natural gas, therefore, poses a risk of fire and/or possible explosion if a release occurs under certain specific conditions. Natural gas' tendency to disperse rapidly (Lees 2012) means it is less likely to cause explosions than other fuel gases such as liquefied petroleum gas (propane). However, natural gas can explode under certain confined conditions as demonstrated by the natural gas explosion at the Kleen Energy power plant in Middletown, Connecticut in February 2010 (Chemical Safety Board (US CSB 2010).

While natural gas would be used in significant quantities, it would not be stored on site. It would be delivered by SoCalGas via the existing onsite gas pipelines that serve the currently operating Alamitos Generating Station (AEC 2015i, Section 4.0). The pipelines and onsite metering station are, and would continue to be, owned and operated by SoCalGas. A new gas metering station would be constructed in the northeastern corner of the site to serve the new AEC.

The existing SoCalGas metering station would remain in service during AEC construction for continued operation of existing Alamitos Generating Station Units 1 through 6 until they are decommissioned. The existing metering station would then be demolished.

The risk of a fire and/or explosion on site can be reduced to insignificant levels through adherence to applicable codes and the development and implementation of effective safety management practices. The National Fire Protection Association (NFPA) code 85 requires both the use of double-block and bleed valves for gas shut off and automated combustion controls. These measures would significantly reduce the likelihood of an explosion in gas-fired equipment. Additionally, start-up procedures would require air purging of the gas turbines prior to start up, thereby precluding the presence of an explosive mixture. The safety management plan proposed by the applicant would address the handling and use of natural gas, and would significantly reduce the potential for equipment failure because of either improper maintenance or human error.

Staff concludes that existing LORS are sufficient to ensure minimal risks of pipeline failure. Additionally, the new gas metering station would be located entirely on-site, which greatly reduces the risks of impacts to the public from a rupture or failure.

On June 28, 2010, the United States Chemical Safety and Hazard Board (US CSB) issued Urgent Recommendations to the United States Occupational Safety and Health Administration (OSHA), the NFPA, the American Society of Mechanical Engineers (ASME), and major gas turbine manufacturers to make changes to their respective regulations, codes, and guidance to require the use of inherently safer alternatives to natural gas blows for the purposes of pipe cleaning (US Chemical Safety Board 2010). Recommendations were also made to the 50 states to enact legislation applicable to power plants that prohibits flammable gas blows for the purposes of pipe cleaning.

In accordance with those recommendations, staff proposes condition of certification **HAZ-9** which prohibits the use of flammable gas blows for pipe cleaning at the facility, including during construction and after the start of operations. Fuel gas pipe cleaning and purging shall adhere to the provisions of the latest edition of NFPA 56, the Standard for Fire and Explosion Prevention during Cleaning and Purging of Flammable Gas Piping Systems, with special emphasis on sections 4.4.1 (written procedures for pipe cleaning and purging) and 6.1.1.1 (prohibition on the use of flammable gas for cleaning or purging at any time).

Aqueous Ammonia

Aqueous ammonia would be used to control the emission of oxides of nitrogen (NO_x), a form of air pollution, from the combustion of natural gas at the AEC. The accidental release of aqueous ammonia without proper mitigation can result in significant down-wind concentrations of ammonia gas. AEC would have two 19-percent aqueous ammonia above ground horizontal storage tanks (AST) on site for the four simple-cycle generator turbines (SCGT) and two combined-cycle generator turbines (CCGT). A 30,000 gallon AST would be used for the AEC SCGT and a 40,000 gallon AST would be used for the AEC CCGT (AEC 2015i, Section 5.5.3.2, Table 5-5.1 & 5-5.2). The two ASTs are separated from each other and would not suffer from a common cause failure.

Based on staff's analysis described above, aqueous ammonia is the only hazardous material that may pose the risk of off-site impact. The use of aqueous ammonia can result in the formation and release of toxic gases (Lees 2012) in the event of a spill even without interaction with other chemicals. This is a result of its moderate vapor pressure and the large amounts of aqueous ammonia that would be used and stored on site. However, the use of aqueous ammonia poses far less risk than the use of the far more hazardous anhydrous ammonia.

To assess the potential impacts associated with an accidental release of aqueous ammonia, staff uses four bench mark exposure levels of ammonia gas occurring offsite. These include:

1. the lowest concentration posing a risk of lethality, 2,000 parts per million (ppm);
2. the immediately dangerous to life and health level of 300 ppm;
3. the emergency response planning guideline level 2 of 150 ppm, which is also the Risk Management Plan (RMP) level 1 criterion used by US EPA and California; and,
4. the level considered by the Energy Commission staff to be without serious adverse effects on the public for a one-time exposure of 75 ppm (considered by staff to be a level of significance).

If the potential exposure associated with a potential release exceeds 75 ppm at any public receptor, staff would assume that the potential release poses a risk of significant impact. However, staff would also assess the probability of occurrence of the release and/or the nature of the potentially exposed population in determining whether the likelihood and extent of potential exposure are sufficient to support a finding of potentially significant impact. A detailed discussion of the exposure criteria considered by staff, as well as their applicability to different populations and exposure-specific conditions, is provided in **Appendix A**.

Section 5.5.3.4 and Appendix 5.5A of the AFC (AEC 2015i) described the modeling parameters that would be used for the worst-case accidental releases of aqueous ammonia in the applicant's off-site consequence analysis (OCA). Pursuant to the California Accidental Release Program (CalARP) regulations (federal risk management plan regulations do not apply to sources that store or use aqueous ammonia solutions below 20 percent), the OCA would be performed for the worst-case release scenario, which would involve the failure and complete discharge of the storage tank. Ammonia emissions from the potential release scenario would be calculated following methods provided in the RMP off-site consequence analysis guidance (US EPA, April 1999). Potential off-site ammonia concentrations would be estimated indicating the distance from the source release point to the benchmarks of ammonia concentration.

Staff received applicant's offsite consequence analysis indicating that potential worst-case plume concentrations of more than 75 ppm would not move beyond the site boundaries. Applicant's modeling was performed using the SLAB dense-gas plume modeling program (AEC 2015h, Appendix 5.5A). The applicant modeled the worst case release of the 40,000 gallon AST on the site.

Staff verified applicant's results using a different EPA-approved plume modeling program, ALOHA in conjunction with MARPLOT, a mapping program that showed the distance of the plume from a specific reference point. Staff located ammonia storage tanks (the source point of the plume) based on the scaled plot layout provided in the AFC (AEC 2015i, Chapter 2.0, Figure 2.1-2). The applicant proposes that the secondary containment areas of both the 40,000 and 30,000 gallon tanks would be partially covered to effectively reduce the exposed surface area of spilled ammonia by 50 percent (AEC 2015g, Appendix 5.5A). Staff's modeling using ALOHA indicated that there was a very small potential of ammonia concentrations of 75 ppm to reach just off-site to the north, south, east and west. Staff therefore proposes that the secondary containment exposure area be limited to 50 square feet for both the 40,000 and 30,000 gallon tanks to ensure that the plume concentrations of 75 ppm would not migrate off-site and would not pose a significant risk to any off-site members of the public.

However, the Rosie the Riveter school sits on the AGS site but is located outside the current security fence, and would be outside the proposed AEC site. Staff's ALOHA modeling indicated that the ammonia plume would have a small potential of extending over to the Rosie the Riveter school in the case of a catastrophic ammonia release. Staff proposes Condition of Certification **HAZ-10** which would include accidental ammonia release notification and response procedures communicated to Rosie the Riveter school due to its close proximity to the AEC site. The notification requirement would include adding a procedural step to the AEC's Emergency Action Plan (EAP) requiring that plant personnel notify the school immediately of a catastrophic aqueous ammonia spill. The plant would also provide a safety procedure to the school indicating what best-practice actions to take during a catastrophic release to avoid exposure of personnel to a potential air-borne plume. These two items would help to ensure the safety of the sensitive receptors located at the school in the very unlikely event of an accidental ammonia release.

Staff's proposed Condition of Certification **HAZ-4** ensures that the aqueous ammonia secondary containment structure would include essential design elements to prevent a worst-case spill from producing significant off-site impacts.

Furthermore, the potential for accidents resulting in the release of hazardous materials is greatly reduced through implementation of a safety management program that would include the use of both engineering and administrative controls. Elements of both facility controls and the safety management plan are summarized below.

Engineering Controls

Engineering controls help to prevent accidents and releases (spills) from moving off site and affecting communities by incorporating engineering safety design criteria in the design of the project. The engineered safety features proposed by the applicant for use at the AEC project include:

- construction of secondary containment areas surrounding each of the hazardous materials storage areas designed to contain accidental releases that might happen during storage or delivery;
- physical separation of stored chemicals in isolated containment areas with a non-combustible partition in order to prevent accidental mixing of incompatible materials, which could result in the evolution and release of toxic gases or fumes;
- installation of a fire protection system for hazardous materials storage areas;
- construction of bermed containment areas surrounding the aqueous ammonia storage tank capable of holding the entire tank volume plus the water associated with a 24-hour period of a 25-year storm;

- construction of a sloped ammonia unloading pad that drains into the storage tank's secondary containment structure; and
- process protective systems including continuous tank level monitors, automated leak detectors, temperature and pressure monitors, alarms, and emergency block valves.

Administrative Controls

Administrative controls also help prevent accidents and releases (spills) from moving off site and affecting neighboring communities by establishing worker training programs, process safety management programs, and complying with all applicable health and safety laws, ordinances, and standards.

A worker health and safety program would be prepared by the applicant and include (but not be limited to) the following elements (see the **Worker Safety and Fire Protection** section for specific regulatory requirements):

- worker training regarding chemical hazards, health and safety issues, and hazard communication;
- procedures to ensure the proper use of personal protective equipment;
- safety operating procedures for the operation and maintenance of systems utilizing hazardous materials;
- fire safety and prevention; and,
- emergency response actions including facility evacuation, hazardous material spill clean-up, and fire prevention.

At the facility, the project owner would be required to designate an individual with the responsibility and authority to ensure a safe and healthful work place. The project health and safety official would oversee the health and safety program and have the authority to halt any action or modify any work practice to protect the workers, facility, and the surrounding community in the event of a violation of the health and safety program.

The applicant would be required to develop a safety management plan for the delivery of all liquid hazardous materials, including aqueous ammonia. Staff believes that an accidental release of aqueous ammonia during transfer from the delivery truck to the storage tank, although likely much smaller in spilled volume than a worst-case spill, would be the most probable accident scenario and therefore proposes Condition of Certification **HAZ-3** requiring the development of a safety management plan. A safety management plan addressing the delivery of all liquid hazardous materials during construction, commissioning and operations would further reduce the risk of any accidental release not addressed by the proposed spill-prevention mitigation measures and the required RMP. This plan would additionally prevent the mixing of incompatible materials that could result in toxic vapors.

The applicant would also prepare a risk management plan for aqueous ammonia, as required by both CalARP regulations and Condition of Certification **HAZ-2**. This condition also includes the requirement for a program for the prevention of accidental releases and responses to an accidental release of aqueous ammonia. A hazardous materials business plan would also be prepared by the applicant that would incorporate

California requirements for the handling of hazardous materials. Other administrative controls would be required in proposed Conditions of Certification **HAZ-1** (limitations on the use and storage of hazardous materials and their strength and volume) and Condition of Certification **HAZ-4** would require that the final design drawings for the aqueous ammonia storage (and secondary containment) facility be submitted to the Compliance Project Manager (CPM) for review and approval.

On-Site Spill Response

In order to address the issue of spill response, the facility would prepare and implement an emergency response plan that includes information on hazardous materials contingency and emergency response procedures, spill containment and prevention systems, personnel training, spill notification, on-site spill containment, and prevention equipment and capabilities, as well as other elements. Emergency procedures would be established which include evacuation, spill cleanup, hazard prevention, and emergency response. The first responders to a hazardous materials incident at AEC would be from Station No. 22 of the LBFD. If needed, a full hazardous materials response would be provided by either LBFD Station No. 19 or Station No. 24. Staff finds that the LBFD response team would be capable of responding to a hazardous materials emergency call from the AEC.

Transportation of Hazardous Materials

Hazardous materials, including aqueous ammonia, would be transported to the facility by tanker truck. While many types of hazardous materials would be transported to the site, staff believes that transport of aqueous ammonia poses the predominant risk associated with hazardous materials transport.

Staff reviewed the applicant's proposed transportation route for hazardous materials delivery. Trucks would travel on I-405 to SR 22 (7^{th} Street), west along 7^{th} Street, and then south on Studebaker Road to the AEC entrance (AEC 2012g, Section 5.5.3.3).

Aqueous ammonia can be released during a transportation accident and the extent of impact in the event of such a release would depend upon the location of the accident and the rate of dispersion of ammonia vapor from the surface of the aqueous ammonia pool. The likelihood of an accidental release during transport is dependent upon three factors:

- the skill of the tanker truck driver;
- the type of vehicle used for transport; and,
- accident rates.

To address this concern, staff evaluated the risk of an accidental transportation release in the project area. Staff's analysis focused on the project area after the delivery vehicle leaves the main highway (I-405). Staff believes it is appropriate to rely upon the extensive regulatory program that applies to the shipment of hazardous materials on California highways to ensure safe handling in general transportation (see Federal Hazardous Materials Transportation Law 49 USC §5101 et seq, DOT regulations 49 CFR subpart H, §172–700, and California Department of Motor Vehicles (DMV) regulations on hazardous cargo). These regulations also address the issue of driver competence.

To address the issue of tanker truck safety, aqueous ammonia would be delivered to the proposed facility in DOT-certified vehicles with design capacities of 7,000 gallons. These vehicles would be designed to meet or exceed the specifications MC307/DOT 407. These are high-integrity vehicles designed to haul caustic materials such as ammonia. Staff has, therefore, proposed Condition of Certification **HAZ-5** to ensure that, regardless of which vendor supplies the aqueous ammonia, delivery would be made in a tanker that meets or exceeds the specifications prescribed by these regulations.

To address the issue of accident rates, staff reviewed the technical and scientific literature on hazardous materials transportation (including tanker trucks) accident rates in the United States and California. Staff relied on six references and three federal government databases to assess the risk of a hazardous materials transportation accident.

Staff used the data from the Harwood studies (Harwood 1990 & Harwood 1993) to determine that the truck accident rate for the transportation of materials in the U.S. is between 0.64 and 13.92 per 1,000,000 miles traveled on well-designed roads and highways. The applicant estimated that routine operation of the proposed AEC would require six ammonia deliveries per month, each delivering about 7,000 gallons (AEC 2015g, Section 5.5.3.2). Each delivery would travel approximately 0.97 mile from I-405 to the facility.

This would result in a maximum of 5.85 miles of tanker truck travel in the project area per month during peak operation (with a full load) and an average of approximately 70 miles of tanker truck travel per year (assuming six deliveries per month). Staff believes that the risk over this distance is insignificant.

In addition, staff used a transportation risk assessment model (Harwood 1993, Brown 2000 & Guidelines for Chemical Transportation Risk Analysis 1995) in order to calculate the probability of an accident resulting in a release of a hazardous material due to delivery from the freeway to the facility via Studebaker Road. Results show a risk of about one in 1,333,333 for one trip from I-405 and a total annual risk of about one in 18,000 for 72 deliveries over a year. This risk was calculated using accident rates on various types of roads (in this case, urban multilane undivided and multilane divided) with distances traveled on each type of road computed separately. Although it is an extremely conservative model in that it includes accident rates per million mile of highway trucking as a mode of transportation and does not distinguish between a high-integrity steel tanker truck and other less secure modes, the results still show that the risk of a transportation accident is insignificant.

Staff therefore believes that the risk of exposure to significant concentrations of aqueous ammonia during transportation to the facility is insignificant because of the remote possibility that an accidental release of a sufficient quantity would be very unlikely. The transportation of similar volumes of hazardous materials on the nation’s highways is neither unique nor infrequent. Staff’s analysis of the transportation of aqueous ammonia to the proposed facility (along with data from the U.S. DOT and studies) demonstrates that the risk of accident and exposure is less than significant.

In order to further ensure that the risk of an accident involving the transport of aqueous ammonia to the power plant is insignificant, staff-proposes Condition of Certification **HAZ-6**, which would require the use of only the specified and California Highway Patrol-approved route to the site from I-405 to SR 22 (7th Street), west along 7th Street, and then south on Studebaker Road to the AEC entrance.

Based on the environmental mobility, toxicity, the quantities at the site, and frequency of delivery, it is staff's opinion that aqueous ammonia poses the predominate risk associated with both use and hazardous materials transportation. Staff concludes that the risk associated with the transportation of other hazardous materials to the proposed project does not significantly increase the risk over that of aqueous ammonia transportation.

Seismic Issues

It is possible that an earthquake could cause the failure of a hazardous materials storage tank. An earthquake could also cause failure of the secondary containment system (berms and dikes), as well as the failure of electrically controlled valves and pumps. The failure of all of these preventive control measures might then result in a vapor cloud of hazardous materials that could move off site and affect residents and workers in the surrounding community. The effects of the Loma Prieta earthquake of 1989, the Northridge earthquake of 1994, and the earthquake in Kobe, Japan, in January 1995, have all heightened concerns about earthquake safety.

Information obtained after the January 1994 Northridge earthquake showed that some damage was caused both to several large storage tanks and to smaller tanks associated with the water treatment system of a cogeneration facility. The tanks with the greatest damage, including seam leakage, were older tanks, while the newer tanks sustained displacements and failures of attached lines. Staff reviewed the impacts of the February 2001 Nisqually earthquake near Olympia, Washington, a state with similar seismic design codes as California. No hazardous materials storage tanks failed as a result of that earthquake. Staff has also reviewed the impacts of the recent earthquakes in Haiti (January 12, 2010; magnitude 7.0) and Chile (February 27, 2010; magnitude 8.8). The building standards in Haiti are not as stringent while those in Chile are similar to California building seismic codes. Reports show a lack of impact on hazardous materials storage and pipelines infrastructure in both countries. For Haiti, this most likely reflects a lack of industrial storage tanks and gas pipelines; for Chile, this most likely reflects the use of strong safety codes. Staff also conducted an analysis of the codes and standards which should be followed when designing and building storage tanks and containment areas to withstand a large earthquake. Staff notes that the proposed facility would be designed and constructed to the standards (including seismic) of the most recent (2013 or later) California Building Code (AEC2015g, Section 5.4.5 & Appendix 2C).

Therefore, on the basis of what occurred in Northridge (with older tanks) and the lack of failures during the Nisqually earthquake (with newer tanks) and in the 2010 Chilean earthquake (with rigorous seismic building codes), and given that the construction of

AEC would comply with stringent California Building Codes, staff determines that tank failures during seismic events are not probable and do not represent a significant risk to the public.

Site Security

The applicant proposes to use hazardous materials identified by the U.S. EPA as requiring the development and implementation of special site security measures to prevent unauthorized access. The U.S. EPA published a Chemical Accident Prevention Alert regarding site security (EPA 2000a) and the U.S. Department of Justice published a special report entitled *Chemical Facility Vulnerability Assessment Methodology* (US DOJ 2002). The North American Electric Reliability Corporation (NERC) published an updated *Security Guideline for the Electricity Sector: Physical Security* (2011) and the U.S. Department of Energy (U.S.DOE) published the draft *Vulnerability Assessment Methodology for Electric Power Infrastructure* in 2002 (DOE 2002).

The energy generation sector is one of 14 areas of critical infrastructure listed by the U.S. Department of Homeland Security. On April 9, 2007, the U.S Department of Homeland Security published in the Federal Register (6 CFR Part 27) an interim final rule requiring that facilities that use or store certain hazardous materials conduct vulnerability assessments and implement certain specified security measures. This rule was implemented with the publication of Appendix A, the list of chemicals, on November 2, 2007. While the rule applies to aqueous ammonia solutions of 20 percent or greater and this proposed facility plans to utilize a 19 percent aqueous ammonia solution, staff still believes that all power plants under the jurisdiction of the Energy Commission should implement a minimum level of security consistent with the guidelines listed here.

The applicant has stated that a security plan would be prepared for the proposed facility and would include a description of perimeter security measures and procedures for evacuating, notifying authorities of a security breach, monitoring fire alarms, conducting site personnel background checks, site access, and a security plan and background checks for hazardous materials drivers. Perimeter security measures utilized for this facility may include security guards, security alarms, breach detectors, motion detectors, and video or camera systems (AEC 2015g, Section 5.5.5.2).

In order to ensure that neither this project nor a shipment of hazardous material is the target of unauthorized access, staff's proposed Conditions of Certification **HAZ-7** and **HAZ-8** address both construction security and operation security plans. These plans would require implementation of site security measures consistent with the above-referenced documents.

The goal of these conditions of certification is to provide for the minimum level of security for power plants necessary for the protection of California's electrical infrastructure from malicious mischief, vandalism, or domestic/foreign terrorist attacks. The level of security needed for the AEC is dependent upon the threat imposed, the likelihood of an adversarial attack, the likelihood of success in causing a catastrophic event, and the severity of the consequences of that event. The results of the off-site consequence analysis prepared as part of the RMP would be used, in part, to determine the severity of consequences of a catastrophic event.

In order to determine the level of security, the Energy Commission staff used an internal vulnerability assessment decision matrix modeled after the U.S. Department of Justice Chemical Vulnerability Assessment Methodology (July 2002), the North American Electric Reliability Corporation's (NERC) 2011 guidelines, the U.S. DOE VAM-CF model, and the U.S. Department of Homeland Security regulations published in the Federal Register (Interim Final Rule 6 CFR Part 27). Staff determined that this project would fall into the category of medium vulnerability due to the urban setting and close proximity to sensitive receptors. Staff therefore proposes that certain security measures be implemented but does not propose that the project owner conduct its own vulnerability assessment.

These security measures include perimeter fencing and breach detectors, alarms, site access procedures for employees and vendors, personnel background checks, and law enforcement contacts in the event of a security breach. The perimeter fencing should include slats or other methods to reduce and restrict the visibility of the site from off-site locations. Site access for vendors shall be strictly controlled. The project owner would be required, through the use of contractual language with vendors, to ensure that vendors supplying hazardous materials strictly adhere to the U.S. DOT requirements for hazardous materials vendors to prepare and implement security plans (as per 49 CFR 172.800) and to ensure that all hazardous materials drivers are in compliance through personnel background security checks (as per 49 CFR Part 1572, Subparts A and B). The compliance project manager (CPM) may authorize modifications to these measures or may require additional measures in response to additional guidance provided by the U.S. Department of Homeland Security, the U.S. DOE, or the NERC, after consultation with both appropriate law enforcement agencies and the applicant.

CUMULATIVE IMPACTS AND MITIGATION

Staff analyzed the potential for the existence of cumulative impacts. A significant cumulative hazardous materials impact is defined as the simultaneous uncontrolled release of hazardous materials from multiple locations in a form (gas or liquid) that could cause a significant impact where the release of one hazardous material alone would not cause a significant impact. Existing locations that use or store gaseous or liquid hazardous materials, or locations where such facilities might likely be built, were both considered. Staff believes that while cumulative impacts are theoretically possible, they are not probable because of the many safeguards implemented to both prevent and control an uncontrolled release. The chances of one uncontrolled release occurring are remote. The chance of two or more occurring simultaneously, with resulting airborne plumes comingling to create a significant impact, are even more remote. Staff believes the risk to the public is insignificant.

The applicant would develop and implement a hazardous materials handling program for AEC independent of any other projects considered for potential cumulative impacts. Staff believes that the facility, as proposed by the applicant and with the additional mitigation measures proposed by staff, poses a minimal risk of accidental release that could result in off-site impacts. It is unlikely that an accidental release that has very low probability of occurrence (about one in one-million per year) would independently occur at the AEC site and another facility at the same time. Therefore, staff concludes that the facility would not contribute to a significant hazardous materials-related cumulative impact.

COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Staff concludes that construction and operation of the AEC project would be in compliance with all applicable laws, ordinances, regulations, and standards (LORS) regarding long-term and short-term project impacts in the area of hazardous materials management.

CONCLUSIONS

Staff's evaluation of the proposed project (with proposed mitigation measures) indicates that hazardous material use would not pose a significant risk of impact to the public. Staff's analysis also shows that there would be no significant cumulative impact. With adoption of the proposed conditions of certification, the proposed project would comply with all applicable LORS. In response to California Health and Safety Code, section 25531 et seq., the applicant would be required to develop a Risk Management Plan (RMP). To ensure the adequacy of the RMP, staff's proposed conditions of certification require that the RMP be submitted for concurrent review by the LBEHB and by the CPM. In addition, staff's proposed Condition of Certification **HAZ-2** requires the review and approval of the RMP by the CPM prior to the delivery of any hazardous materials to the facility. Other proposed conditions of certification address the issue of the transportation, storage, and use of aqueous ammonia, in addition to site security matters.

Staff recommends that the Energy Commission impose the proposed conditions of certification, presented herein, to ensure that the project would be designed, constructed, and operated to comply with all applicable LORS and to protect the public from significant risk of exposure to an accidental ammonia release. If all mitigation measures proposed by the applicant and staff are required and implemented, the use, storage, and transportation of hazardous materials would not present a significant risk to the public.

Staff proposes nine conditions of certification mentioned throughout the text (above), and listed below. Condition of Certification **HAZ-1** ensures that no hazardous material would be used at the facility except as listed in **Appendix B** of this staff assessment, unless there is prior approval by the Energy Commission compliance project manager. Condition of Certification **HAZ-2** requires that an RMP be submitted and approved prior to the delivery of aqueous ammonia.

Condition of Certification **HAZ-3** would require the development of a safety management plan for the delivery of all liquid hazardous materials, including aqueous ammonia. Condition of Certification **HAZ-4** requires that the aqueous ammonia storage tank be designed to appropriate standards. The transportation of hazardous materials is addressed in Conditions of Certification **HAZ-5** and **HAZ-6**. Site security during both the construction and operations phases is addressed in Conditions of Certification **HAZ-7** and **HAZ-8.** Condition of Certification **HAZ-9** prohibits the use of natural gas for “gas blows” used for cleaning debris from newly installed piping.

PROPOSED CONDITIONS OF CERTIFICATION

HAZ-1 The project owner shall not use any hazardous materials not listed in Appendix B, below, or in greater quantities or strengths than those identified by chemical name in Appendix B, below, unless approved in advance by the compliance project manager (CPM).

Verification: The project owner shall provide to the CPM, in the Annual Compliance Report, the Hazardous Materials Business Plan’s list of hazardous materials and quantities contained at the facility.

HAZ-2 The project owner shall concurrently provide a Hazardous Materials Business Plan (HMBP), a Spill Prevention Control and Countermeasure Plan (SPCC), and a Risk Management Plan (RMP) to the Long Beach Environmental Health Bureau (LBEHB) and the CPM for review. After receiving comments from the LBEHB and the CPM, the project owner shall reflect all recommendations in the final documents. Copies of the final HMBP, SPCC, and RMP shall then be provided to the LBEHB for information and to the CPM for approval.

Verification: At least 30 days prior to receiving any hazardous material on the site for commissioning or operations, the project owner shall provide a copy of a final HMBP and SPCC to the CPM for approval.

At least 30 days prior to delivery of aqueous ammonia to the site, the project owner shall provide the final RMP to the Certified Unified Program Agency (LBEHB) for information and to the CPM for approval.

HAZ-3 The project owner shall develop and implement a Safety Management Plan for delivery of aqueous ammonia and other liquid hazardous materials by tanker truck. The plan shall include procedures, protective equipment requirements, training, and a checklist. It shall also include a section describing all measures to be implemented to prevent mixing of incompatible hazardous materials including provisions to maintain lockout control by a power plant employee not involved in the delivery or transfer operation. This plan shall be applicable during construction, commissioning, and operation of the power plant. The Safety Management Plan shall be submitted to the CPM for review and approval.

Verification: At least 30 days prior to the delivery of any liquid hazardous material to the facility, the project owner shall provide a Safety Management Plan as described above to the CPM for review and approval.

HAZ-4 The aqueous ammonia storage facilities shall be designed to the ASME code for Unfired Pressure Vessels, Section VIII, Division 1. The storage tanks shall be protected by a secondary containment vault capable of holding precipitation from a 24-hour, 25-year storm event plus 100 percent of the capacity of the largest tank within its boundary. The containment vaults shall incorporate a cover design that allows free flow of any aqueous ammonia release into the containment, yet limits the total vent area to not more than 25 square feet. The final design drawings and specifications for the ammonia storage tanks and secondary containment basins shall be submitted to the CPM for review and approval.

Verification: At least 30 days prior to start of construction of the aqueous ammonia storage and transfer facilities, the project owner shall submit final design drawings and specifications for the 30,000 and 40,000 ammonia storage tanks, ammonia pumps, ammonia detectors, and secondary containment basins to the CPM for review and approval.

HAZ-5 The project owner shall direct all vendors delivering aqueous ammonia to the site to use only tanker truck transport vehicles, which meet or exceed the specifications of MC-307/DOT-407.

Verification: At least 30 days prior to receipt of aqueous ammonia on site, the project owner shall submit copies of the notification letter to supply vendors indicating the transport vehicle specifications to the CPM for review and approval.

HAZ-6 Prior to initial delivery, the project owner shall direct vendors delivering bulk quantities (>800 gallons per delivery) of hazardous material (e.g., aqueous ammonia, lubricating and insulating oils) to the site to use only the route approved by the CPM (from I-405 to SR 22 (7^{th} Street), west along 7^{th} Street, and then south on Studebaker Road to the facility). The project owner shall obtain approval of the CPM if an alternate route is desired.

Verification: At least 60 days prior to initial receipt of bulk quantities (>800 gallons per delivery) of hazardous materials (e.g., aqueous ammonia, lubricating or insulating oils) and at least 10 days prior to a new vendor delivery of bulk quantities (>800 gallons per delivery), the project owner shall submit a copy of the letter containing the route restriction directions that were provided to the hazardous materials vendor to the CPM for review and approval.

HAZ-7 Prior to commencing construction, a site-specific Construction Site Security Plan for the construction phase shall be prepared and made available to the CPM for review and approval. The Construction Security Plan shall include the following:

1. perimeter security consisting of fencing enclosing the construction area;
2. security guards;
3. site access control consisting of a check-in procedure or tag system for construction personnel and visitors;
4. written standard procedures for employees, contractors and vendors when encountering suspicious objects or packages on site or off site;
5. protocol for contacting law enforcement and the CPM in the event of suspicious activity, incident or emergency; and,

6. evacuation procedures.

<u>Verification:</u> At least 30 days prior to commencing construction, the project owner shall notify the CPM that a site-specific Construction Security Plan is available for review and approval.

HAZ-8 The project owner shall also prepare a site-specific security plan for the commissioning and operational phases that would 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 Security Guideline for the Electricity Sector: Physical Security v1.9).

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 (and with slats or other methods to restrict visibility if a fence is selected);
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;
6. 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;
7. 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;
8. site access controls for employees, contractors, vendors, and visitors;
9. 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 172.880, and that they have conducted

employee background investigations in accordance with 49 CFR Part 1572, subparts A and B;

10. 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 that are able to pan, tilt, and zoom, have low-light capability, and are able to view 100 percent of the perimeter fence, the ammonia storage tank, the outside entrance to the control room, and the front gate; and,

11. additional measures to ensure adequate perimeter security consisting of either:

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

    B. power plant personnel on site 24 hours per day, seven days per week, and perimeter breach detectors **or** on-site motion detectors.

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 Corporation, after consultation with both appropriate law enforcement agencies and the project owner.

Verification: At least 30 days prior to receiving any hazardous materials on site for commissioning or operations, 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 signed statements similar to Attachments A and B 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 signed statement similar to Attachment C that the operations security plan includes all current hazardous materials transport vendor certifications for security plans and employee background investigations.

HAZ-9: The project owner shall not allow any fuel gas pipe cleaning activities on site, either before placing the pipe into service or at any time during the lifetime of the facility, that involve “flammable gas blows” where natural (or flammable) gas is used to blow out debris from piping and then vented to atmosphere. Instead, an inherently safer method involving a non-flammable gas (e.g. air, nitrogen, steam) or mechanical pigging shall be used as per the latest edition of NFPA 56, Standard for Fire and Explosion Prevention during Cleaning and Purging of Flammable Gas Piping Systems. A written procedure shall be developed and implemented as per NFPA 56, section 4.4.1. The written procedure shall be provided to the CPM for review and approval.

<u>Verification:</u> At least 30 days before any fuel gas pipe cleaning activities begin, the project owner shall submit a copy of the Fuel Gas Pipe Cleaning Work Plan (as described in the 2014 NFPA 56, section 4.4.1) which shall indicate the method of cleaning to be used, what gas will be used, the source of pressurization, and whether a mechanical PIG will be used, to the CBO for information and to the CPM for review and approval.

HAZ-10: The project owner shall include in their Emergency Action Plan (EAP) a procedure to provide an immediate notification to the Rosie the Riveter school in case of a catastrophic aqueous ammonia spill. The project owner shall also provide to the school a specific best practices response procedure that school personnel should follow after being notified of a catastrophic aqueous ammonia spill. The safety procedures shall be provided to the CPM for review and approval.

<u>Verification:</u> At least 30 days before delivery of aqueous ammonia to the site, the project owner shall provide a copy of the EAP highlighting the notification requirement to the school and a copy of the safety procedures being provided to the school to the CPM for review and approval.

SAMPLE CERTIFICATION (Attachment A)

Affidavit of Compliance for Project Owners

I,

____

(Name of person signing affidavit)(Title)

do hereby certify that background investigations to ascertain the accuracy of the identity and employment history of all employees of

____

(Company name)

for employment at

____

(Project name and location)

have been conducted as required by the California Energy Commission Decision for the above-named project.

____

(Signature of officer or agent)

Dated this ____________________ day of ____________________, 20 _______.

THIS AFFIDAVIT OF COMPLIANCE SHALL BE APPENDED TO THE PROJECT SECURITY PLAN AND SHALL BE RETAINED AT ALL TIMES AT THE PROJECT SITE FOR REVIEW BY THE CALIFORNIA ENERGY COMMISSION COMPLIANCE PROJECT MANAGER.

SAMPLE CERTIFICATION (Attachment B)

Affidavit of Compliance for Contractors

I,

____

(Name of person signing affidavit)(Title)

do hereby certify that background investigations to ascertain the accuracy of the identity and employment history of all employees of

____

(Company name)

for contract work at

____

(Project name and location)

have been conducted as required by the California Energy Commission Decision for the above-named project.

____

(Signature of officer or agent)

Dated this ____________________ day of ____________________, 20 _______.

THIS AFFIDAVIT OF COMPLIANCE SHALL BE APPENDED TO THE PROJECT SECURITY PLAN AND SHALL BE RETAINED AT ALL TIMES AT THE PROJECT SITE FOR REVIEW BY THE CALIFORNIA ENERGY COMMISSION COMPLIANCE PROJECT MANAGER.

SAMPLE CERTIFICATION (Attachment C)

Affidavit of Compliance for Hazardous Materials Transport Vendors

I,

____

(Name of person signing affidavit)(Title)

do hereby certify that the below-named company has prepared and implemented security plans in conformity with 49 CFR 172.880 and has conducted employee background investigations in conformity with 49 CFR 172, subparts A and B,

____

(Company name)

for hazardous materials delivery to

____

(Project name and location)

as required by the California Energy Commission Decision for the above-named project.

____

(Signature of officer or agent)

Dated this ____________________ day of ____________________, 20 _______.

THIS AFFIDAVIT OF COMPLIANCE SHALL BE APPENDED TO THE PROJECT SECURITY PLAN AND SHALL BE RETAINED AT ALL TIMES AT THE PROJECT SITE FOR REVIEW BY THE CALIFORNIA ENERGY COMMISSION COMPLIANCE PROJECT MANAGER.

REFERENCES

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HAZARDOUS MATERIALS
APPENDIX A

Basis for Staff's Use of 75 Parts Per Million Ammonia Exposure Criteria

BASIS FOR STAFF'S USE OF 75 PARTS PER MILLION AMMONIA EXPOSURE CRITERIA

Staff uses a health-based airborne concentration of 75 parts per million (PPM) to evaluate the significance of impacts associated with potential accidental releases of ammonia. While this level is not consistent with the 200-ppm level used by the U.S. Environmental Protection Agency and the California Environmental Protection Agency in evaluating such releases pursuant to the Federal Risk Management Program and State Accidental Release Program, it is appropriate for use in staff's analysis of the proposed project. The Federal Risk Management Program and the State Accidental Release Program are administrative programs designed to address emergency planning and ensure that appropriate safety management practices and actions are implemented in response to accidental releases. However, the regulations implementing these programs do not provide clear authority to require design changes or other major changes to a proposed facility. The preface to the Emergency Response Planning Guidelines states that "these values have been derived as planning and emergency response guidelines, **not** exposure guidelines, they do not contain the safety factors normally incorporated into exposure guidelines. Instead they are estimates, by the committee, of the thresholds above which there would be an unacceptable likelihood of observing the defined effects." It is staff's contention that these values apply to healthy adult individuals and are levels that should not be used to evaluate the acceptability of avoidable exposures for the entire population. While these guidelines are useful in decision making in the event that a release has already occurred (for example, prioritizing evacuations), they are not appropriate for and are not binding on discretionary decisions involving proposed facilities where many options for mitigation are feasible. The California Environmental Quality Act requires permitting agencies making discretionary decisions to identify and mitigate potentially significant impacts through feasible changes or alternatives to the proposed project.

Staff has chosen to use the National Research Council's 30-minute Short Term Public Emergency Limit (STPEL) for ammonia to determine the potential for significant impact. This limit is designed to apply to accidental unanticipated releases and subsequent public exposure. Exposure at this level should not result in serious effects but would result in "strong odor, lacrimation, and irritation of the upper respiratory tract (nose and throat), but no incapacitation or prevention of self-rescue." It is staff's opinion that exposures to concentrations above these levels pose significant risk of adverse health impacts on sensitive members of the general public. It is also staff's position that these exposure limits are the best available criteria to use in gauging the significance of public exposures associated with potential accidental releases. It is, further, staff's opinion that these limits constitute an appropriate balance between public protection and mitigation of unlikely events and are useful in focusing mitigation efforts on those release scenarios that pose real potential for serious impacts on the public. Table 1 provides a comparison of the intended use and limitations associated with each of the various criteria that staff considered in arriving at the decision to use the 75-ppm STPEL.

Hazardous Materials Appendix A Table-1
Acute Ammonia Exposure Guidelines

Guideline	Responsible Authority	Applicable Exposed Group	Allowable Exposure Level	Allowable* Duration of Exposures	Potential Toxicity at Guideline Level/Intended Purpose of Guideline
IDLH[2]	NIOSH	Workplace standard used to identify appropriate respiratory protection.	300 ppm	30 minutes	Exposure above this level requires the use of “highly reliable” respiratory protection and poses the risk of death, serious irreversible Injury, or impairment of the ability to escape.
IDLH/10[1]	EPA, NIOSH	Work place standard adjusted for general population factor of ten for variation in sensitivity	30 ppm	30 minutes	Protects nearly all segments of general population from irreversible effects.
STEL[2]	NIOSH	Adult healthy male workers	35 ppm	15 minutes, 4 times per 8-hour day	No toxicity, including avoidance of irritation.
EEGL[3]	NRC	Adult healthy workers, military personnel	100 ppm	Generally less than 60 minutes	Significant irritation, but no impact on personnel in performance of emergency work; no irreversible health effects in healthy adults. Emergency conditions one-time exposure.
STPEL[4]	NRC	Most members of general population	50 ppm 75 ppm 100 ppm	60 minutes 30 minutes 10 minutes	Significant irritation, but protects nearly all segments of general population from irreversible acute or late effects. One-time accidental exposure.
TWA[2]	NIOSH	Adult healthy male workers	25 ppm	8 hours	No toxicity or irritation on continuous exposure for repeated eight-hour work shifts.
ERPG-2[5]	AIHA	Applicable only to emergency response planning for the general population (evacuation) (not intended as exposure criteria) (see preface attached)	200 ppm	60 minutes	Exposures above this level entail** unacceptable risk of irreversible effects in healthy adult members of the general population (no safety margin).

1) (EPA 1987) 2) (NIOSH 1994) 3) (NRC 1985) 4) (NRC 1972) 5) (AIHA 1989)
* The (NRC 1979), (WHO 1986), and (Henderson and Haggard 1943) all conclude that available data confirm the direct relationship to increases in effect with both increased exposure and increased exposure duration.
** The (NRC 1979) describes a study involving young animals, which suggests greater sensitivity to acute exposure in young animals. The WHO (1986) warned that the young, elderly, asthmatics, those with bronchitis, and those that exercise should also be considered at increased risk based on their demonstrated greater susceptibility to other non-specific irritants.

REFERENCES FOR HAZARDOUS MATERIALS APPENDIX A, TABLE 1

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NIOSH. 1994. National Institute of Occupational Safety and Health, Pocket Guide to Chemical Hazards, U.S. Department of Health and Human Services, Washington D.C., Publication numbers 94-116.

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ABBREVIATIONS - HAZARDOUS MATERIALS APPENDIX A, TABLE 1

ACGIH	American Conference of Governmental and Industrial Hygienists
AIHA	American Industrial Hygienists Association
EEGL	Emergency Exposure Guidance Level
EPA	Environmental Protection Agency
ERPG	Emergency Response Planning Guidelines
IDLH	Immediately Dangerous to Life and Health Level
NIOSH	National Institute of Occupational Safety and Health
NRC	National Research Council
STEL	Short Term Exposure Limit
STPEL	Short Term Public Emergency Limit
TLV	Threshold Limit Value
WHO	World Health Organization

HAZARDOUS MATERIALS
APPENDIX B

Hazardous Materials Proposed for Use at the AEC
Hazardous Materials Appendix B

Table 5.5-3 (from AFC)
Chemical Inventory, Description of Hazardous Materials Stored Onsite, and Reportable Quantities

TABLE 5.5-3

Chemical Inventory, Description of Hazardous Materials Stored Onsite, and Reportable Quantities

Trade Name	Chemical Name	CAS Number	Maximum Quantity Onsite	CERCLA SARA RQ[a]	RQ of Material as Used Onsite[b]	EHS TPQ[c]	Regulated Substance TQ[d]	Prop 65
Aqueous ammonia ($19\%\ NH_3$ by weight)	Aqueous ammonia	7664-41-7	70,000 gallons[g]	100 pounds	526 pounds	500 pounds	500 pounds	No
Anti-scalant (e.g., NALCO PermaTreat® PC-191T)	Antiscalant	Various	400 gallons	[e]	[e]	[e]	[e]	No
Battery electrolyte	Sulfuric acid	7664-93-9	400 gallons	1,000 pounds	2,632 pounds	1,000 pounds	1,000 pounds	Yes
Citric acid	Citric acid	77-92-9	625 pounds	[e]	[e]	[e]	[e]	No
Cleaning chemicals/detergents	Various	None	25 gallons	[e]	[e]	[e]	[e]	No
Cleaning chemicals/detergents for membrane-based water treatment systems (e.g., NALCO PermaClean® PC-77, NALCO PermaClean® PC-40, and NALCO PermaClean® PC-98)	Various	None	55 gallons	[e]	[e]	[e]	[e]	No
Sanitizing chemicals for membrane-based (MF/RO/EDI) water treatment systems (e.g., NALCO PermaClean® PC-11)	Dibromoacetonitrile 2,2-dibromo-3-nitrilopropionamide Polyethylene glycol	3252-43-5 10222-01-2 25322-68-3	400 gallons	[e]	[e]	[e]	[e]	No No No
Diesel No. 2	Diesel No. 2	68476-34-6	200 gallons	[e]	[e]	[e]	[e]	No
Hydraulic fluid	Phosphate ester	None	50 gallons	42 gallons[f]	42 gallons[f]	[e]	[e]	No
Laboratory reagents	Various	Various	10 gallons	[e]	[e]	[e]	[e]	No
Lubrication oil	Oil	None	12,000 gallons	42 gallons[f]	42 gallons[f]			No
Mineral insulating oil	Oil	8012-95-1	35,000 gallons	42 gallons[f]	42 gallons[f]			No
Waste oil	Oil	None	250 gallons	[e]	[e]	[e]	[e]	No

TABLE 5.5-3

Chemical Inventory, Description of Hazardous Materials Stored Onsite, and Reportable Quantities

Trade Name	Chemical Name	CAS Number	Maximum Quantity Onsite	CERCLA SARA RQ[a]	RQ of Material as Used Onsite[b]	EHS TPQ[c]	Regulated Substance TQ[d]	Prop 65
Amine solution	Amine	2008-39-1	400 gallons	[e]	[e]	[e]	[e]	No
Sodium bisulfite ($NaHSO_3$)	Sodium bisulfite	7631-90-5	500 gallons	5,000 pounds	5,000 pounds	[e]	[e]	No
Sulfuric acid (93%)	Sulfuric acid	7664-93-9	600 gallons	1,000 pounds	1,075 pounds	1,000 pounds	1,000 pounds	Yes
Sodium hydroxide (NaOH) (20 to 50%)	Sodium hydroxide	1310-73-2	400 gallons	1,000 pounds	2,000 pounds	[e]	[e]	No
Sodium hypochlorite (12.5%)	Sodium hypochlorite	7681-52-9	200 gallons	100 pounds	800 pounds	[e]	[e]	No
Hydrochloric acid	Hydrochloric acid	7647-01-0	25 gallons	5,000 pounds	5,000 pounds	[e]	15,000 pounds	No
Sodium nitrite	Sodium nitrite	7632-00-0	300 pounds	100 pounds	100 pounds	[e]	[e]	No
Proprietary corrosion/scale inhibitor (e.g., NALCO TRAC107)	Inorganic salt Sodium hydroxide	Proprietary 1310-73-2	55 gallons	[e] [e]	[e] [e]	[e] [e]	[e] [e]	No No
Proprietary nonoxidizing biocide (e.g., NALCO 7330)	5-chloro-2-methyl-4-isothiazolin-3-one (1.1%) 2-methyl-4-isothiazolin-3-one (0.3%)	26172-55-4 2682-20-4	400 gallons	[e]	[e]	[e]	[e]	No No
Propylene glycol	Propylene glycol	57-55-6	3,000 gallons	[e]	[e]	[e]	[e]	Yes
Trisodium phosphate (Na_3PO_4) or phosphate/sodium hydroxide blend (e.g., NALCO BT-3400 or NALCO BT-4000)	Trisodium phosphate	7601-54-9	400 gallons	[e]	[e]	[e]	[e]	No
Sulfur hexafluoride	Sulfur hexafluoride	2551-62-4	320 pounds	[e]	[e]	[e]	[e]	No
Acetylene	Acetylene	47-86-2	500 cubic feet	[e]	[e]	[e]	[e]	No
Oxygen	Oxygen	7782-44-7	500 cubic feet	[e]	[e]	[e]	[e]	No
Propane	Propane	74-98-6	200 cubic feet	[e]	[e]	[e]	[e]	No
EPA Protocol gases	Various	Various	2,000 cubic feet	[e]	[e]	[e]	[e]	No

TABLE 5.5-3

Chemical Inventory, Description of Hazardous Materials Stored Onsite, and Reportable Quantities

Trade Name	Chemical Name	CAS Number	Maximum Quantity Onsite	CERCLA SARA RQ[a]	RQ of Material as Used Onsite[b]	EHS TPQ[c]	Regulated Substance TQ[d]	Prop 65
Cleaning chemicals	Various	Various	Varies (less than 25 gallons of liquids or 100 pounds solids for each chemical)	[e]	[e]	[e]	[e]	No
Paint	Various	Various	Varies (less than 25 gallons of liquids or 100 pounds solids for each type)	[e]	[e]	[e]	[e]	No

[a] RQ for a pure chemical, per the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Superfund Amendments and Reauthorization Act (SARA) (Ref. 40 Code of Federal Regulations [CFR] Section 302, Table 302.4). Release equal to or greater than RQ must be reported. Under California law, any amount that has a realistic potential to adversely affect the environment or human health or safety must be reported.

[b] RQ for materials as used onsite. Since some of the hazardous materials are mixtures that contain only a percentage of an RQ, the RQ of the mixture can be different than for a pure chemical. For example, if a material only contains 10 percent of a reportable chemical and the RQ is 100 pounds, the RQ for that material will be (100 pounds)/(10%) = 1,000 pounds.

[c] Extremely Hazardous Substance (EHS) TPQ (Ref. 40 CFR Part 355, Appendix A). If quantities of extremely hazardous materials equal to or greater than the TPQ are handled or stored, they must be registered with the local Administering Agency.

[d] TQ is from Title 19 of the California Code of Regulations (CCR) Section 2770.5 (state) or Title 40 of the CFR, Section 68.130 (federal).

[e] No reporting requirement. Chemical has no listed threshold under this requirement.

[f] State RQ for oil spills that will reach California state waters [Ref. CA Water Code Section 13272(f)].

[g] The CCGT has a 40,000-gallon ammonia tank and the SCGT has a 30,000-gallon ammonia tank.

LAND USE

Negar Vahidi and Tatiana Inouye

SUMMARY OF CONCLUSIONS

The proposed Alamitos Energy Center (AEC or project) would be consistent with the applicable laws, ordinances, regulations, and standards (LORS) pertaining to land use planning, and would not cause a significant impact under the California Environmental Quality Act (CEQA) guidelines.

With the implementation of Condition of Certification **LAND-1,** the project owner would be required to provide evidence that the project meets the design standards of the General Industrial Zone District (IG) of the Long Beach Zoning Code.

The proposed project would not result in any impacts in **Noise and Vibration, Traffic and Transportation, Public Health, Air Quality, Hazardous Materials Management, and Soil and Water** and therefore would not create any land use incompatibilities in these areas. Furthermore, with the implementation of Condition of Certification **VIS-3** the proposed project would be compatible with surrounding land uses.

California Energy Commission staff has not identified any significant adverse direct or cumulative land use impacts resulting from the proposed project, including impacts to the environmental justice population identified in **Socioeconomics Figure 1**. Therefore, there are no land use environmental justice issues related to this project and no minority or low-income populations would be significantly or adversely impacted.

INTRODUCTION

This land use analysis addresses project compatibility with existing or reasonably foreseeable[1] land uses; consistency with applicable city of Long Beach and state LORS; and potential project-related direct, indirect, and cumulative environmental effects.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

Land Use Table 1 lists the state and local land use LORS applicable to the proposed project. The project site does not involve federally-managed lands; therefore, there are no identified applicable federal land use related LORS. The proposed project's consistency with adopted LORS is analyzed under the section "Assessment of Impacts and Discussion of Mitigation" and in **Land Use Table 2**. **Land Use Table 3** describes the proposed project's consistency with the city's proposed or draft LORS.

[1]Whether a project is reasonably foreseeable (i.e., a probable future project) for purposes of cumulative impact analysis depends on the nature of the resource in question, the location of the project, and the type of project (Title14, California Code of Regulations, section 15130(b)(2)).

Land Use Table 1
Applicable Laws, Ordinances, Regulations, and Standards (LORS)

Applicable LORS	**Description**
State	
Warren-Alquist Act Public Resources Code, section 25529	Pursuant to Public Resources Code section 25529, the Energy Commission shall require public access to coastal resources as a condition of certification of a facility proposed in the coastal zone.
California Coastal Act of 1976, Public Resources Code, Chapter 3, section 30200 et seq.	The California Coastal Act establishes a comprehensive scheme to govern land use planning along the entire California coast. The act requires that new development not interfere with the public's right of access to the shoreline. It also encourages the use of existing coastal-dependent industrial sites within the coastal zone instead of using undeveloped areas of the coastal zone.
Local	
City of Long Beach General Plan Land Use Element July 1, 1989 Revised April 1997	The Long Beach General Plan Land Use Element includes goals and policies related to planning and development, and identifies specific land use districts that are defined by the land use types considered appropriate for that district. The city is currently updating its general plan and released a Draft Land Use Element in October 2015. The Draft Land Use Element has redefined its districts into PlaceTypes, which are designed to provide greater flexibility in development types and mixed uses. The draft element also identifies 9 areas of change intended to strengthen economic development and allow focused development opportunities, while supporting new mobility and sustainability objectives.
Southeast Area Development and Improvement Plan (SEADIP) Amended January 3, 2006	The SEADIP is intended to implement the policies within the city of Long Beach General Plan and Local Coastal Program by setting forth specific regulations regarding land use, development review processes, and design standards suitable for its planned development district (i.e., PD-1). In 2015, the city prepared an Initial Study for a proposed update to the SEADIP; a Draft Specific Plan and Environmental Impact Report is expected to be released for public review in mid-2016.
City of Long Beach Local Coastal Program Adopted February 12, 1980 Certified July 22, 1980 Amended January 1994	The Local Coastal Program (LCP) identifies land uses and standards by which development will be evaluated within the coastal zone. The SEADIP is incorporated by reference into the LCP and defines the uses and standards specific to this coastal zone subarea.

Applicable LORS	Description
Long Beach Municipal Code Supplement 12 Update 3; Codified through Ordinance No. ORD-16-0001 Enacted January 19, 2016	The Municipal Code designates the land use districts that divide the city into planning areas. The AEC would be subject to the zoning regulations for a planned development district that is designated General Industrial (IG). The IG district is intended to promote an *industrial sanctuary* where land is preserved for industry and manufacturing, and where existing industries are protected from non-industrial users that may object to the operating characteristics of industry. The IG district includes electric, gas, and sanitary services as conditionally permitted uses. Municipal Code sections 21.33.060 through 21.33.230 address coverage, structure heights, development standards, and parking requirements. Municipal Code sections 21.37.050 through 21.37.060 establish the development standard requirements for planned development (PD) districts. The AEC would be located within PD-1.

SETTING

PROJECT SITE

The proposed AEC would be located within the existing Alamitos Generating Station (AGS) property in the city of Long Beach, Los Angeles County, California. The proposed project site is bounded on the north by State Route 22, on the east by the San Gabriel River, on the south by 2nd Street, and on the west by N. Studebaker Road.

PROPOSED PROJECT

The AEC is a proposed natural gas-fired, fast starting, air-cooled, combined-cycle and simple-cycle generating facility with a gross generating capacity of 1,040 megawatts (MW). Administration and maintenance buildings would be constructed within the existing site footprint. The project would include the use of 21 acres within a larger 71.1-acre parcel.

The AEC is proposed to use potable water provided by the city of Long Beach Water Department (LBWD) for construction, operational process, and sanitary uses. The AEC would include a new 1,000-linear-foot process/sanitary wastewater pipeline to the first point of interconnection with the existing LBWD sewer system.

The Assessor's Parcel Numbers (APN) for the AEC site are 7237-017-805, 7237-017-806, 7237-017-807, 7237-017-808, 7237-017-809, 7237-018-807, 7237-018-808, 7237-018-808,7237-019-808, and 7237-019-005.

The proposed AEC would be accessed from Studebaker Road along the west side of the project site, which is currently the main entrance to the existing AGS. Studebaker

Road is a four-lane arterial that connects East 2nd Street to the south with the 405 Freeway to the north.

Construction Laydown and Parking Areas

Construction of the proposed AEC would use onsite construction parking areas and onsite and offsite laydown areas. According to the Application for Certification (AFC), approximately 8 acres of the laydown and construction area would be located within the existing AGS property and 10 acres of construction laydown would be located offsite at a vacant parcel that is south of and adjacent to the AGS property and the Plains West Coast Terminals petroleum storage facility (AES 2015, Figure 2.1-1). The construction laydown areas would be used for storage of materials, equipment, and vehicles.

Linear Facilities

The existing AGS has various ancillary facilities that would support the AEC, such as the Southern California Edison (SCE) 230-kilovolt (kV) switchyard adjacent to the northern side of the property. Natural gas would be supplied to the AEC via the existing offsite 30-inch-diameter, high-pressure pipeline owned and operated by SoCalGas, which currently serves the AGS. Any construction of natural gas compressors, water treatment facilities, emergency services, and administration and maintenance buildings would be constructed within the existing site footprint. The AEC would include a new 1,000-foot process/sanitary wastewater pipeline from the western edge of the facility connected to the bridge on Loynes Drive. The pipeline would cross Los Cerritos Channel to the first point of interconnection with the existing LBWD sewer system along Loynes Drive. The pipeline would eliminate the current practice of treatment and discharge of process/sanitary wastewater into the San Gabriel River.

SURROUNDING AREA

Much of the city has been developed, with many of the remaining undeveloped parcels planned for development based on specific plans and development agreements, or preserved for open space.

Existing land uses immediately adjacent to and nearby the proposed AEC site within the city of Long Beach include:

- North: The area immediately adjacent to the project site includes the SCE 230-kV switchyard and paved open area. There is an existing mini-storage facility adjacent to SR-22 between Studebaker Road and the San Gabriel River. Further north of SR-22, land uses transition to residential neighborhoods.
- South: There is an oil tank farm directly adjacent to the site extending to 2nd Street. Beyond 2nd Street there is an open area with sporadic oil derricks that end at the San Gabriel River.
- East: The entire eastern portion of the project site is bordered by the San Gabriel River. Across the river to the northeast is a tank farm and to the southeast is the Haynes Power Generating Station owned by the Los Angeles Department of Water and Power (LADWP). Further east from the project site is an active adult community known as Leisure World located within Orange County.
- West: The western edge of the project site is bordered by Studebaker Road. Beyond

the road, the northwest portion of the project area is bordered by the Los Cerritos Channel with a residential neighborhood further west. The project area is bordered by estuary land along the southwestern portion of the facility beyond the road, eventually ending at the El Cerritos Channel.

The following land uses are within one mile of the project site:

- El Cerrito Estuary
- Rosie the Riveter Charter High School
- Channel View Park
- College Park
- Edison Park
- Bixby Village Golf Course
- Bikrim's Yoga College of India
- Redeemer Lutheran Church
- Faith Christian Assembly
- Assembly of God
- Cornerstone Church
- Charles F. Kettering Elementary
- Jack Nichol Park

The project site and surrounding area do not contain land identified as Important Farmlands (CDOC 2016, 2015).

GENERAL PLAN LAND USE AND ZONING DESIGNATIONS

AFC Figure 5.6-2 (General Plan Land Use Designations) and AFC Figure 5.6-3 (Zoning in Project Vicinity) illustrate the current land use and zoning designations of the proposed project site as well as lands within the one-mile buffer of the proposed site (AES 2015). The land use and zoning designations of the areas surrounding the proposed project are presented to illustrate the city of Long Beach's existing and currently planned pattern of land use development in the project area.

PROJECT SITE

City of Long Beach General Plan

The Long Beach General Plan Land Use Element specifies 32 land use districts intended to provide guidance for the types of land uses considered appropriate to the city. The AEC site, laydown areas, and wastewater pipeline are located within a Mixed Use district (LUD NO. 7) that is used for "…blending of different types of land uses that serve to save time and energy in transportation and communications…" (LB 1997). The proposed project site is also located within a planned development (PD) district for which specific development standards apply. The PD district that contains the proposed project site is known as the Southeast Area Development Improvement Plan (SEADIP) or PD-1. The SEADIP neighborhood district is comprised of 1,470 acres.

The city is in the process of updating its general plan, referred to as the Long Beach development within SEADIP is guided by the adopted specific plan.

Additional development guidelines apply to portions of the proposed project that are located within the coastal zone. This includes a portion of the proposed AEC site and the proposed wastewater pipeline alignment, as well as the 10-acre southern laydown area. As discussed under the subsection "Direct/Indirect Impacts and Mitigation," the SEADIP Specific Plan was adopted by reference as an integral part of the city's LCP. Consequently, specific development and use standards that apply to the portions of the proposed project site within the coastal zone are provided within the SEADIP Specific Plan.

City of Long Beach Zoning Ordinance

The Long Beach Zoning Ordinance (Long Beach Municipal Code, tit. 21), in conformance with the General Plan, regulates land use development within the city of Long Beach. Within each zoning district, the zoning regulations specify the permitted and prohibited uses as well as the development standards including setbacks, height, parking, and design standards, among others. As the proposed AEC project is located within a PD district (i.e., SEADIP or PD-1), the approved development plans for that district serve as the applicable zoning regulations. If a PD zone does not contain any standards for a particular aspect of development, then the development standards for that aspect of a zoning district closest to the overall intent of the particular planned development district shall apply (Long Beach Municipal Code, ch. 21.37).

For each of the project components, zoning within the SEADIP (i.e., PD-1) would be as follows (LB 2012):

- PD-1, Subarea 19 (AEC site, offsite laydown area): Land uses are designated industrial. The specific design and development standards require that any project conform to the design and development standards of the city's General Industrial (IG) zone.
- PD-1, Subarea 9 (wastewater pipeline): Land uses are designated residential, and the area is considered fully developed in accordance with a special permit (No. S-158-62) and two subdivision tracts (No. 24883 and 22087).
- PD-1, Subarea 22(b) (wastewater pipeline): Land uses are designated residential with accommodations for a golf course.
- PD-1, Subarea 24 South (wastewater pipeline): Land uses are to be developed as an overlook area and interpretive center for the bordering marsh.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Staff has reviewed the AFC and applicable LORS documents to determine consistency of the proposed AEC with applicable land use LORS, and the proposed project's potential to have any significant adverse land use impacts.

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

Significance criteria used in this document are based on Appendix G of the CEQA Guidelines and performance standards or thresholds identified by staff, as well as applicable LORS utilized by other governmental regulatory agencies.

An impact may be considered significant if the proposed project results in:

- Conversion of Farmland or Forest Land.
    - Conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide or Local Importance (Farmland) as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program (FMMP) of the California Resources Agency, to non-agricultural use.[2]
    - Conflict with existing zoning for agricultural use, or a Williamson Act contract.
    - Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Pub. Resources Code, § 12220 (g)), timberland (as defined by Pub. Resources Code, § 4526), or timberland zoned Timberland Production (as defined by Gov. Code, § 51104(g)).
    - Loss of forest land or conversion of forest land to non-forest use.
    - Changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use[3] or conversion of forest land to non-forest use.
- Physical disruption or division of an established community.
- Conflict with any applicable habitat conservation plan, natural community conservation plan, or biological opinion.
- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction, or that would normally have jurisdiction, over the project adopted for the purpose of avoiding or mitigating environmental effects. This includes, but is not limited to, a general plan, redevelopment plan, or zoning ordinance.
- Incremental impacts that, although individually limited, are cumulatively considerable[4] when viewed in connection with other project-related effects or the effects of past projects, other current projects, and probable future projects.

In general, a power plant and its related facilities may also be incompatible with existing or planned land uses, resulting in potentially significant impacts, if: they create unmitigated noise, dust, or a public health or safety hazard or nuisance; result in adverse traffic or visual impacts; or preclude, interfere with, or unduly restrict existing or

[2] FMMP defines *land committed to non-agricultural use* as land that is permanently committed by local elected officials to non-agricultural development by virtue of decisions which cannot be reversed simply by a majority vote of a city council or county board of supervisors.
[3] A non-agricultural use in this context refers to land where agriculture (the production of food and fiber) does not constitute a substantial commercial use.
[4] Cumulative impacts refer to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts. The individual effects may be changes resulting from a single project or a number of separate projects and can result from individually minor, but collectively significant actions taking place over a period of time (CEQA Guidelines §15355).

future uses. Please see other sections of this document, as noted, for a detailed discussion of any additional potential project impacts and recommended mitigation and conditions of certification.

DIRECT/INDIRECT IMPACTS AND MITIGATION

This section discusses the potential project impacts and associated methods and thresholds of significance referenced above.

AGRICULTURE AND FOREST

Would the project convert Farmland to non-agricultural use?

The proposed AEC site does not contain, and would therefore not convert, any farmland with FMMP designations of Prime Farmland, Farmland of Statewide Importance, Unique Farmland, or Farmland of Local Importance to non-agricultural use (CDOC 2015). The proposed AEC would have no impact with respect to farmland conversion.

Would the project conflict with existing zoning for agricultural use or a Williamson Act contract?

The California Land Conservation Act, commonly referred to as the Williamson Act, enables local governments to enter into contracts with private landowners for the purpose of restricting specific parcels of land to agricultural or related open space uses. (Gov. Code, §§ 51200—51207) There are no existing agricultural uses present on the proposed project site (CDOC 2016). The proposed AEC is not located on land that is under a Williamson Act contract and as a result would not conflict with any Williamson Act contracts.

Would the project conflict with existing zoning for, or cause rezoning of, forest land (as defined in Pub. Resources Code, § 12220(g)), timberland (as defined by Pub. Resources Code, § 4526), or timberland zoned Timberland Production (as defined by Gov. Code, § 51104(g))?

The proposed project site is not zoned for forest land, timberland, or for timberland production. In addition, there is no land zoned for such purposes within one mile of the project site. Therefore, there would be no conflict with, or cause for, rezoning of forest land or timberland and as a result there would be no impact to forest land or timberland.

PHYSICAL DISRUPTION OR DIVISION OF AN ESTABLISHED COMMUNITY

The proposed AEC would be located within the boundaries of an existing power plant that has been in its current location since the late 1950s. The proposed AEC site is located on lands zoned PD-1 and designated as General Industrial (IG). Electrical generating facilities are a conditionally permitted use within IG districts (Long Beach Municipal Code, ch. 21.33, Table 33-2). The AEC would be located entirely on private property, on existing parcels that contain similar industrial uses and facilities related to the activities at the existing AGS. The proposed AEC would reduce the overall height of existing structures. Access to the proposed project would be through existing rights-of-way on Studebaker Road, and no existing roadways or pathways would be blocked or removed from service due to the proposed project. No residential communities are located immediately adjacent to the proposed AEC. The nearest residences are approximately 0.2 mile west of the project, and Los Cerritos Channel serves as a natural barrier separating these residences from the proposed site.

Rosie the Riveter Charter High School is located within the northwest corner of the existing AGS property at 690 North Studebaker Road. Access to the school is from Studebaker Road, and construction of the proposed AEC would not prevent continued access or use of the school site. According to staff communications with the school's executive director of youth programs, the proposed project would not affect operations at the school (CEC 2016).

Construction and operation of the proposed AEC would not require relocation of community land uses (e.g., residences or schools). Therefore, the AEC would not physically divide or disrupt any community within the city of Long Beach.

CONFLICT WITH ANY APPLICABLE HABITAT OR NATURAL COMMUNITY CONSERVATION PLAN

The AEC is not located within any Habitat Conservation Plan or Natural Community Conservation Plan (CDFW 2015; LB 1973). There would be no conflicts with a conservation plan as a result of the proposed project.

CONFLICT WITH ANY APPLICABLE LAND USE PLAN, POLICY OR REGULATION

As required by Title 20, California Code of Regulations, section 1744, Energy Commission staff evaluates a project's consistency with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project, or that would normally have jurisdiction over the project except for the Energy Commission's exclusive authority. The discussion of the proposed project's consistency with adopted LORS is presented below in **Land Use Table 2**, and project consistency with the city's proposed draft plans and policies is discussed in **Land Use Table 3**.

California Coastal Act

The Coastal Act establishes a comprehensive approach to govern land use planning along the entire California coast. The Coastal Act also sets forth general policies (Pub. Resources Code, § 30200 et seq.) that govern the Coastal Commission's review of permit applications and local plans. In the case of energy facilities, section 30600 of the Coastal Act states: (a) Except as provided in subdivision (e), and in addition to obtaining any other permit required by law from any local government or from any state, regional, or local agency, any person, as defined in section 21066, wishing to perform or undertake any development in the coastal zone, other than a facility subject to section 25500, shall obtain a coastal development permit. Section 25500 specifically identifies the Energy Commission's exclusive power to certify sites for power generation facilities 50 MW or greater and related facilities anywhere in the state.

The southern-half of the existing AGS property is within the coastal zone. The city of Long Beach adopted its LCP on February 12, 1980. The Coastal Commission certified the LCP on July 22, 1980. As such, coastal development permit authority has been delegated to the city of Long Beach, while the Coastal Commission retains original permit jurisdiction over certain specified lands (e.g., tidelands, public trust lands). A discussion of the city of Long Beach LCP and applicable LORS is included under the subsection “City of Long Beach Local Coastal Program.”

Warren-Alquist Act

The Warren-Alquist Act (Pub. Resources Code, § 25500 et seq.) discusses the Energy Commission’s statutory requirement for a public use area for facilities proposed in the coastal zone. Pursuant to section 25529 of the Warren-Alquist Act, the Energy Commission shall require the establishment of an area for public use as a condition of certification of a facility proposed in the coastal zone as follows:

"When a facility is proposed to be located in the Coastal Zone or any other area with recreational, scenic, or historic value, the [Energy] Commission shall require, as a condition of certification of any facility contained in the application, that an area be established for public use, as determined by the Commission. Lands within such area shall be acquired and maintained by the applicant and shall be available for public access and use, subject to restrictions required for security and public safety. The applicant may dedicate such public use zone to any local agency agreeing to operate or maintain it for the benefit of the public. If no local agency agrees to operate or maintain the public use zone for the benefit of the public, the applicant may dedicate such zone to the state. The [Energy] Commission shall also require that any facility to be located along the coast or shoreline of any major body of water be set back from the shoreline to permit reasonable public use and to protect scenic and aesthetic values."

The 21-acre proposed AEC would be located entirely within the 71.1-acre existing AGS property. Roughly the southern half of the existing AGS site is located within the coastal zone and the northern half of the site is located outside of the coastal zone. A portion of the proposed AEC Power Block 1 and the construction access road would be constructed within the coastal zone. Offsite of the AGS property, the proposed project would utilize a temporary 10-acre laydown area south of existing generating Units 5 and 6, as well as require construction of a wastewater pipeline. The laydown area is currently vacant and designated for industrial use, and would only be required temporarily to support construction activities at the AEC site. A portion of the proposed wastewater pipeline would be located within the coastal zone, as it travels south to the intersection with Loynes Drive, turns west and crosses Los Cerritos Channel (AES 2015, Figure 5.6-1). The project site is located approximately 2-miles inland from the seashore where there is ample existing public access to approximately one-mile of beach to the south in Seal Beach, approximately four-miles of beach to the southwest in Long Beach, and additional beach areas on the protected waters of the Alamitos Bay.

The AEC project site would be located entirely within an existing industrial area, only a portion of the site would be within the coastal zone, and none of the project components would restrict existing beach access or require additional access along a coastline or shoreline. Therefore, staff believes that in this case reasonable access for public use of the nearby coastal areas currently exists and no additional lands would need to be acquired by the applicant.

City of Long Beach General Plan

California Law requires each local government to adopt a local general plan that reflects the goals and policies that guide the physical development of land within its jurisdiction (Gov. Code, § 65300 et seq.). A general plan must contain at least seven elements: Land Use, Transportation, Housing, Conservation, Noise, Open Space, and Safety. The elements for the city of Long Beach General Plan were adopted by the city council over a period extending from 1973 (Conservation Element) to 2002 (Open Space Element). **Land Use Table 2** provides a summary of the proposed project's consistency with the city's approved LORS. Based on the LORS consistency analysis conducted by staff, the proposed project is consistent with existing land use LORS (see **Land Use Table 2**). 2030 Plan. To date, the city adopted a Mobility Element in October 2013 and the 2013—2021 Housing Element in January 2014. The Draft Land Use Element was published in October 2015 but has not yet been adopted by the city council (LB 2015a). However, the Draft Land Use Element's proposed implementation strategies and policies that are applicable to the proposed project are included in **Land Use Table 3** to determine project consistency with the city's future planning goals. Based on the draft LORS consistency analysis conducted by staff, the proposed project would be consistent with the city's Draft General Plan (see **Land Use Table 3**).

City of Long Beach City of Long Beach Local Coastal Program (LCP)

As defined in Coastal Act section 30108.6, an LCP consists of a local government's land use plans, zoning ordinances and maps, and other implementing actions, which taken together, meet the requirements of and implement the provisions and policies of the Coastal Act at the local level. The city of Long Beach coastal zone encompasses approximately 3,100 acres of land (or 4.84 square miles) in south Long Beach.

The LCP was adopted by the Long Beach City Council on February 12, 1980, and certified by the California Coastal Commission on July 22, 1980. The LCP area is split into seven subareas, which includes the SEADIP. One of the steps for preparation of the city's LCP was incorporation of the SEADIP Specific Plan, which is adopted by reference as an integral part of the Long Beach LCP.

Land Use Table 2 provides a summary of the proposed project's consistency with the key policies of the LCP. Based on the LORS consistency analysis conducted by staff, the proposed project is consistent with the city's adopted LCP (see **Land Use Table 2**).

As part of the city's long-term planning efforts, the city has begun the process for updating the SEADIP, which will include an amendment to the LCP. A Draft Specific Plan and Environmental Impact Report is expected to be released for public review in mid-2016 (LB 2015b). **Land Use Table 3** discusses the proposed SEADIP land use designations to determine whether the proposed project would be consistent with the revised specific plan. Based on the draft LORS consistency analysis conducted by staff, the proposed project would be consistent with proposed updates to the SEADIP (see **Land Use Table 3**).

Land Use Table 2
Project Compliance with Adopted Federal, State, and Local Land Use LORS

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
Federal	**None**		
State			
Public Resources Code, Chapter 3, section 30200 et seq.	**Section 30211** requires that new development not interfere with the public's right of access to the shoreline, where the access has been previously acquired by a federal, state, or local government authorization. **Section 30212** requires new development to provide public access from the nearest public roadway to the shoreline and along the coast except where: (1) it is inconsistent with public safety, military security needs, or the protection of fragile coastal resources; (2) adequate access exists nearby; or (3) agriculture would be adversely affected. **Section 30240** requires development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas to be sited and designed to prevent impacts which would significantly degrade those areas, and be compatible with the continuance of those habitat and recreation areas. **Section 30250** requires new residential, commercial, or industrial development, except as otherwise provided in this division, to be located within, contiguous with, or in close proximity to, existing developed areas able to accommodate it or, where such areas are not able to accommodate it, in other areas with adequate public services and where it will not have significant adverse effects, either individually or	YES	**Section 30211:** The AEC would be developed on the same property as an existing electrical generating facility and would not interfere with the public's right of access to the shoreline. **Section 30212:** The project site is approximately two-miles from the shoreline where adequate public access exists nearby in Seal Beach and Long Beach. **Section 30240:** The 21-acre proposed AEC would be located entirely within the 71.1-acre existing AGS property and would not be directly adjacent to environmentally sensitive habitat areas and parks and recreation areas. **Section 30250:** By constructing the proposed AEC within the existing AGS property, the project would comply with this section. The project would be located within an existing developed industrial area with adequate resources to accommodate it. The 10-acre laydown area outside of the AGS property would be compatible with the existing zoning of that parcel (IG), and its use would be

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
	cumulatively, on coastal resources.		temporary.
Warren-Alquist Act Public Resources Code, section 25529	**Section 25529:** The Energy Commission shall require the establishment of an area for public use as a condition of certification of a facility proposed in the coastal zone as follows: *When a facility is proposed to be located in the Coastal Zone or any other area with recreational, scenic, or historic value, the [Energy] Commission shall require, as a condition of certification of any facility contained in the application, that an area be established for public use, as determined by the Commission. Lands within such area shall be acquired and maintained by the applicant and shall be available for public access and use, subject to restrictions required for security and public safety. The applicant may dedicate such public use zone to any local agency agreeing to operate or maintain it for the benefit of the public. If no local agency agrees to operate or maintain the public use zone for the benefit of the public, the applicant may dedicate such zone to the state. The [Energy] Commission shall also require that any facility to be located along the coast or shoreline of any major body of water be set back from the shoreline to permit reasonable public use and to protect scenic and aesthetic values.*	YES	The AEC project site would be located entirely within an existing industrial area, only a portion of the site would be within the coastal zone, and none of the project components would restrict existing beach access or require additional access along a coastline or shoreline. Therefore, staff believes that in this case reasonable access for public use of the nearby coastal areas currently exists and no additional lands would need to be acquired by the applicant.
Local			
City of Long Beach General Plan Land Use Element July 1, 1989 Revised April 1997	**Land Use District No. 7** provides a blending of different types of land uses that serve to save time and energy in transportation and communications, simplify and shorten transactions of goods and services, vitalize a site, and give it more importance in the urban structure of the city.	YES	The 1989 Land Use Element established neighborhoods (now called PD districts) that facilitate special design policies and standards suitable for that district. The AEC would be located within the SEADIP neighborhood (PD-1). For each designated neighborhood, the Element identifies land use districts to provide general guidance as to the types of land uses considered appropriate to the city, and to

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
			provide the policy base for future zoning regulations. The AEC would be located within LUD No. 7 (Mixed Uses). The proposed AEC would be developed on the property where an existing electrical generating facility currently operates and would not create incompatibilities with the required provisions of the LUD No. 7 designation.
City of Long Beach Local Coastal Program Adopted February 12, 1980 Certified by California Coastal Commission on July 22, 1980 Amended January 1994	**SEADIP Recommendation #8:** Environmental considerations of special significance include seismic safety, water protections, problems of uncontrolled landfill, methane gas generated in landfill, wildlife protections, the impact of traffic, preserving unique natural habitats, and the requirement of landfill for many vacant areas.	YES	The SEADIP Specific Plan and Ordinance are adopted in this LCP by reference, and specific LCP development and use standards are provided within the SEADIP Specific Plan. The LCP designates planning sub-areas within the city's coastal zone, and the proposed AEC would be located within LCP Subarea 8, which is the SEADIP. The LCP designates the proposed project site as Mixed Use. Construction of the proposed AEC at the existing AGS property would be consistent with the city's General Plan and LCP designation of the site as Mixed Use, and with the SEADIP's zoning of the site as IG (General Industrial). The proposed AEC would be constructed within the existing AGS property and would not impact coastal resources or the implementation of the LCP. Offsite components would either be adjacent to the existing AGS property on a vacant parcel designated for IG use, or along rights-of-way in areas that would not affect coastal zone uses. The project has also been designed to provide adequate protection to surrounding uses from the impacts of noise, light, visibility of activity, vehicular traffic, and other potential nuisance impacts, as discussed in the **Noise, Visual Resources, Traffic and Transportation, Air Quality, Hazardous**

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
			Materials Management, and **Public Health** sections.
Southeast Area Development and Improvement Plan (SEADIP) Amended January 3, 2006	Development and Use Standards that are specific to the PD-1 subareas applicable to the proposed project include the following:	YES	The SEADIP identifies 33 subareas within its plan area and establishes goals and policies that are specific to each subarea. The AEC site and offsite laydown area would be located within SEADIP Subarea 19. The wastewater pipeline would be located within SEADIP Subareas 9, 22(b), and 24 South.
	Subarea 9: Land uses are designated residential, and the area is considered fully developed in accordance with a special permit (No. S-158-62) and two subdivision tracts (No. 24883 and 22087).		**Subarea 9:** The wastewater pipeline would be subsurface (with the exception of a portion that crosses over Los Cerritos Channel), and no changes to the land use or zoning along the pipeline are proposed. Further, the proposed AEC would not change the use of the existing sewer system in adjacent residential areas.
	Subarea 19: Land uses are designated industrial, and the area is considered fully developed in accordance with the provisions of the MG zone (now defined as IG-General Industrial zone). Commercial storage/self-storage shall be allowed by Conditional Use Permit.		**Subarea 19:** Project design plans would demonstrate compliance with the General Development Standards that apply to the IG zone district. Electric services are a conditionally permitted uses within the IG zone (Long Beach Municipal Code, ch. 21.33, Table 33-2).
	Subarea 22(b): Land uses are designated residential with accommodations for a golf course. No additional street access to Seventh Street shall be permitted.		**Subarea 22(b):** The wastewater pipeline would be subsurface (with the exception of a portion that crosses over Los Cerritos Channel), and no changes to the land use or zoning along the pipeline are proposed. Further, the proposed AEC would not change the use of the existing sewer system in adjacent residential areas.
	Subarea 24 South: Land uses are to be developed as an overlook area and interpretive center for the bordering marsh.		**Subarea 24 South:** The wastewater pipeline within this subarea would be subsurface, and no changes to the land use or zoning in Subarea 24 is proposed.

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
	The following SEADIP provisions apply to all subareas: 1. Prior to issuance of a building permit, all infrastructure, including street improvements, fire hydrants, water lines, storm drains, and sanitary sewers shall be constructed on a block basis in accordance with the approved plans. Such improvements, including engineering plans, shall be financed by subdivider(s) or by an assessment district or both. 2. A minimum of 30 percent of the site shall be developed and maintained as usable open space (building footprint, streets, parking areas and sidewalks adjacent to streets shall not be considered usable open space. Bicycle and pedestrian trails not included within the public right-of-way may be considered usable open space). All buildings shall be set back a minimum of twenty feet from all public streets and a wider setback may be required by individual subarea. Within this minimum 20-foot setback area, a strip having a minimum width of 10 feet and abutting the street shall be attractively landscaped. 5. The maximum height of buildings shall be 30 feet for residential and 35 feet for non-residential uses, unless otherwise provided herein. 6. Minimum parking for commercial and industrial uses shall be provided in accordance with parking standards as specified in the zoning regulations. 9. All development shall be designed and constructed to be in harmony with the character and quality of surrounding development so as to create community unity within the entire area. 10. Developers shall construct public open space, trails, pathways and bicycle trails for each development in such a manner that they will be		SEADIP provisions that apply to all subareas: **Provision 1:** The project owner would submit design plans for review and approval prior to the commencement of construction, which would ensure design review consistent with the SEADIP provisions. **Provision 2:** Project design plans would demonstrate compliance with the General Development Standards that apply to the IG zone district. **Provision 5:** The proposed AEC would comply with the General Development Standards that apply to the IG zone district. Stack heights at the existing AGS are over 200 feet. The proposed AEC design would result in significantly shorter stacks (140-foot and 80-foot stack heights), and new project features would appear more streamlined overall. **Provision 6:** Project design plans would demonstrate compliance with the General Development Standards that apply to the IG zone district, including parking standards. **Provision 9:** The design of the proposed AEC would be compatible with the existing electrical uses at the project site and with the standards of the IG zone. **Provision 10:** Project components outside of the AGS property would be located adjacent to existing industrial uses or within existing rights-of-way that are compatible with that component (i.e., wastewater pipeline). None of the project components would affect the access or use of public open space or trails. **Provision 12:** The proposed AEC would be located on the property of an existing power generating facility and would utilize existing

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
	generally accessible to the public and that they will interconnect with similar facilities in adjacent developments so as to form an integrated system of open space and trails connecting major points of destination. 12. Public views to water areas and public open spaces shall be maintained and enhanced to the maximum extent possible, consistent with the wetlands restoration plan. 13. Adequate landscaping and required irrigation shall be provided to create a park-like setting for the entire area. A landscaped parkway area shall be provided along all developments fronting on Pacific Coast Highway, Westminster Avenue, Studebaker Road, Seventh Street and Loynes Drive. 14. No additional curb cuts shall be permitted on Pacific Coast Highway, Westminster Avenue, Studebaker Road, or Seventh Street, unless it can be shown that inadequate access exists from local streets or unless specifically permitted by Subarea regulations provided herein. This restriction shall not preclude the provision of emergency access from these streets as may be required by the City. 15. All utility lines shall be placed underground and utility easements shall be provided as required unless waived by the Commission on the advice of the Director of Public Works.		infrastructure. The project would include more streamlined equipment and facilities, such as new stacks with lower overall structure height than currently exist at the AGS property. The project would not introduce a new barrier to public views. **Provision 13:** Project design plans would demonstrate compliance with the General Development Standards that apply to the IG zone district, including landscaping standards. **Provision 14:** Project design plans would demonstrate compliance with the General Development Standards that apply to the IG zone district, including curb and driveway standards. **Provision 15:** The proposed wastewater pipeline would be placed underground with the exception of a portion that would be affixed to the bridge as it crosses over Los Cerritos Channel.
City of Long Beach Municipal Code Supplement 12 Update 3; Codified through Ordinance No. ORD-16-0001 Enacted January 19, 2016	Chapter 21.37 defines standards for PD districts as the following: **21.37.050- Development Standards:** Development plans approved by the City Council shall serve as the applicable zoning regulations for a PD zone. Whenever a PD zone does not contain any standards for a particular aspect of development, then the development standards for	YES (with implementation of Condition of Certification **LAND-1**)	**21.37.050:** The proposed AEC site would be located within PD-1, which is a planned development district also known as SEADIP. Within the SEADIP, the proposed AEC would be located in Subarea 19, which has been designated for development consistent with the provisions of the IG zone. Project design plans would demonstrate compliance with the

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
	that aspect of a zoning district which is closest to the overall intent of the particular planned development district shall apply. **21.37.060- Site Plan Review:** Site plan review is required for all development proposals within PD districts. The Site Plan Review Committee shall refer to the Planning Commission all planned development project applications which vary from the general or specific use and development standards but which are consistent with the intent of the particular planned development district. Chapter 21.33 defines the IG zone as the following: **21.33.020(C)- General Industrial:** The IG district is considered the City's *industrial sanctuary* district where a wide range of industries that may not be desirable in other districts may locate. The emphasis is on traditionally heavy industrial and manufacturing uses. The IG district is intended to promote an *industrial sanctuary* where land is preserved for industry and manufacturing, and where existing industries are protected from non-industrial users that may object to the operating characteristics of industry. Performance standards still must be met, but the development standards are the minimum necessary to assure safe, functional, and environmentally-sound activities. General Development Standards for IG District: **Max. Lot Coverage-** 80 percent **Max. Building Height-** 65 ft. **Max. Non-Building Structure Height-** no restriction **Max. Accessory Office Space-** 25 percent of gross floor area **Parking Lot Setback for Yard Fronting on a**		General Development Standards that apply to the IG zone district. **21.37.060:** Staff has determined that implementation of **LAND-1** would best ensure the proposed project's consistency with the city's community development standards of the PD-1 district. **21.33.020(C):** Municipal Code chapter 21.33, Table 33-3, lists permitted uses within industrial zones. Within the IG zone district, electric, gas, and sanitary services are a conditionally permitted use. The proposed AEC would be developed in accordance with the provisions of the IG zone, which are also consistent with PD-1 development and use standards for that site. The proposed AEC would utilize an existing industrial site already developed for power generation and surrounded by other industrial facilities. The project would also utilize existing infrastructure such as the SCE switchyard and transmission facilities, connections to a natural gas pipeline system, water connections, process water supply lines, and certain administrative, maintenance, and warehouse buildings. The proposed AEC would comply with the General Development Standards that apply to the IG zone district. Stack heights at the existing AGS are over 200 feet. The proposed AEC design would result in significantly shorter stacks (140-foot and 80-foot stack heights), and new project features would appear more streamlined overall. With implementation of Condition of Certification **LAND-1**, the proposed AEC design plans would demonstrate compliance with the

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
	Street- 5 ft.		General Development Standards that apply to the IG zone district, including parking setbacks, lot coverage, and building and structure heights.

Land Use Table 3
Project Compliance with Draft Land Use LORS

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
City of Long Beach General Plan Draft Land Use Element October 2015	**Allowable Building Height at AEC site:** 65 feet (Map LU-7, p. 67). **Proposed Area of Change at AEC site:** Designation #3- Promote Regional-Serving Uses	YES	The Draft Land Use Element defines PlaceTypes that identify permitted land uses, development patterns, streetscapes, and urban form features for specific areas. The proposed AEC would be located within an Industrial PlaceType. As stated in the Draft Element, "where the Industrial PlaceType is applied, continued industrial activities are strongly encouraged. Industrially-developed lands should be preserved, particularly for the expansion of quality employment opportunities. Conversion of industrial lands to nonindustrial uses is generally discouraged in this plan." The Draft Element also identifies 9 major areas of change within the city. The proposed AEC would be located within Proposed Area of Change #3 (Promote Regional-Serving Uses). This area would be intended to accommodate future development of facilities (e.g., AES Los Alamitos) in order to promote their continued success in generating exceptional employment opportunities. The proposed AEC would be consistent with the Draft Land Use Element given that it would be located on the property of an existing power generating facility and would utilize existing infrastructure. The project would include more streamlined equipment and facilities, such as new stacks with lower overall structure height than currently exist at the AGS property. Project construction and operation would also provide opportunities for employment.
Initial Study of the Proposed Southeast Area	**Land Use Designation: Industrial Use-** Provides for general industrial uses including utilities and oil	YES	The proposed SEADIP Land Use Plan identifies the AEC project site as an Industrial Use.

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
Specific Plan October 2015	related operations. No heavy industrial, commercial, distribution, warehousing or public storage uses are permitted.		The AEC project would be consistent with proposed SEADIP land use designations given that it would be constructed on the property of an existing power generating facility and would utilize existing infrastructure.

CUMULATIVE IMPACTS

Under the CEQA Guidelines, “a cumulative impact consists of an impact which is created as a result of the combination of the project evaluated in the EIR [environmental impact report] together with other projects causing related impacts” (Cal. Code of Regs., tit. 14, § 15130(a)(1)). Cumulative impacts of the project must be discussed if the incremental effect of a project, combined with the effects of other projects is *cumulatively considerable* (Cal. Code of Regs., tit. 14, § 15130(a)). Such incremental effects are to be viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (Cal. Code of Regs., tit. 14, § 15164(b)(1)). Together, these projects comprise the cumulative scenario which forms the basis of the cumulative impact analysis.

Geographic Scope of Analysis

The cumulative land use and planning analysis considers past, current and probable future projects that are relatively near the proposed project that would contribute to cumulative impacts by impacting agricultural or forest lands, disrupt or divide an established community, conflict with applicable land use plans, policy or regulation, or conflict with an applicable habitat conservation plan or natural community conservation plan. **Land Use Table 4** identifies the proposed and planned projects within the immediate vicinity of the proposed AEC that would be applicable to the land use cumulative analysis.

Land Use Table 4
Notable Cumulative Projects

Label ID	Project Name	Project Description	Location	Distance from AEC (Miles)	Status
1	AGS Units 1 through 6	The existing units are to remain operational during AEC construction. After construction of the AEC, demolition of the existing Units 1–6 would occur according to an MOU with the city of Long Beach.	690 N. Studebaker Road Long Beach, CA 90803	0.19	Schedule of demolition of Units 1–6 is unknown.
2	Los Cerritos Wetlands Conceptual Restoration Plan and Mitigation Bank	A mitigation bank (76 acres) and wetlands habitat restoration area (72 acres) is proposed on the 152-acre Synergy Oil Field. Project includes construction of public access improvements. Synergy would remove approximately 37 oil wells from the restoration area. It would conduct oil production activities on an adjacent 5-acre property at the northeast corner of Studebaker Rd. and 2nd St./Westminster Blvd (70 new oil wells), and at the 7-acre "Pumpkin Patch" property at the southeast corner of Pacific Coast Highway and Studebaker Rd. (50 new oil wells). Approximately. 21 oil wells would be removed from the city's adjacent 33-acre site.	Mitigation bank and wetlands restoration areas are located between Pacific Coast Highway, Los Cerritos Channel, Studebaker Rd. and 2nd St. in the city of Long Beach.	0.22	Entitlements would require Coastal Commission approval of a CDP. An EIR would be prepared for the project.
3	AES Battery Energy Storage System (BESS)	The BESS project at the AGS would include three 100-MW containment buildings, constructed in sequential phases from east to west. Each building would be 50 ft. tall, 270 ft. long, 165 ft. wide (44,550 sq. ft.). Each building would contain: 2 battery storage levels, electrical controls, and HVAC units. Construction is proposed to start third quarter 2019, after major mechanical completion of the AEC Power Block 1, with completion of the first 100-MW building planned for late 2020. The second and third 100-MW buildings would be constructed & operational in 2021 and 2022.	On the north side of the AEC project site, in the 10-acre area proposed for AEC parking and construction laydown.	0.25	Conceptual site plan has been submitted to the city. Project is still in the entitlement process.
4	Alamitos Barrier Improvement Project	Project involves drilling, construction, development, and aquifer testing of 17 injection wells, installing 4 nested (multi-casing) monitoring	Located on the western access roadway of the	0.40	Final EIR has been published (SCH #2012031027).

Label ID	Project Name	Project Description	Location	Distance from AEC (Miles)	Status
		wells, and installing 2 shallow piezometers. Wells are located in Seal Beach. The injection wells and 3 nested monitoring wells would be constructed on a narrow (17 ft. by 20 ft.) access roadway for Los Alamitos Channel.	Orange County Flood Control District Los Alamitos Channel.		
5	Los Angeles Department of Water and Power Haynes Generating Station	Addition of six LMS100 simple-cycle gas turbines and two emergency diesel-powered generators.	6801 2nd Street Long Beach, CA 90803	0.64	Under construction
6	Alamitos Bay Bridge Improvement Project	Project would improve seismic deficiencies on the Alamitos Bay Bridge. Proposal includes a No Build Alternative, Bridge Retrofit Alternative (constructing additional concrete piles next to the existing bridge piles), and Bridge Replacement Alternative (replacing the existing bridge with a new wider bridge).	Project crosses El Cerritos Channel on Pacific Coast Highway in Long Beach.	0.90	Scoping meeting held August 2015. Caltrans to prepare an Initial Study/ Environmental Assessment to be released Fall 2016.
7	PCH and 2nd	The proposed project involves demolition of the existing Seaport Marina Hotel and construction of a commercial center totaling approximately 250,000 sq. ft. of retail and restaurant space and a three-level enclosed parking structure. The proposed commercial structures would be one- and two-story buildings with a maximum height of 35 ft. The project is on a 10.93-acre site.	Southwest corner of Pacific Coast Highway and 2nd Street in Long Beach.	0.94	Initial Study was published March 2014. Comment period on NOP for a Draft EIR ended April 2014.
8	Rehabilitation of Western Regional Sewers, Project No. 3-64	Orange County Sanitation District proposes to rehabilitate and/or replace entire lengths of the Orange Western Sub-Trunk, Los Alamitos Sub-trunk, Westside Relief Interceptor, and the Seal Beach Interceptor regional pipelines. In addition to pipeline and manhole replacement and/or rehabilitation, project includes rehabilitation/replacement of the Westside Pump Station force main, reconstruction of the Westside Pump Station wet well, and construction of a new vent line from the wet well to the downstream manhole or construction of an odor control	Primarily follows public rights-of-way in the cities of La Palma, Buena Park, Cypress, Anaheim, Los Alamitos, Seal Beach, and the community of Rossmoor (Orange County). Westside Pump	1.28	Initial Study was published November 2015 (SCH #2015111077). Draft EIR is scheduled for publication at the end of March 2016.

Label ID	Project Name	Project Description	Location	Distance from AEC (Miles)	Status
		scrubber.	Station is at 3112 Yellowtail Drive.		
9	Alamitos Bay Marina Rehabilitation Project	Project would renovate the existing Marina facilities and enhance existing recreational boating facilities in the Marina. The project would provide upgraded ADA-compliant facilities, upgraded restrooms, dredged basins to ensure safe navigation, and longer average slip lengths. The existing 1,967 slips in Basins 1 through 7 would be replaced by 1,646 slips, at a loss of approximately 321 slips.	Located adjacent to and northwest of the mouth of the San Gabriel River in the City of Long Beach.	1.33	Draft EIR was published October 2009 (SCH #2008041028).

The following topics have been analyzed with regard to cumulative land use impacts. The AEC would not contribute to any cumulative land use effects.

AGRICULTURE AND FOREST

The AEC as proposed would not have any impacts to agricultural or forest lands or conflict with any land that is zoned for agricultural purposes and therefore, would not contribute to cumulative impacts related to this land use topic.

PHYSICAL DISRUPTION OR DIVISION OF AN ESTABLISHED COMMUNITY

The AEC would be located entirely within the boundaries of an existing power plant facility that has been in operation since the 1950s. The project is situated on land designated and zoned for industrial uses. The project would not physically disrupt or divide an established community and would not contribute to a cumulative impact in this land use topic.

CONFLICT WITH ANY APPLICABLE HABITAT OR NATURAL COMMUNITY CONSERVATION PLAN

The AEC would not conflict with any habitat or natural community conservation plans and would not contribute to any cumulative impacts in this land use topic.

CONFLICT WITH ANY APPLICABLE LAND USE PLAN, POLICY OR REGULATION

The project would not conflict with any other applicable land use plan, policy, or regulation.

LAND USE COMPATIBILITY

Land use compatibility refers to the physical compatibility of planned and existing land uses. Administrative or conditional use permitting requirements (see discussion in **Land Use Table 2**) and project reviews under CEQA are in place to evaluate the compatibility of projects that are not a permitted use or that have elements that may adversely impact public safety, the environment, or that could interfere with or unduly restrict existing and/or future permitted uses. As noted in the discussions above under the subsection “Physical Disruption or Division of an Established Community” and in **Land Use Table 2** and **Land Use Table 3**, development of the proposed project and its associated features are compatible with the existing and proposed land uses surrounding the site because the proposed AEC is located within the property of the existing AGS.

Temporary use of an offsite laydown area would be at an adjacent property that is currently vacant and is designated for IG (General Industrial) use. While the proposed offsite wastewater pipeline crosses through an area designated as an overlook, and connects to an existing LBWD sanitary line within an area designated for residential use, the proposed pipeline would be subsurface (with the exception of a portion that crosses over Los Cerritos Channel) and no changes to the land use or zoning in these areas is proposed. The existing sanitary line currently extends through areas designated for residential and golf course uses, and the proposed AEC would not change the use of the utility line in these areas. No conflict with the land use or zoning would occur from the onsite or offsite project components.

The AGS property has been used since the 1950s for the purpose of electrical power generation. As such, the project represents continued use of a site committed to ensuring reliable generation is maintained at an electrical system location critical to Southern California. The proposed AEC is consistent with the city's land use designations and zoning and would not constitute a change in the current development pattern of the city, as established by the city's adopted General Plan. Furthermore, the project is compatible with the existing ancillary facilities of the AGS that would be upgraded to support the AEC, such as the Southern California Gas Company natural gas pipeline serving the site, the existing onsite SCE 230-kV switchyard, and the existing connections to the city of Long Beach potable water system and sanitary sewer system.

The proposed AEC is consistent with applicable LORS, including the California Coastal Act, the Warren-Alquist Act, and city LORS such as General Plan Land Use and Zoning designations for the proposed project site and the immediately surrounding existing land uses. Therefore, the proposed project would not result in any physical land use incompatibilities with existing surrounding land uses.

Sensitive Receptors

Land Uses such as schools, day-care facilities, hospitals, nursing homes, and residential areas are considered to be sensitive receptor sites for the purposes of determining a potentially significant environmental impact.

The area immediately surrounding the proposed project includes uses associated with the existing AGS: a natural gas pipeline, an onsite SCE 230-kV switchyard, and existing connections to a potable water system and sanitary sewer system. Residential and recreational uses are located further (approximately 0.5 mile) from the proposed project site. However, the following sensitive receptors would be within close proximity (i.e., within 0.25 mile) of the proposed AEC:

- Rosie the Riveter Charter High School
- Charles F. Kettering Elementary School
- Long Beach Bikeway Route 10/ Channel View Park
- San Gabriel River Bike Trail

These uses may experience project-related nuisance impacts such as construction-generated noise, dust, and traffic and operation-related public health impacts. The **Air Quality, Hazardous Materials Management, Noise, Public Health, Traffic and Transportation,** and **Visual Resources** sections provide detailed analyses of the noise, dust, public health hazards or nuisance, and adverse traffic or visual impacts on surrounding sensitive receptors such as schools, residential uses, and recreation facilities. These technical areas have not identified any significant unmitigated impacts that would affect these land uses.

Because the proposed project would be located entirely within the site of the existing AGS, on a property that has been used since the 1950s for the purpose of electrical power generation, the project is not considered an incompatible land use with the surrounding and nearby uses, including sensitive receptors.

Based on analyses cited in **Land Use Table 2**, **Land Use Table 3,** and within other sections of this document, as well as the zoning and land use designations for the proposed project site and its associated features/facilities and surrounding locations, the proposed project would not result in a significant project-related impact at any sensitive receptor location.

NOTEWORTHY PUBLIC BENEFITS

There are no land use-related benefits associated with the AEC.

CONCLUSIONS AND RECOMMENDATIONS

The proposed AEC would be located entirely within the existing Alamitos Generating Station property, an operating power plant site, in the city of Long Beach.

Staff concludes the AEC:

- Would not convert any farmland (as classified by the Farmland Mapping and Monitoring Program) to non-agricultural use, conflict with existing agricultural zoning or Williamson Act contracts or convert forest land to non-forest use.
- Would not conflict with existing zoning for agricultural use or a Williamson Act contract.
- Would not conflict with existing zoning for, or cause rezoning of, forest land, timberland, or timberland zoned Timberland Production.
- Would not result in the loss of forest land or conversion of forest land to non-forest use.
- Would not conflict with any applicable habitat conservation plan or natural community conservation plan.
- Would not directly or indirectly divide an established community or disrupt an existing or recently approved land use.
- Would be consistent with the maximum allowable height limit within the PD-1(19) zone district.
- Would be consistent with both the California Coastal Act and the Long Beach LCP.
- Would not result in any physical land use incompatibilities with the existing surrounding land uses and would be consistent with the city of Long Beach LORS, including the General Plan, Southeast Area Development and Improvement Plan, and the Municipal Code.
- Would not conflict with the city's future planning and development goals identified in the Draft Land Use Element (October 2015).

- Would not result in incremental impacts that, although individually limited, are cumulatively considerable when viewed in connection with other project-related effects or the effects of past projects, other current projects, and probable future projects.
- Would not result in any land use-related environmental justice issues. No minority or low-income populations would be significantly or adversely impacted.

PROPOSED CONDITIONS OF CERTIFICATION

LAND-1 The project owner shall provide a site plan consistent with the design and performance standards for the city of Long Beach General Industrial (IG) Zone requirements, including height limits, parking requirements, setbacks, and other municipal code requirements as set forth by the Long Beach Municipal Code sections 21.33.060 through 21.33.230.

Verification: At least 30 calendar days prior to the start of construction, the project owner shall submit written documentation to the Compliance Project Manager (CPM), including evidence of review by the city of Long Beach that the project meets the above referenced requirements.

REFERENCES

AES 2015—Alamitos Energy Center (tn: 206427-1), Supplemental Application for Certification Volume 1, dated October 2015, submitted to CEC/Docket Unit on October 26, 2015.

CCC 2014—California Coastal Commission, Staff Report: Permit Amendment, filed August 22, 2014, <http://documents.coastal.ca.gov/reports/2014/11/F12b-11-2014.pdf>, accessed on February 29, 2016.

CCR 2007—California Code of Regulations, Title 14, Chapter 3 (CEQA Guidelines), §§15000-15387, as amended July 27, 2007.

CCR 2016—California Code of Regulations, Health & Safety Code, §§42301.6-42301.9, <http://www.leginfo.ca.gov/cgi-bin/displaycode?section=hsc&group=42001-43000&file=42300-42316>, accessed on March 1, 2016.

CDFW 2015—California Department of Fish and Wildlife, California Regional Conservation Plans, August 2015, <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=68626&inline>, accessed on March 1, 2016.

CDOC 2015— California Department of Conservation, Los Angeles County Important Farmland 2012, published January 2015, <http://www.conservation.ca.gov/dlrp/fmmp/Pages/LosAngeles.aspx>, accessed on March 17, 2016.

CDOC 2016—California Department of Conservation, Los Angeles County Williamson Act FY 2015/2016, published February 2016, <ftp://ftp.consrv.ca.gov/pub/dlrp/wa/LA_15_16_WA.pdf>, accessed on March 17, 2016.

CEC 2016—California Energy Commission (TN 210529), Report of Conversation with Alexandra Torres Galancid, Executive Director, Women in Non Traditional Employment Roles, Rosie the Riveter Youth Programs/Youthbuild and Ellen LeFevre, Planner I, California Energy Commission, February 19, 2016.

LB 1973—City of Long Beach, General Plan Conservation Element, April 30, 1973, <http://www.lbds.info/civica/filebank/blobdload.asp?BlobID=4092>, accessed on March 2, 2016.

LB 1980—City of Long Beach, Long Beach Local Coastal Program, adopted February 12, 1980, certified July 22, 1980, <http://www.lbds.info/civica/filebank/blobdload.asp?BlobID=3795>, accessed on March 2, 2016.

LB 1997—City of Long Beach, General Plan Land Use Element, revised April 1997, <http://www.lbds.info/planning/advance_planning/general_plan.asp>, accessed on February 29, 2016.

LB 2012—City of Long Beach, Zoning Maps 6, 7, and 13, revised April 2012, <http://www.lbds.info/civica/filebank/blobdload.asp?BlobID=2538>, accessed on March 1, 2016.

LB 2015a—City of Long Beach, General Plan Draft Land Use Element, October, <http://www.lbds.info/civica/filebank/blobdload.asp?BlobID=5484>, accessed on February 29, 2016.

LB 2015b—City of Long Beach, Southeast Area Specific Plan EIR Scoping Meeting, November 4, 2015, <http://www.lbds.info/civica/filebank/blobdload.asp?BlobID=5583>, accessed on February 29, 2016.

LB 2016—City of Long Beach, Long Beach Municipal Code, Title 21 Zoning Regulations, Codified through Ordinance No. ORD-16-0001, enacted January 19, 2016, <https://www.municode.com/library/ca/long_beach/codes/municipal_code>, accessed on February 29, 2016.

PlaceWorks 2015—Initial Study: Southeast Area Specific Plan, City of Long Beach, October 2015, <http://www.lbds.info/civica/filebank/blobdload.asp?BlobID=5524>, accessed on March 17, 2016.

NOISE AND VIBRATION

Joseph Hughes and Shahab Khoshmashrab

SUMMARY OF CONCLUSIONS

If built and operated in conformance with the proposed Noise and Vibration conditions of certification, the Alamitos Energy Center (AEC) would comply with all applicable noise and vibration laws, ordinances, regulations, and standards (LORS) and would produce no significant direct or cumulative adverse noise impacts on people within the project area, including the environmental justice population.

Staff retains the responsibility to monitor the enforcement of the conditions of certification listed above. Staff would work under the authority of the Energy Commission's compliance project manager (CPM) to monitor and review the reporting of project performance during construction, demolition, and the full term of operation, including facility closure.

INTRODUCTION

The construction, demolition, and operational activities associated with any power plant create noise, or unwanted sound. The character and loudness of the noise, the times of day or night that it is produced, the duration and frequency of the occurrence of the noise, and the proximity of the facility to sensitive receptors all combine to determine whether the facility would meet applicable noise control laws and ordinances and whether it would cause significant adverse noise impacts. In some cases, vibration may be produced as a result of power plant construction practices such as pile driving. The ground-borne energy of vibration may have the potential to cause nuisance and structural damage.

The purpose of this analysis is to identify and examine the likely noise and vibration impacts from the construction and operation of the AEC. Staff recommends procedures to ensure that the resulting noise and vibration impacts would be adequately mitigated to comply with applicable LORS and to lessen the impacts to less than significant.

For an explanation of technical terms used in this section please refer to **NOISE APPENDIX A** at the end of this section.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Noise Table 1 below identifies the noise and vibration LORS related to AEC.

Noise Table 1
Laws, Ordinances, Regulations and Standards

Applicable Law	Description
Federal:	
Occupational Safety & Health Act (OSH Act), Title 29, Code of Federal Regulations, § 1910.95	Protects workers from the effects of occupational noise exposure.
U.S. Environmental Protection Agency Guidelines	Assists state and local government entities in development of state and local LORS for noise.
Federal Transit Administration	Establishes thresholds for ground-borne vibration associated with construction of rail projects; also applied to other types of projects.
State:	
California Government Code, § 65302(f)	Encourages each local governmental entity to perform noise studies and implement a noise element as part of its general plan.
State of California, Office of Noise Control, Model Community Noise Control Ordinance	Provides guidance for acceptable noise levels in the absence of local noise standards.
California Occupational Safety & Health Act (Cal-OSH Act): Title 8, California Code of Regulations, §§ 5095-5099 (Article 105)	Protects workers from the effects of occupational noise exposure.
California Department of Transportation (Caltrans), Transportation and Construction Vibration Guidance Manual	Establishes guidelines for assessing the impacts of ground-borne vibration associated with pile driving.

<table>
<tr><th>Applicable Law</th><th>Description</th></tr>
<tr><td>Local:
City of Long Beach Municipal Code – Noise Ordinance, Title 8: Health and Safety, Chapter 8.80:

§ 8.80.150 Exterior noise limits – Sound levels by receiving land use district

§ 8.80.160 Exterior noise limits – Correction factor for character of sound</td>
<td>The following noise standards for the various land use districts apply to all such property within a designated district:

<table>
<tr><th colspan="3">Exterior Noise Limits (dBA)</th></tr>
<tr><th>Receiving Land Use District</th><th>Noise Level (dBA)</th><th>Time Period</th></tr>
<tr><td>District One[a]</td><td>45
50</td><td>10 p.m. – 7 a.m.
7 a.m. – 10 p.m.</td></tr>
<tr><td>District Two[b]</td><td>55
60</td><td>10 p.m. – 7 a.m.
7 a.m. – 10 p.m.</td></tr>
<tr><td>District Three[c]</td><td>65</td><td>Any time</td></tr>
<tr><td>District Four[d]</td><td>70</td><td>Any time</td></tr>
<tr><td>District Five[e]</td><td colspan="2">Regulated by other agencies and laws</td></tr>
</table>
Notes:
a. District One: Predominantly residential with other land use types also present.
b. District Two: Predominantly commercial with other land use types also present.
c. District Three and Four: Predominantly industrial with other land use types also present. Limits are intended primarily for use at boundaries rather than for noise control within these districts.
d. District Five: Airport, freeways and waterways regulated by other agencies.

No person shall operate or cause to be operated any source of sound at any location within the incorporated limits of the City or allow the creation of any noise on property owned, leased, occupied, or otherwise controlled by such person, which causes the noise level when measured from any other property, either incorporated or unincorporated, to exceed:

1. The noise standard for that land use district for a cumulative period of more than 30 minutes in any hour.
2. The noise standard plus 5 db(A) for a cumulative period of more than 15 minutes in any hour.
3. The noise standard plus 10 db(A) for a cumulative period of more than 5 minutes in any hour.
4. The noise standard plus 15 db(A) for a cumulative period of more than 1 minute in any hour.
5. The noise standard plus 20 db(A) or the maximum measured ambient, for any period of time.</td></tr>
<tr><td>City of Long Beach Municipal Code – Noise Ordinance, Title 8: Health and Safety, Chapter 8.80: Noise; § 8.80.202 Construction activity – Noise regulations</td><td>Prohibits construction between 7 p.m. and 7 a.m. on Mondays through Fridays, and federal holidays; prohibits construction before 9 a.m. and after 6 p.m. on Saturdays; and prohibits construction on Sundays.</td></tr>
</table>

<table>
<tr><th>Applicable Law</th><th>Description</th></tr>
<tr><td></td><td></td></tr>
<tr><td>City of Seal Beach Municipal Code – Noise Ordinance, Title 7: Public Peace, Morals, and Welfare, Chapter 7.15:

Noise; § 7.15.015 Exterior Noise Standards</td><td>Unless otherwise specifically indicated, the following exterior noise standards shall apply to all property within a designated noise zone:

<table>
<tr><th colspan="3">Noise Standards (dBA)</th></tr>
<tr><th>Noise Zone</th><th>Noise Level (dBA)</th><th>Time Period</th></tr>
<tr><td>1[a]</td><td>50
55</td><td>10 p.m. – 7 a.m.
7 a.m. – 10 p.m.</td></tr>
<tr><td>2[b]</td><td>65</td><td>Any time</td></tr>
<tr><td>3[c]</td><td>70</td><td>Any time</td></tr>
</table>
Notes:
a. Noise Zone 1: Residential properties.
b. Noise Zone 2: Commercial properties.
c. Noise Zone 3: Industrial, manufacturing and oil properties.

In the event the alleged offensive noise consists of impact noise, simple tone noise, speech, music or any combination thereof, each of the above noise levels shall be reduced by 5 db(A).

No person shall create any noise, or allow the creation of any noise, on property owned or occupied by such person when such noise causes the noise level to exceed the following when measured from a residential property:

1. The exterior noise standard for a cumulative period of more than 30 minutes in any hour.
2. The exterior noise standard plus 5 db(A) for a cumulative period of more than 15 minutes in any hour.
3. The exterior noise standard plus 10 db(A) for a cumulative period of more than 5 minutes in any hour.
4. The exterior noise standard plus 15 db(A) for a cumulative period of more than 1 minute in any hour.
5. The exterior noise standard plus 20 db(A) for any period of time.</td></tr>
</table>

FEDERAL

Under the Occupational Safety and Health Act of 1970 (OSH Act), the Department of Labor, Occupational Safety and Health Administration (OSHA) adopted regulations Title 29, § 1910.95, designed to protect workers against the effects of occupational noise exposure. These regulations list permissible noise exposure levels as a function of the amount of time during which the worker is exposed (see **NOISE APPENDIX A, Noise Table A4** at the end of this section). The regulations further specify a hearing protection program that involves monitoring the noise to which workers are exposed, assuring that workers are made aware of overexposure to noise, and periodically testing the workers' hearing to detect any degradation.

Guidelines are available from the U.S. Environmental Protection Agency (USEPA) to assist state and local government entities in developing state and local LORS for noise. Because there are existing local LORS that apply to this project, the USEPA guidelines are not applicable.

There are no federal laws governing off-site (community) noise.

The Federal Transit Administration (FTA) has published guidelines for assessing the impacts of ground-borne vibration associated with construction of rail projects, which have been applied by other jurisdictions to other types of projects. The FTA-recommended vibration standards are expressed in terms of the "vibration level," which is calculated from the peak particle velocity measured from ground-borne vibration. The FTA measure of the threshold of architectural damage for conventional sensitive structures is a peak particle velocity of about 0.2 inches per second (in/sec).

STATE

California Government Code, § 65302(f) encourages each local governmental entity to perform noise studies and implement a noise element as part of its general plan. In addition, the California Office of Planning and Research has published guidelines for preparing noise elements, which include recommendations for evaluating the compatibility of various land uses as a function of community noise exposure.

The State of California, Office of Noise Control, prepared the Model Community Noise Control Ordinance, which provides guidance for acceptable noise levels in the absence of local noise standards. This model also defines a simple tone, or "pure tone," as one-third octave band sound pressure levels that can be used to determine whether a noise source contains annoying tonal components. The Model Community Noise Control Ordinance further recommends that when a pure tone is present, the applicable noise standard should be lowered (made more stringent) by five A-weighted decibels (dBA). This is consistent with the definition in **NOISE APPENDIX A**, **Noise Table A1**, last row, in this analysis.

The California Occupational Safety and Health Administration (Cal-OSHA) has adopted occupational noise exposure regulations (California Code of Regulations, Title 8, §§ 5095-5099) that set employee noise exposure limits. These standards are equivalent to federal OSHA standards (see **NOISE APPENDIX A**, **Noise Table A4**).

In September 2013, California Department of Transportation (Caltrans) released the Transportation and Construction Vibration Guidance Manual, available at http://www.dot.ca.gov/hq/env/noise/pub/TCVGM_Sep13_FINAL.pdf. This manual includes the FTA method and findings. For pile driving impacts, the manual uses a method based on the force of the pile driver as well as soil considerations in the calculation of vibration levels. Thus, it is a bit more robust analysis than the FTAs and so, staff uses the vibration criteria in this manual for pile driving associated with power plants. The Caltrans manual states that for construction activities that generate vibration, e.g., pile driving, the threshold of human response begins at a peak particle velocity of 0.16 in/sec. This is characterized by Caltrans as a “distinctly perceptible” event with an incident range of transient to continuous (Caltrans. “Transportation and Instruction Vibration Guidance Manual”, September 2013. Report No. CT-HWANP-RT-13069.25.3, Table 20).

LOCAL

City of Long Beach LORS

The project is located within the city limits of Long Beach, an incorporated city within Los Angeles County. The City of Long Beach Title 8, Chapter 8.80 Noise Regulation applies to this project. These municipal code references are listed above in **Noise Table 1**.

The criteria for operating conditions are defined in the following sections of the city’s noise regulation:

§ 8.80.160 provides noise limits for exterior locations. The AEC site is located in District 4 (predominantly industrial with other land use types present). § 8.80.160 limits exterior noise levels in District 4, to 70 dBA L_{50}. Residences are located outside District 4 boundary in District 1 (predominantly residential with other land use types present). § 8.80.160 limits exterior noise levels in District 1 to a nighttime noise level of 45 dBA L_{50} and a daytime level of 50 dBA L_{50}.

For construction activities, the noise regulation specifies the following:

§ 8.80.202 prohibits construction between 7 p.m. and 7 a.m. on Mondays through Fridays and federal holidays, prohibits construction before 9 a.m. and after 6 p.m. on Saturdays, and prohibits construction on Sundays.

City of Seal Beach LORS

Although the project is located within the city limits of Long Beach, the project would be located near the border of Seal Beach and the noise impacts could potentially impact residence of Seal Beach. The City of Seal Beach Title 7, Chapter 7.15 Noise Regulation would apply to this project for the residential receptors located to the east of the project site in Seal Beach. These municipal code references are listed above in **Noise Table 1**.

The criteria for operating conditions are defined in the following sections of the city’s noise regulation:

§ 7.15.015 provides noise limits for exterior locations. The AEC site is located within the city limits of Long Beach but could have noise impacts on the nearby residences located in Zone 1 of Seal Beach. § 7.15.015 limits nighttime noise levels to 50 dBA L_{50} and daytime levels to 55 dBA L_{50}.

For construction activities, the noise regulation specifies the following:

§ 7.15.025 exempts noise associated with construction, repair, remodeling or grading of real property performed in the following periods: between 7:00 a.m. and 8:00 p.m. on weekdays; and between 8:00 a.m. and 8:00 p.m. on Saturday.

SETTING

The AEC site and the surrounding vicinity has numerous existing industrial operations such as the existing Alamitos Generating Station, other power generation facilities, oil storage tank farms, in addition to several major air and ground transportation corridors. The closest residence to the noise-producing equipment (combustion turbine) at the proposed AEC would be located approximately 1,500 feet to the west on East Eliot Street. Rosie the Riveter Charter High School is a tenant on the existing Alamitos Generating Station site.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHODS AND THRESHOLDS FOR DETERMINING SIGNIFICANCE

California Environmental Quality Act

The California Environmental Quality Act (CEQA) requires that significant environmental impacts be identified and either eliminated or mitigated to the extent feasible. Section XII of Appendix G of CEQA's guidelines (California Code of Regulations, Title 14, Appendix G) describes some characteristics that could signify a potentially significant impact. Specifically, a significant effect from noise may exist if a project would result in:

1. exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;

2. exposure of persons to, or generation of, excessive ground borne vibration or ground borne noise levels;

3. substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project; or

4. substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

Staff, in applying Item 3 above to the analysis of this and other power plant projects, concludes that an increase in background noise levels up to and including 5 dBA is less than significant, and an increase of above 5 dBA could be either significant or less than significant depending upon the circumstances of a particular case. For example, a significant impact may exist where the noise of the project plus the background exceeds the nighttime background level by more than 5 dBA at residential communities. Factors staff considers in determining if the noise is significant or not, are:

1. the resulting noise level;[1]
2. the character of the noise;
3. the time the noise is produced (day or night);
4. the duration and frequency of occurrence of the noise; and
5. the land use designation of the affected receptor site and the type of receptor (residential, commercial, etc.).

Noise due to construction activities is usually considered to be less than significant in terms of CEQA compliance if:

- the construction activity is temporary; and
- the use of heavy equipment and noisy[2] activities is limited to daytime hours.

For purposes of evaluating impacts on residential uses, the project noise is compared with measured nighttime ambient noise levels, when residents are asleep. Staff uses the above methods and thresholds to evaluate the project's noise impacts on the project area's populations, including its environmental justice population.

Ambient Noise Monitoring

In order to establish a baseline for the comparison of predicted project noise with existing ambient noise, the applicant has presented the results of an ambient noise survey, a long-term survey taken between August 23-31, 2011 (AEC 2015f, AFC Section 5.7.3.2, Table 5.7-4, and AEC 2015d, Appendix 5.7A, Table 5.7A-1 for M1, Table 5.7A-2 for M2, and Table 5.7A-3 for M3). This noise survey monitored existing noise levels at three locations, labeled M1, M2, and M3, shown below in **Noise Figure 1**.

These surveys were performed using industry accepted equipment and techniques. During these surveys, the existing Alamitos Generation Station operated for a substantial period of time at various power ratings. Based on staff's examination of

[1] For example, a noise level of 40 dBA would be considered quiet in many locations. A noise limit of 40 dBA would be consistent with the recommendations of the California Model Community Noise Control Ordinance for rural environments and with industrial noise regulations adopted by European jurisdictions. In this case, if the project creates an increase in ambient noise no greater than 10 dBA, the project noise level may not be significant if the resulting noise level does not exceed 40 dBA.

[2] Noise that draws project-related complaints. For definition of "project-related complaints", see the footnote in Condition of Certification **NOISE-2**.

these surveys, the Alamitos Generation Station did not appear to substantially elevate the average ambient baseline levels at the project's sensitive noise receptors during the critical times, the quietest nighttime hours. Staff derived the average L_{eq} values for use as the reference metric for daytime and nighttime baseline noise when evaluating construction impacts, average L_{50} values for daytime and nighttime baseline noise when evaluating operational compliance with LORS, and quietest consecutive four-hour average L_{90} for use as nighttime baseline noise when evaluating operational compliance with CEQA. The derived values are outlined in **Noise Table 2**.

Noise Table 2
Noise Monitoring Results

		Daytime		Nighttime		
Receptor	**Description**	**L_{eq} Daytime Average dBA**	**L_{50} Daytime Average dBA**	**L_{eq} Nighttime Average dBA**	**L_{50} Nighttime Average dBA**	**L_{90} Nighttime Lowest 4-hr Avgerage dBA**
M1	Residence at 6333 Eliot Street, Long Beach	55	53	52	51	49
M2	Residence at 6810 East Septimo Street, Long Beach	59	57	53	52	45
M3	Residence at the intersection of El Dorado Drive and Nassau Drive, Seal Beach	57	51	49	48	46

Sources: AEC 2015f, AFC Section 5.7.3.2, Table 5.7-4, and AEC 2015d, Appendix 5.7A.

DIRECT IMPACTS AND MITIGATION

Noise impacts associated with the project can be created by construction activities and normal operation of the project.

Construction and Demolition Impacts and Mitigation

Construction noise is usually a temporary phenomenon where construction extends one to two years. Demolition activities use equipment similar to that used for construction activities so the noise impacts are expected to be similar between construction and demolition. The combined demolition of existing unit 7 and construction of the AEC project is expected to be typical of similar projects in terms of equipment used and types of activities and would last approximately 56 months (**AEC 2015f**, AFC § 5.7.4.2). Over the course of this period, various discrete activities would occur concurrently, creating a cumulative noise effect.

The project would commence with the demolition of retired Alamitos Generating Station (AGS) Unit 7 and other ancillary structures to make room for the construction of AEC Blocks 1 and 2 on the AGS site. The demolition of AGS Unit 7 would commence in the first quarter of 2017. The construction of the AEC CCGT is scheduled to commence in the second quarter of 2017, and construction of AEC SCGT is scheduled to commence in the second quarter of 2020. The demolition of all other existing units is not required to construct AEC. The demolition of existing AGS Units 1-6 would be demolished once construction of the AEC has been completed and operation of the new facility has commenced. The impacts, including noise, would be evaluated and addressed by the City of Long Beach and is discussed in more detail under the Cumulative Impacts and Mitigation section below. **Noise Table 3** provides the project activities schedule.

Noise Table 3
Alamitos Energy Center Project Activities Table

Year	**2017**				**2018**				**2019**				**2020**				**2021**			
Quarter	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Unit 7 Existing																				
CCGT Power Block																				
SCGT Power Block																				

Demolition **Construction** **Operation**

Source: Staff derived from AEC 2015f, Section 2.0, Table 2.2-1.

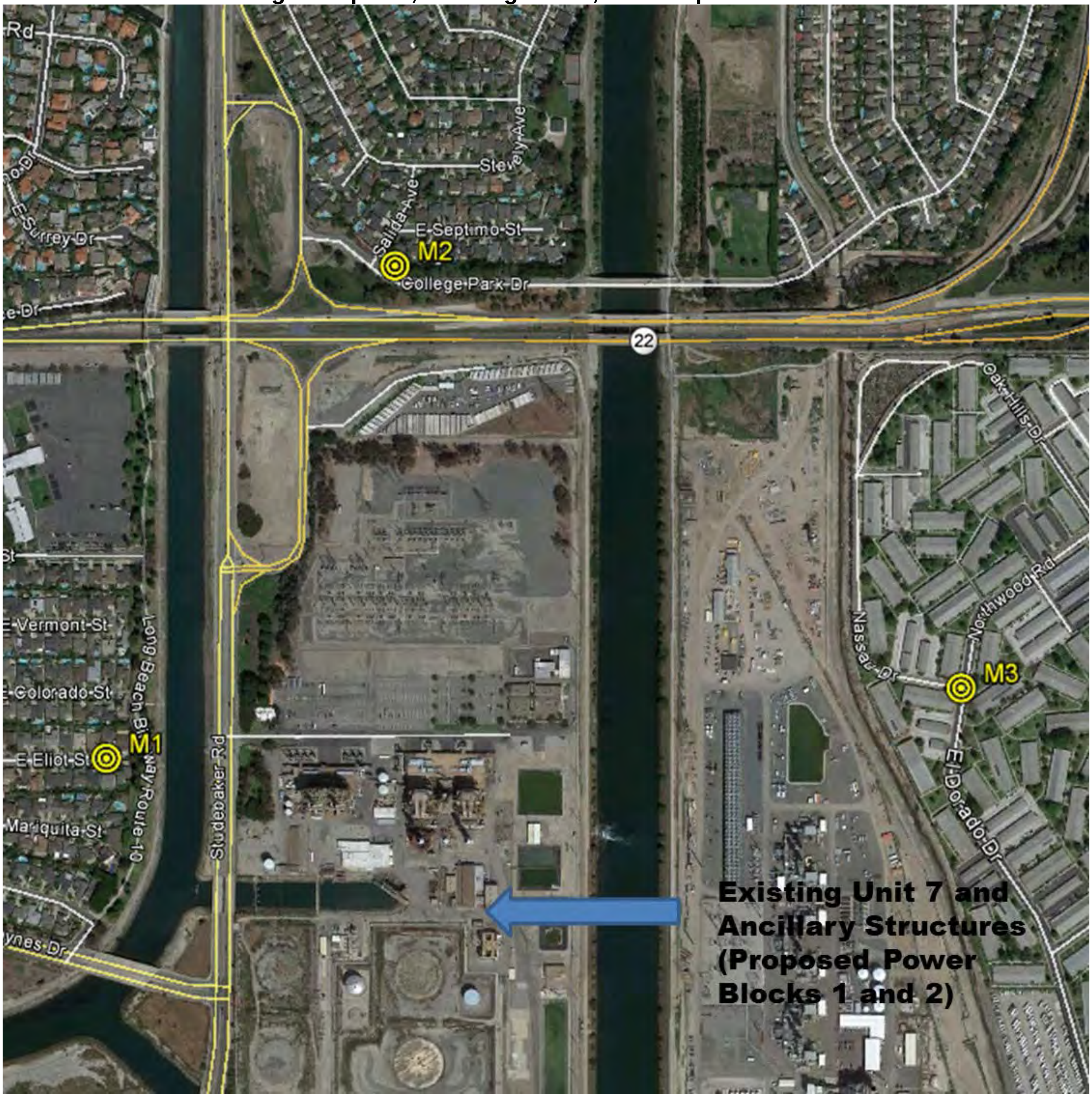
The construction, demolition, and operational activities provided in **Noise Table 3** would be limited to the approximate center of the project site (location of existing AGS Unit 7). **Noise Figure 1** provides a visual representation of the noise monitoring locations and the location where demolition and construction activities would occur. **Noise Table 4** provides the distances from each sensitive receptor to construction and demolition activities that would occur on the project site.

Noise Table 4
Monitoring Receptor Distances to Construction/Demolition Activities

Monitoring Receptor	Approximate Distance from Construction/Demolition Activities (feet)
M1[a]	1,500
M2[b]	2,500
M3[c]	2,100

Source: Staff derived from Google Earth.
Notes:
a. Residence at 6333 Eliot Street, Long Beach.
b. Residence at 6810 East Septimo Street, Long Beach.
c. Residence at the intersection of El Dorado Drive and Nassau Drive, Seal Beach.

Noise Figure 1
Monitoring Receptors, Existing Unit 7, and Proposed Power Blocks



Source: Staff derived from AEC 2015f, Figure 2.1-2, and Figure 5.7-1.

Compliance with LORS

Construction of an industrial facility such as a power plant is typically noisier than permissible under standard noise ordinances that apply to plant operations. In order to allow the construction of new facilities, construction noise during certain hours of the day is commonly exempt from enforcement by local ordinances. The applicable local noise LORS do not limit the loudness of construction noise, but staff compares the projected noise levels with ambient levels (please see the following discussion under CEQA Impacts).

Where circumstances require construction activity to proceed outside the allowable hours, city of Long Beach noise regulation § 8.80.340 Variance – Exemption from regulations, gives the Noise Control Officer authority to issue a variance for construction outside the approved hours, where conditions warrant. Because the Energy Commission has permitting jurisdiction over this project, it must take the responsibility of fulfilling the applicable rule in ensuring that such an activity is managed in a manner to ensure any significant noise impacts at the surrounding communities are mitigated to below a significance level, in compliance with CEQA. This has been done in this analysis; please see the following discussion under CEQA Impacts.

The applicant commits to performing noisy construction work during the times specified in the city of Long Beach noise regulation; that is: 7 a.m. to 7 p.m. on Mondays through Fridays and 9 a.m. to 6 p.m. on Saturdays. To ensure this requirement is met, staff proposes Condition of Certification **NOISE-6**, Construction Noise Restrictions, which restricts construction to those times. Therefore, the noise impacts of the AEC project construction activities would comply with the noise LORS.

CEQA Impacts

Since construction noise typically varies with time, it is most appropriately measured by and compared with the L_{eq} metric.

Staff has calculated the worst-case construction noise levels at the nearest residential receptors. **Noise Table 5** provides the predicted daytime construction worst case noise levels. The average L_{eq} values for M1, M2, and M3 were derived from the noise measurements taken in August, 2011 and based on values of L_{eq} for the periods of 7 a.m. to 10 p.m.

Noise Table 5
Predicted Daytime Construction Worst Case Noise Levels

Activity	Receptor	Daytime Ambient Noise L_{eq} (dBA)	Receptor Distance to Construction/ Demolition Activity (feet)	Daytime Construtction/ Demolition Noise[a] (dBA)	Daytime Cumulative Noise[b] (dBA)	Daytime Change[c] (dBA)
Demo Unit 7, Const Block 1 & 2	M1	55	1,500	59	61	6
	M2	59	2,500	55	61	2
	M3	57	2,100	56	60	3

Source: AEC 2015f, Table 5.7-6, and Staff derived.
Notes:
a. Daytime construction and demolition noise are estimated to be 71 dBA at 375 feet. Daytime construction and demolition noise at nearby receptors are calculated using the noise distance logarithm.
b. Daytime cumulative noise is calculated by adding the noise generated from construction and demolition to the daytime ambient noise using the noise addition logarithm.
c. The daytime change is the difference between the daytime cumulative noise and the daytime ambient noise.

As discussed under the Thresholds for Determining Significance for CEQA, Staff has concluded that a potential for a significant noise impact exists where the long-term noise of the project plus the background exceeds the background by more than 5 dBA at the nearest residential receptors in the late night and early morning hours when people are asleep. **Noise Table 5** shows that the noise impacts associated with construction/demolition could result in a potentially significant impact for the M1 receptor location. Therefore, staff proposes Condition of Certification **NOISE-6** (Construction Noise Restrictions), which restricts construction (except concrete pour) to daytime and would require construction equipment and trucks to avoid generating excessive and unnecessary noise.

Nighttime Concrete Pouring Activities

For AEC, it is inevitable that an extended or continuous concrete pour would carry over to nighttime (10 p.m. – 7 a.m.). For example, a monolithic pour of equipment foundations at the power block may require a full 24 hour cycle to complete. Ambient temperatures at night improve the curing and improve strength. When the noise generated by these kinds of activities technically exceed: 1) LORS limits specified in the Long Beach noise ordinance or the measured ambient limit already measured to exceed the stipulated ordinance limit and 2) CEQA limit of significance of 5 dBA, mitigation measures must be implemented.

For nighttime conditions at AEC, an exception must be requested by the project owner to the CPM to handle a monolithic concrete pour at the power block that would require continuous 24-hour operation. As shown in **Noise Table 6** below, ambient L_{eq} measurements are used to evaluate the impact of nighttime construction activities, instead of ambient L_{90} measurements used for steady-state operational noise, because the L_{eq} metric correlates to the variable nature of construction-related noise.

Noise Table 6
Predicted Nighttime Concrete Pour Noise Levels

Activity	Receptor	Nighttime L_{eq} Average (dBA)	Receptor Distance to Concrete Pour (feet)	Nighttime Concrete Pour Noise[a] (dBA)	Nighttime Cumulative Noise[b] (dBA)	Nighttime Change[c] (dBA)
Concrete Pour Power Block 1 & 2	M1	52	1,500	48	54	2
	M2	53	2,500	44	54	1
	M3	49	2,100	45	51	2

Source: AEC 2015f, Table 5.7-6 and Staff derived.
Notes:
a. Concrete pours are estimated to be 60 dBA at 375 feet. Nighttime noise from concrete pours at nearby receptors is calculated using the noise distance logarithm.
b. Cumulative noise is calculated by adding the noise created from concrete pours to the L_{eq} nighttime average ambient noise using the noise addition logarithm.
c. The nighttime change is the difference between nighttime cumulative noise and L_{eq} nighttime average.

As seen in **Noise Table 6** above, concrete pouring would result in increases of 1-2 dBA in nighttime ambient levels at M1, M2, and M3. Because, staff regards an increase of up to 5 dBA as a less-than-significant impact, this nighttime activity would be less than significant. Also, concrete pour would be required for only some of the major equipment (mainly, the gas turbines, HRSGs, and steam turbines), and the entire pour would be expected to last no more than two weeks at each power block. Nevertheless, the sensitivity to nighttime construction activities in the surrounding residential areas should not be undermined. Therefore, the applicant should be prepared to take mitigation measures quickly. So, the potentially excessive noise levels caused by nighttime concrete pour need to be mitigated by anticipating and controlling noise. To ensure nighttime noise from concrete pour would be effectively managed to reduce the impacts to less than significant, staff proposes Condition of Certification **NOISE-9** (**Concrete Pour Noise Control**), which would require this noise not to exceed the nighttime ambient levels by more than 5 dBA at M1, M2, and M3.

A host of appropriate mitigation measures are available to accomplish this. Examples include:

- Portable partitions that can be placed so that noise receptors are protected
- Encasing the transfer (concrete) pump boom arm to reduce effect of pump pulsing
- Repair of defective mufflers and tightening of rattling components
- Arranging work sites to avoid or minimize concrete truck reversing movements (the use of backup alarms), ensuring vehicles enter and exit work sites in a forward direction when possible, and installation of non-tonal and automatically adjusting reversing alarms
- Reorienting noisy equipment to minimize impact to residential receptors
- Using silenced powered equipment and silencing unsilenced powered equipment

- Assuring that vibration is sufficiently isolated, i.e., less than 0.2 in/sec at nearest sensitive receptor.

NOISE-9 also requires the following:

- Written notification of the initiation and duration of nighttime concrete pouring activities to the CPM and all the residents that could potentially be affected by this work.
- Written notification to the CPM when and if nighttime concrete pour activities could potentially exceed a threshold of ambient noise baseline plus 5 dBA.

Initiating measurements to address complaints, mitigation steps, and resolution would be performed using procedures specified in **NOISE-2** (Noise Complaint Process).

In light of the requirements contained in Conditions of Certification **NOISE-2** and **NOISE-9**, nighttime construction would create a less-than significant impact and satisfy the requirements of the local LORS (Long Beach Municipal Code, § 8.80.340).

Linear Facilities

The AEC would require a new 1,000-foot-long, 6 inch-diameter pipeline that would connect the AEC to the existing Long Beach Water Department (LBWD) sewer system. The new, offsite pipeline would commence at the west side of the site near the intersection of Studebaker Road and the northern cooling water canal. The pipeline would cross under Studebaker Road then turn south to the intersection with Loynes Drive. The pipeline would then turn west and will cross over the Los Cerritos Channel (affixed to the bridge). After crossing the channel, the pipeline would turn north on East Vista Street to connect into the existing system in the residential subdivision.

Construction of linear facilities typically moves along at a rapid pace, thus not subjecting any one receptor to noise impacts for more than two or three days. Further, construction activities would be limited to daytime hours. To ensure that these hours are, in fact, adhered to, in compliance with the LORS, staff proposes Condition of Certification **NOISE-6** (Construction Noise Restrictions).

Vibration

The only construction operation likely to produce vibration that could be perceived off site would be pile driving. The applicant anticipates that pile driving would be required for construction of the AEC (AEC 2015f, Section 5.7.4.2, and Table 5.7-7). The Caltrans measure of the threshold of distinct perception begins at 92 vibrational decibels, which correlates to a peak particle velocity of about 0.16 in/sec (inches per second). Condition of Certification **NOISE-8** (Pile Driving Management) would ensure potential vibrations from pile driving are limited to a peak particle velocity of 0.16 in/sec at the nearest sensitive receptors.

The U.S. Environmental Protection Agency (EPA) Office of Noise Abatement and Control estimate that pile driving activities could reach 104 dBA at a distance of 50 feet (86 dBA at a distance of 375 feet). **Noise Table 7** provides the estimated noise impacts on nearby receptors due to pile driving activities.

Noise Table 7
Predicted Pile Driving Noise Levels

	Daytime (L_{eq})				
Receptor	**Daytime Ambient Noise L_{eq} (dBA)**	**Receptor Distance to Power Block (feet)**	**Pile Driving Noise Unsilenced[a] (dBA)**	**Daytime Cumulative Noise[b] (dBA)**	**Daytime Change[c] (dBA)**
M1	55	1,500	74	74	19
M2	59	2,500	70	70	11
M3	57	2,100	71	71	14

Source: Staff derived.
Notes:
a. Pile driving is estimated to be 86 dBA at 375 feet (AEC 2015f, Table 5.7-7). Pile driving noise at nearby receptors is calculated using the noise distance logarithm.
b. Cumulative noise is calculated by adding the noise created by pile driving to the daytime ambient noise using the noise addition logarithm.
c. The daytime change is the difference between daytime cumulative noise and daytime ambient noise.

As seen in **Noise Table 7**, the increases in the existing ambient levels at these locations would range 11-19 dBA. These increases confirm that unsilenced pile drivers can cause a significant noise impact at the nearest noise-sensitive receptors. However, several methods are available for reducing noise generated by pile driving. These methods are: (1) the use of pads or impact cushions of plywood; (2) dampened driving, which involves some form of blanket or enclosure around the hammer; and (3) the use of vibratory drivers. These methods can be effective in reducing the noise by 8-15 dBA compared to unsilenced impact drivers.

To ensure that pile driving would be performed in a manner to reduce the potential for any noise complaints staff proposes Condition of Certification **NOISE-8** (Pile Driving Management). **NOISE-8** also requires the project owner to submit to the CPM, a description of the pile driving technique to be employed, including calculations showing its projected noise impacts at monitoring locations M1, M2, and M3. Also to ensure that pile driving would be limited to daytime hours staff proposes Condition of Certification **NOISE-6** (Construction Noise Restrictions).

Worker Effects

The applicant has acknowledged the need to protect construction workers from noise hazards and has recognized applicable LORS that would protect construction workers (AEC 2015f, Section 5.7.4.2, 5.7.4.3, 5.7.7). To ensure construction workers are, in fact, adequately protected, staff proposes Condition of Certification **NOISE-3** (Employee Noise Control Program).

Steam Blows

Typically, the loudest noise encountered during construction, inherent in building any project incorporating a steam turbine, is created by the steam blows. After erection and assembly of the feedwater and steam systems, the piping and tubing that comprise the steam path have accumulated dirt, rust, scale, and construction debris such as slag, weld spatter, dropped welding rods, and the like. If the plant were started up without thoroughly cleaning out these systems, all this debris would find its way into the steam turbine, quickly destroying the machine.

In order to prevent this from happening and before the steam system is connected to the turbine, the steam line is temporarily routed to the atmosphere. Traditionally, high pressure steam is then raised in the HRSG or a temporary boiler and allowed to escape to the atmosphere through the steam piping. This flushing action, referred to as a “high pressure steam blow”, is quite effective at cleaning out the steam system. A series of short steam blows, lasting two or three minutes each, are performed several times daily over a period of two or three weeks. At the end of this procedure, the steam lines are connected to the steam turbine, which is then ready for operation. Alternatively, high pressure compressed air can be substituted for steam.

If a traditional, high-pressure steam blow process is used, the applicant has proposed to equip the piping with a temporary silencer that would quite the noise of steam blows to 89 dBA or less, measured at a distance of 50 feet. High pressure steam or air blows, if unsilenced, can typically produce noise levels well above 89 dBA (AEC 2015f, Section 5.7.6.3).

Steam blows could be very disturbing at the nearest noise-sensitive receptors, depending on the frequency, duration, and noise intensity of venting. As shown in **Noise Table 8** below, this silenced steam blow would amount to a range of 56-61 dBA at M1 through M3 with a 2-6 dBA increase over the existing ambient levels at these locations; less than significant.

Noise Table 8
Predicted Steam Blows Noise Levels

	Daytime (L_{eq})				
Receptor	**Daytime Ambient Noise L_{eq} (dBA)**	**Receptor Distance to Power Block (feet)**	**Daytime Steam Blows Noise[a] (dBA)**	**Daytime Cumulative Noise[b] (dBA)**	**Daytime Change[c] (dBA)**
M1	55	1,500	60	61	6
M2	59	2,500	55	61	2
M3	57	2,100	57	60	3

Source: Staff derived.
Notes:
a. Steam Blows would be limited to 89 dBA at 50 feet. The noise produced by steam blows at nearby receptors is calculated using the noise distance logarithm.
b. Cumulative noise is calculated by adding the noise created by steam blows at nearby receptors to the daytime ambient noise using the noise addition logarithm.
c. The daytime change is the difference between daytime cumulative noise and daytime ambient noise.

Staff proposes Condition of Certification **NOISE-7** (**Steam Blow Restrictions**) in order to limit steam blow noise to 89 dBA at 50 feet, and to limit this activity to daytime hours.

Traffic Noise during Construction

The number of vehicles required for material delivery and worker commute would increase the traffic on the roadway network around the project. Truck trips transporting demolition waste and construction equipment and material deliveries are expected to peak in month 42 when 28 trucks per day (for a total of 56 truck trips per day) would transporting construction equipment and materials. Although the truck trips are expected to peak in month 42, the peak traffic generation (workforce and truck trips combined) is expected to occur during month 44, coinciding with peak construction workforce (AEC 2015f, AFC § 5.12.2.1)

The increased traffic is summarized in Table 5.12-8 of the AFC (AEC 2015f, Section 5.12). It was assumed that during the peak traffic month, the estimated number of workers daily round trips would be 1,024 (512 workers x 2 trips per worker = 1,024 total trips) plus 42 truck trips (21 trucks x 2 trips per truck = 42 total trips).

The expected increase in traffic due to construction and demolition activities along the Pacific Coast Highway (PCH) and California State Route 22, which are the main routes that would be utilized for access to the project site, would be no more than 1 percent, which would not measurably increase the existing ambient noise levels in the neighboring communities. Therefore, this noise impact would not be significant.

As discussed in the **Traffic and Transportation** section of this document, the project would include a traffic control plan (TCP) as required by Condition of Certification **TRANS-2**. The TCP would address the movement of workers, vehicles and materials, including arrival and departure schedules and designated workforce and delivery routes. Specifically, it would require any delivery truck(s) or workers that arrive at the site prior to allowable construction start time (7 a.m. on weekdays and 9 a.m. on Saturdays) to be parked on the AEC project site. The TCP would require a parking/staging plan for all phases of project construction and operation to require all project-related parking to be on the AEC project site with the exception of offsite parking related to construction of the wastewater linear (workers and construction equipment).

California Air Resources Board prohibits idling diesel-fueled large trucks (similar to those used to deliver construction materials to the project site) for more than 5 minutes.[3] The longer a noise source is heard, the more adverse impact it would potentially have. A 5-minute limit, as opposed to a longer time limit, or no time limit at all, which may potentially cause a significant effect, is one effective measure to sufficiently reduce the noise impact, while allowing timely delivery of construction material.

In addition, **NOISE-6** would require haul trucks and other engine-powered equipment to be equipped with adequate mufflers and other state-required noise attenuation devices; haul trucks to be operated in accordance with posted speed limits; and truck engine exhaust brake use (jake braking) to be limited to emergencies.

Therefore, with staff's proposed conditions of certification, project's traffic-related noise impacts would be less than significant.

[3] http://www.arb.ca.gov/msprog/truck-idling/factsheet.pdf

Operation Impacts and Mitigation

The primary noise sources of the AEC project, when operational, would include combustion turbine generators, heat recovery steam generators (HRSGs), exhaust stacks, combustion air inlets, air cooled condensers, steam turbine generators, electric transformers, and various pumps and fans. Staff compares the projected project noise with applicable LORS. In addition, staff evaluates any increase in noise levels at sensitive receptors due to the project in order to identify any significant adverse impacts.

As the first step, the applicant has outlined design measures to control and mitigate noise generated by operational elements of the project. Using a computer-generated noise model,[4] the applicant has modeled operating conditions that include mitigation measures designed to control plant noise (AE 2015f, Section 5.7.4.3). They include:

- Large noise barriers
- Enclosures around major equipment or equipment skids
- Additional or increased silencing
- Lagging or enclosing of the ACC ductwork
- Lagging of high-noise piping
- Steam vent silencers
- Low noise valves
- Low noise fans

Compliance with LORS

The applicant performed the noise modeling to determine the project's noise impacts on sensitive receptors M1, M2, and M3 (AEC 2015f, Section 5.7.4.3) and to determine whether the project would comply with the applicable LORS limits. The LORS maximum exterior level in District 4 is 70 dBA at the boundary of the district for all times of the day. The LORS maximum exterior level in District 1(predominantly residential with other land use types), which represents M1, and M2, is 50dBA for daytime (7 a.m. – 10 p.m.) and 45 dBA for nighttime (10 p.m. – 7 a.m.). The LORS maximum exterior level for Seal Beach, Zone 1, which represents M3, is 55dBA for daytime (7 a.m. – 10 p.m.) and 50 dBA for nighttime (10 p.m. – 7 a.m.).

If the existing ambient noise levels already exceed the applicable LORS limits, then the existing ambient noise levels become the applicable noise limits. The applicable noise limits are provided in **Noise Table 9** below.

[4] CADNA/A noise model, DataKustik GmbH, Munich 1996. Sound propagation factors adopted under ISO standard 9613-2 "Acoustics-Sound Attenuation during Propagation Outdoors"

Noise Table 9
LORS Limits

	Daytime			Nighttime		
Receptor	**L_{50} Daytime Average dBA**	**LORS Limit Daytime (dBA)**	**Applicable Daytime Noise Limit (dBA)**	**L_{50} Nighttime Average dBA**	**LORS Limit Nighttime (dBA)**	**Applicable Nighttime Noise Limit (dBA)**
M1	53	50[a]	53	51	45[a]	51
M2	57	50[a]	57	52	45[a]	52
M3	51	55[b]	55	48	50[b]	50

Source: AEC 2015f, Appendix 5.7A, and Long Beach Municipal Code § 8.80.160
Notes:

a. Receptors M1 and M2 are located in Long Beach, District 1 and are subject to those limits.
b. Receptor M3 is located in Seal Beach, Zone 1 and is subject to those limits.

The noise impact results and determination of compliance with applicable LORS are provided in **Noise Table 10** below.

Noise Table 10
Predicted Operational Noise Levels at Sensitive Residential Receptors

	Daytime			Nighttime		
Receptor	**Plant Noise L_{50} (dBA)**	**Applicable Daytime Noise Limit (dBA)**	**Compliant With Daytime LORS (YES/NO)**	**Plant Noise L_{50} (dBA)**	**Applicable Nighttime Noise Limit (dBA)**	**Compliant With Nighttime LORS (YES/NO)**
M1	55	53	NO	55	51	NO
M2	51	57	YES	51	52	YES
M3	53	55	YES	53	50	NO

Source: AEC 2015f, Section 5.7, Table 5.7-10.

As shown in **Noise Table 10**, the modeled plant operating noise impact of 55 dBA at receptor M1 would exceed the daytime and nighttime noise limits at receptor M1 and the modeled plant operating noise impact of 53 dBA at receptor M3 would exceed the nighttime noise limit at receptor M3.

However, as explained in the CEQA Impacts section below, an increase of above 5 dBA in existing nighttime ambient levels at residential receptors is considered significant. Because the results in the CEQA Impacts section below show that there would be a change in nighttime ambient noise at all three receptors above 5 dBA (**Noise Table 12**), additional noise mitigation would be required for compliance with CEQA. **Noise Table 13** shows the maximum plant noise that when added to the measured ambient nighttime lowest 4-hour average would not result in a cumulative increase of more than 5 dBA and would comply with CEQA. **Noise Table 11** compares the CEQA limiting plant noise to the applicable LORS.

Noise Table 11
CEQA Limiting Noise Limits at Sensitive Residential Receptors Compared to LORS Limits

	Daytime			Nighttime		
Receptor	**CEQA Limiting Plant Noise L_{90} (dBA)**	**Applicable Daytime Noise Limit (dBA)**	**Compliant With Daytime LORS (YES/NO)**	**CEQA Limiting Plant Noise L_{90} (dBA)**	**Applicable Nighttime Noise Limit (dBA)**	**Compliant With Nighttime LORS (YES/NO)**
M1	53	53	YES	53	51	NO
M2	49	57	YES	49	52	YES
M3	50	55	YES	50	50	YES

Source: Staff derived.

Noise Table 11 shows that with plant noise limits required for compliance with CEQA, the plant noise would also comply with all applicable LORS with the exception of the nighttime LORS limit at receptor M1. The CEQA limiting plant noise would exceed the applicable noise limit by 2 dBA. However, as explained in the CEQA impact section below, a change in background noise level of at least 5 dBA is required before any noticeable change in community response would be expected.

To ensure that the project would comply with the above noise level limits, staff proposes Condition of Certification **NOISE-4** (Operational Noise Restrictions). This condition of certification requires an operational noise survey to ensure project compliance. Similar to construction compliance and in addition to **NOISE-4**, staff proposes Condition of Certification **NOISE-2** (Noise Complaint Process), which would establish a noise complaint process requiring the applicant to resolve any problems that may be caused by operational noise.

With implementation of these conditions of certification, noise due to project operation would comply with the applicable LORS.

CEQA Impacts

Power plant noise is unique. A power plant under base load may operate essentially, as a steady, continuous, broadband noise source. Under load following duty, the power plant noise may be intermittent and start-up at random times for a system designed as load follower. This would be more noticeable at nighttime when background noises are particularly low. Where power plant noise is audible, it tends to define the background noise level. For this reason, and because power plant operational noise is steady in nature (as opposed to the intermittent and variable nature of noise from construction), staff typically compares projected power plant noise to existing ambient background (L_{90}) noise levels at affected sensitive receptors. If this comparison identifies a significant adverse impact, then feasible mitigation must be applied to the project to either reduce or remove that impact.

In many cases, a power plant operates around the clock for much of the year. AEC is expected to operate as an intermediate load and peaking facility, and it could likely operate at night, which could affect nearby residences if the noise impacts are left unmitigated. For residential receptors, staff evaluates project noise emissions by comparing them with nighttime ambient background levels; this evaluation assumes that the potential for public annoyance from power plant noise is greatest at night when people are trying to sleep. Nighttime ambient noise levels are typically lower than daytime levels and differences in background noise levels of 5 to 10 dBA are common. Staff determined it is prudent to average the lowest nighttime hourly background noise levels in terms of the L_{90} metric, which exceeds measured noise 90 percent of the time, to arrive at a reasonable baseline for comparison with the project's predicted noise level. Using this comparison, adverse impacts on residential receptors can be identified by comparing predicted power plant noise levels with the nighttime ambient background noise levels at the nearest sensitive residential receptors.

The applicant has predicted operational noise levels by modeling the plant operation, which is summarized in **Noise Table 12** for receptors M1, M2, and M3.

Noise Table 12
Predicted Operational Noise Levels at Sensitive Residential Receptors and CEQA Limits

Receptor	Plant Noise L_{50} (dBA)	Measured Ambient Nighttime Lowest 4-hr Avg L_{90} (dBA)	Cumulative Nighttime Noise Level (dBA)	Change in Nighttime Ambient (dB)	CEQA Compliance (Yes/No)
M1	55	49	56	7	NO
M2	51	45	52	7	NO
M3	53	46	54	8	NO

Source: AEC 2015f, Section 5.7, Table 5.7-10 and Appendix 5.7A, Tables 5.7A-1 through 5.7A-3.

An increase of above 5 dBA in existing nighttime ambient levels at residential receptors is significant. As shown in **Noise Table 12** the change in nighttime ambient noise at all three receptors would be above 5 dBA increase. **Noise Table 13** shows the maximum plant noise that when added to the measured ambient nighttime lowest 4-hour average would not result in a cumulative increase of more than 5 dBA and also shows the reduction needed from the applicant modeled noise impact for compliance with CEQA.

Noise Table 13
Maximum Plant Noise for CEQA Compliance

Receptor	CEQA Limiting Plant Noise[a] L_{50} (dBA)	Measured Ambient Nighttime Lowest 4-hr Avg L_{90} (dBA)	Cumulative Nighttime Noise Level (dBA)	Change in Nighttime Ambient (dB)	CEQA Compliance (Yes/No)	Reduction in Plant Noise Needed for CEQA Compliance[b] (dBA)
M1	53	49	54	5	YES	2
M2	49	45	50	5	YES	2
M3	50	46	51	5	YES	3

Source: Staff derived.
Notes:
a. The maximum level of plant noise that when added to the measured ambient nighttime lowest 4-hour average would not result in a cumulative increase of more than 5 dBA.
b. Reduction needed from the applicant modeled plant noise impact, as shown **Noise Table 12**, for compliance with CEQA.

In order to verify compliance with the allowable noise limits, staff proposes Condition of Certification **NOISE-4** (Operational Noise Restrictions) to ensure that the changes in noise levels due to project operation would neither cause the cumulative effect of operational noise to exceed the LORS limits nor increase noise above the 5 dBA (nighttime) significance threshold at the nearest sensitive receptors. **NOISE-4** requires an operational noise survey to ensure this, when the plant achieves a minimum of 85 percent of its rated capacity (between 85 and 100 percent of the rated capacity, the change in the overall plant noise would not be measurable at the project's noise sensitive receptors).

Tonal Noises

One possible source of annoyance could be strong tonal noises. Tonal noises are individual sounds (such as pure tones) which, while not louder than permissible levels, stand out in sound quality. The applicant plans to address overall noise in project design, and to take appropriate measures, as needed, to eliminate tonal noises as possible sources of annoyance (AEC 2015f, Section 5.7.4.3.).

High pressure steam released directly into the atmosphere has the potential to cause annoying tonal noise. Releasing steam directly into the atmosphere while stepping down electric generation would not occur in the same fashion as the existing boiler systems operating at Alamitos Generating Station. In modern combined cycle power plants, such as the proposed AEC, flash tanks and direct condenser bypass are used to condense the excess steam to liquid condensate instead of direct steam release.

To ensure that tonal noises do not cause public annoyance, staff proposes Condition of Certification **NOISE-4**, which would require mitigation measures, if necessary, to ensure the project would not create tonal noises.

Linear Facilities

All water pipes and gas pipes would be underground and therefore silent during plant operation. Noise effects from electrical interconnection lines typically do not extend beyond the lines' right-of-way easements and would be inaudible to receptors.

Vibration

Vibration from an operating power plant could be transmitted through two primary means: ground (ground-borne vibration), and air (airborne vibration).

The operating components of power plant consist of high-speed gas turbines and steam turbines, HRSGs, compressors, and various pumps. All of these pieces of equipment must be carefully balanced in order to operate; permanent vibration sensors are attached to the turbines and generators. Power plants operating under Energy Commission jurisdiction have not resulted in ground-borne or airborne vibration impacts. Staff agrees with the applicant that ground-borne vibration from the AEC project would be undetectable by any likely receptor.

Airborne vibration (low frequency noise) can rattle windows and objects on shelves, and can rattle the walls of lightweight structures. The AEC's chief source of airborne vibration would be the gas turbines' exhaust. In a modern power plant such as the proposed AEC, however, the exhaust must pass through the selective catalytic reduction (SCR) modules and the HRSG stack silencers before it reaches the atmosphere. The SCRs act as efficient mufflers. The combination of SCR units and stack silencers ensure that AEC would not cause perceptible airborne vibration effects.

Worker Effects

The applicant acknowledges the need to protect plant operating and maintenance workers from noise hazards and commits to compliance with all applicable LORS (AEC 2015f, Section 5.7.4.3). Signs would be posted in areas of the plant with noise levels exceeding 85 dBA (the level that OSHA recognizes as a threat to workers' hearing), and hearing protection would be required and provided. To ensure that plant operation and maintenance workers are adequately protected, staff proposes Condition of Certification **NOISE-5**. For further discussion of proposed worker safety conditions of certification, please see **Worker Safety and Fire Protection** section of this document.

CUMULATIVE IMPACTS AND MITIGATION

Section 15130 of the CEQA guidelines (Cal. Code of Regs., tit. 14) requires a discussion of cumulative environmental impacts. Cumulative impacts are two or more individual impacts (from existing and/or reasonably foreseeable projects) that, when considered together, compound or increase other environmental impacts. CEQA guidelines require that this discussion reflect the severity of the impacts and the likelihood of their occurrence, but do not need to provide as much detail as the discussion of impacts solely attributable to the project.

Staff has compiled a list of 54 projects which are, by proximity (approximate nine mile radius), size and possible construction schedule, candidates for consideration with AEC for cumulative effect. Because of the effect of noise propagation, and population and terrain in the project area, staff concludes that generated noise would only have a measureable impact within one mile of the project site. This reduces the perspective projects to five:

1. Demolition of existing AGS Units 1-6: The project would consist of demolishing existing AGS Units 1-6 once construction of the AEC has been completed and operation of the new facility has commenced. The existing units range in distance from 0.06 to 0.24 miles from the proposed AEC.

2. Los Cerritos Wetlands Conceptual Restoration Plan & Mitigation Bank: Synergy intends to establish a mitigation bank & wetlands habitat restoration area on the Synergy Oil Field. The project would include removing existing oil wells from the wetland habitat restoration area and drilling new wells on a 5-acre site that would be obtained from the Los Cerritos Wetlands Authority (LCWA). The project would be located approximately 0.22 miles from the proposed AEC site.

3. AES Recharge Battery Building: The proposed project would consist of three 44,550 square foot power storage facilities, located approximately 0.25 miles from the proposed AEC.

4. Alamitos Barrier Improvement Project: The proposed project involves the construction and operation of up to 20 injection wells, 4 monitoring wells and 4 piezometers along the Alamitos Barrier within the City of Seal Beach to help minimize saltwater intrusion into the Orange County Groundwater Basin. The project would be located approximately 0.40 miles from the proposed AEC.

5. Los Angeles Department of Water and Power Haynes Generating Station: The proposed project would consist of the addition of six General Electric LMS100 simple-cycle gas turbines and two emergency diesel-powered generators. The project would be located approximately 0.64 miles from the AEC site.

Demolition of Existing AGS Units 1-6

According to an MOU with the City, existing AGS Units 1-6 would be demolished once construction of the AEC has been completed and operation of the new facility has commenced. Although noise impacts on nearby residential receptors from the demolition of existing Units 1-6 may be higher than the noise impacts evaluated as part of construction of the AEC due to the fact that the existing units are located closer to residential receptors, the cumulative impacts are expected to be similar between the two phases evaluated. That is, the cumulative noise impacts from construction of the AEC with concurrent operation of the existing AGS, is expected to be similar to demolition of the existing AGS with concurrent operation of the AEC.

This is because construction and demolition activities are assumed to consist of similar types and quantities of noise generating equipment and therefore result in similar noise impacts. While construction/demolition of one facility would occur, it is assumed concurrent operation of the second would occur, and vice versa. Because all construction/demolition and concurrent operation would occur within the same project boundary, the cumulative impacts from both projects are expected to be similar, and therefore less than significant as determined by this staff assessment.

Los Cerritos Wetlands Conceptual Restoration Plan & Mitigation Bank
Synergy and the LCWA wish to enter into a non-binding agreement that provides for the exchange of each party's respective properties. As part of the exchange, Synergy intends to establish a mitigation bank on the northerly approximately 76-acres of the 156-acre Synergy Oil Field. It intends to implement a wetlands habitat restoration plan on the southerly approximately 72-acres of the Synergy Oil Field. It also intends to construct public access improvements, such as trails and a parking lot on existing disturbed areas, and convert an existing building for use as a visitor's center, within approximately 4-acres of the Synergy Oil Field. The project would be located approximately 0.22 miles from the proposed AEC site.

As part of the restoration of the southerly approximately 76-acres, Synergy intends to remove, over time, approximately 58 oil wells from the Synergy Oil Field and would conduct its oil production activities at the 5-acre LCWA site that would be obtained in the exchange. Synergy would also conduct oil production activities from a second off-site location unaffiliated with LCWA.

Synergy has requested the preparation of an environmental impact report pursuant to CEQA by the City of Long Beach. Synergy and LCWA do not intend to be legally bound to consummate the property exchange until the agreement is executed by the parties following any required CEQA review, including any required public hearings.

Because the Los Cerritos Wetlands Conceptual Restoration Plan & Mitigation Bank has not yet entered the EIR phase, a potential construction schedule has not been provided. It is uncertain whether there would be an overlap in construction activities between the Los Cerritos Wetlands Conceptual Restoration Plan & Mitigation Bank and the AEC, and if so, what activities would occur. It is also unclear if there would be any potential for an overlap of operational noise impacts. As part of the CEQA review, the City of Long Beach would evaluate any potential noise and vibration impacts, including cumulative impacts, and require necessary mitigation to reduce the proposed project's impacts to a level of less than significant.

AES Battery Energy Storage System (BESS)

The BESS project would include three 100-MW containment buildings, constructed in sequential phases from east to west. Each building would be 50 feet tall, 270 feet long, and 165 feet wide (44,550 square feet). Each energy storage building would contain two battery storage levels, electrical controls, & HVAC units. Construction of the proposed BESS is expected to start the third quarter of 2019, after major mechanical completion of the AEC CCGT power block. Completion of the first 100-MW building is planned for late 2020. The second and third energy storage buildings are expected to be constructed and operational in 2021 and 2022, respectively.

A conceptual site plan has been submitted to the City of Long Beach. However, the proposed project is still in the entitlement process. The City anticipates receiving revised open space, landscape, & parking plans. City staff expects to consider the AEC proposal together with the BESS to assess consistency with City development requirements.

Because the BESS has not yet entered the EIR phase it is uncertain what construction activities, if any, would occur concurrently between the BESS and the AEC. It is also unclear if there would be any potential for an overlap of operational noise impacts. As part of the CEQA review, the City of Long Beach would evaluate any potential noise and vibration impacts, including cumulative impacts, and require necessary mitigation to reduce the proposed project's impacts to a level of less than significant.

Alamitos Barrier Improvement Project

The Alamitos Barrier currently consists of 41 injection wells, 221 active monitoring wells, and four inactive extraction wells. The injection wells are on a continuous 24-hour operation to prevent seawater from migrating into deeper potable aquifers of the Central Basin in Los Angeles County and the Orange County Groundwater Basin. The proposed improvement project would add up to 20 injection wells, 4 monitoring wells and 4 piezometers along the Alamitos Barrier within the City of Seal Beach to help minimize saltwater intrusion. A Final Environmental Impact Report (EIR) has been completed for the Orange County Water District for the Alamitos Barrier Improvement Project that highlights expected noise impacts during construction and operation and the recommended mitigation for such impacts (OCWD 2013).

Operation

The proposed injection wells would operate continuously 24 hours a day, seven days per week. All of the injection and monitoring wells would be housed in underground vaults. The operation of the wells would not increase existing noise levels in the project area (OCWD 2013, Section 3, p. 135) and would therefore not have a significant cumulative impact with the AEC project.

Construction

Construction of the proposed project would occur just west of the Los Alamitos Channel north of 2nd Street. The injection wells and monitoring wells would require approximately 4 days each of continuous 24-hour drilling. Construction impacts for each group of similar well sites have been analyzed in the EIR. Where possible significant impacts are shown, mitigation is being proposed to reduce the impacts to a level of less than significant. Mitigation measures that would be required include: 1) utilizing temporary noise barriers to reduce noise impacts throughout the project site; 2) providing written notification to nearby residents about construction activities; and 3) utilizing construction equipment that contains noise reduction features.

The EIR has identified that even with the implementation of proposed mitigation measures, potential noise impacts above existing noise standards at some of the injection and monitoring wells could occur. Due to the need for 24-hour drilling, a majority of the impacts occur at nighttime when construction activities are not exempt from noise standards. NOISE-6 would limit heavy equipment operation and noisy construction and demolition work at the AEC project site to daytime hours.

Los Angeles Department of Water and Power Haynes Generating Station

Haynes Generating Station, which is located approximately 0.64 miles from the AEC, is a natural gas and steam power plant located in the city of Long Beach that was built in the mid-1960s. In 2005, LADWP repowered Units 3 and 4 utilizing combined cycle technology. Repowering is a common term among electric utilities that refers to rebuilding power plants by taking an old generating unit out of commission, dismantling it, and building a new, modern one at the same site.

LADWP plans to repower the Haynes Generating Station in several phases:

- Units 3 and 4 were repowered in 2005
- Units 5 and 6 were proposed to be repowered in 2013
- Units 1 and 2 are expected to be repowered in 2023

Staff does not expect the repowering of remaining units at the Haynes Generating Station in addition to construction and operation of the AEC to result in any significant cumulative noise impacts due to the distances between the two sites, in addition to the heavy development and noise attenuation that currently exists between the two sites.

FACILITY CLOSURE

All operational noise from the project would cease when the AEC project closes, and no further adverse noise impact from its operation would be possible. The remaining potential temporary noise source would be the dismantling of the project structures and equipment, as well as any site restoration work that may be performed. Since this noise would be similar to that caused by the original demolition and construction, it could be similarly treated -- that is, noisy work could be performed during daytime hours with machinery and equipment that are properly insulated and/or equipped with mufflers. Any noise LORS in existence at that time would apply. Applicable conditions of certification included in the Energy Commission decision would also apply to facility closure, unless modified by a Petition to Amend.

CONCLUSIONS

If built and operated in conformance with the proposed conditions of certification, it is staff's position that AEC would comply with all applicable noise and vibration LORS. Staff concludes that the project would produce no significant adverse noise impacts under CEQA guidelines on people within the project area, including the minority populations, directly, indirectly, or cumulatively.

Staff recommends conditions of certification addressing worker and employee protection (**NOISE-3**, Employee Noise Control Program, and **NOISE-5**, Occupational Noise Survey), measurement and verification that noise performance criteria are met at project's noise-sensitive residential receptors (**NOISE-4**, Operational Noise Restrictions), restrictions on construction activities (**NOISE- 6**, Construction Noise Restrictions, **NOISE-7**, Steam Blow Restrictions, and **NOISE-8**, Pile Drive Management). Also, **NOISE-9** (Concrete Pour Noise Control) requires that nighttime concrete pouring activities remain within the required noise limits. Finally, **NOISE-1**

(Public Notification Process) and **NOISE-2** (Noise Complaint Process) describe the process of complaint investigation and resolution.

Regarding the staff's retention of responsibility to monitor the enforcement of these conditions of certification, staff works under the authority of the CPM to monitor and review the reporting of plant performance during construction and the full term of operation, including facility closure.

PROPOSED CONDITIONS OF CERTIFICATION

PUBLIC NOTIFICATION PROCESS

NOISE-1 Prior to the start of ground disturbance, the project owner shall notify all residents within one mile of the project site and one-half mile of the linear facilities, by mail, or by other effective means, of the commencement of project construction. At the same time, the project owner shall establish a telephone number for use by the public to report any undesirable noise conditions associated with the construction demolition, and operation of the project. If the telephone is not staffed 24 hours a day, the project owner shall include an automatic answering feature, with date and time stamp recording, to answer calls when the phone is unattended. This or a similarly effective telephone number shall be posted at the project site during construction where it is visible to passersby. This telephone number shall be maintained until the project has been operational for at least one year.

Verification: At least 15 days prior to ground disturbance, the project owner shall transmit to the compliance project manager (CPM) a statement, signed by the project owner's project manager, stating that the above notification has been performed, and describing the method of that notification. This communication shall also verify that the telephone number has been established and posted at the site, and shall provide that telephone number.

NOISE COMPLAINT PROCESS

NOISE-2 Throughout the construction, demolition, and operation of the project, the project owner shall document, investigate, evaluate, and attempt to resolve all project-related noise complaints[5]. The project owner or its authorized agent shall:

- use the Noise Complaint Resolution Form (below), or a functionally equivalent procedure acceptable to the CPM, to document and respond to the 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;

[5] A project-related noise complaint is a complaint about noise that is caused by the P3 project as opposed to another source and may constitute a violation by the project of any noise condition of certification, which is documented by an individual or entity affected by such noise.

- if the noise is 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 that states 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 with the CPM a Noise Complaint Resolution Form, shown below, that documents the resolution of the complaint. If mitigation is required to resolve the complaint, and the complaint is not resolved within a three business-day period, the project owner shall submit an updated Noise Complaint Resolution Form when the mitigation is implemented.

EMPLOYEE NOISE CONTROL PROGRAM

NOISE-3 The project owner shall submit to the CPM for review and approval a noise control program. The noise control program shall be used to reduce employee exposure to high (above permissible) noise levels during construction and demolition in accordance with Title 8, California Code of Regulations, Sections 5095-5099, and Title 29, Code of Federal Regulations, Section 1910.95.

Verification: At least 30 days prior to the start of ground disturbance, the project owner shall submit the noise control program to the CPM. The project owner shall make the program available to Cal-OSHA upon request.

OPERATIONAL 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 normal steady-state plant operation alone, during the four quietest consecutive hours of the nighttime, to exceed an average of 53 dBA L_{90} measured at or near monitoring location M1, 49 dBA L_{90} measured at or near monitoring location M2, and 50 dBA L_{90} measured at or near monitoring location M3.

No new pure-tone components (as defined in **Noise Table A1**, bottom row defining pure tone) shall be caused by the project. No single piece of equipment shall be allowed to stand out as a source of noise that draws project-related noise complaints.

When the project first achieves a sustained output of 85 percent or greater of its rated capacity for each power block, the project owner shall conduct a 25-hour community noise survey at monitoring locations M1, M2, and M3, or at a closer location acceptable to the CPM. This survey 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.

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 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.

If the results from the noise survey indicate that the power plant noise at the affected receptor sites exceed the above values, mitigation measures shall be implemented to reduce noise to a level of compliance with these limits.
If the results from the noise survey indicate that pure tones are present, mitigation measures shall be implemented to reduce the pure tones to a level that complies with **Noise Table A1** (bottom row defining pure tone) below.

Verification: The above noise survey shall be conducted each time a power block becomes operational and shall take place within 90 days of the power block first achieving a sustained output of 85 percent or greater of its rated capacity. The second survey shall include the combined operation of both power blocks at 85 percent, or greater, of the overall plant rated capacity with all turbine generators operating. Within 15 days after completing this survey, the project owner shall submit a summary report to the CPM. Included in the survey report shall be a description of any additional mitigation measures necessary to achieve compliance with the above listed noise limits, and a schedule, subject to CPM approval, for implementing these measures. When these measures are implemented and in place, the project owner shall repeat the noise survey.

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

OCCUPATIONAL NOISE SURVEY

NOISE-5 Following the project’s attainment of a sustained output of 85 percent or greater of its rated capacity, the project owner shall conduct an occupational noise survey to identify any noise hazardous areas within the power plant.

The survey shall be conducted by a qualified person in accordance with the provisions of Title 8, California Code of Regulations, Sections 5095-5099 (Article 105) and Title 29, Code of Federal Regulations, Section 1910.95. The survey results shall be used to determine the magnitude of employee noise exposure.

The project owner shall prepare a report of the survey results and, if necessary, identify proposed mitigation measures to be employed in order to comply with the above regulations.

Verification: Within 30 days after completing each survey, the project owner shall submit the noise survey report to the CPM. The project owner shall make the report available to OSHA and Cal-OSHA upon request from OSHA and Cal-OSHA.

CONSTRUCTION AND DEMOLITION NOISE RESTRICTIONS

NOISE-6 Heavy equipment operation and noisy construction and demolition work relating to any project features, including pile driving, shall be restricted to the times delineated below:

Mondays through Fridays and designated holidays:	7:00 a.m. to 7:00 p.m.
Saturdays:	9:00 a.m. to 6:00 p.m.
Sundays:	Construction not allowed

Nighttime concrete pour shall comply with Condition of Certification **NOISE-9**.

Haul trucks and other engine-powered equipment shall be equipped with adequate mufflers and other state-required noise attenuation devices. Haul trucks shall be operated in accordance with posted speed limits. Truck engine exhaust brake use (jake braking) shall be limited to emergencies.

Verification: Prior to ground disturbance, the project owner shall transmit to the CPM a statement acknowledging that the above restrictions will be observed throughout the construction of the project.

Construction equipment generating excessive noise shall be updated or replaced. Temporary acoustic barriers shall be installed around stationary construction noise sources, if required to minimize construction noise. Reorient construction equipment, and relocate construction staging areas, when possible, to minimize the noise impact at nearest noise-sensitive receptors.

STEAM BLOW RESTRICTIONS

NOISE-7 When using a high-pressure steam blow process, the project owner shall equip steam blow piping with a temporary silencer that quiets the noise of steam blows to no greater than 89 dBA measured at a distance of 50 feet. The steam blows shall be conducted between 7:00 a.m. and 7:00 p.m. Mondays through Fridays, and between 9:00 a.m. and 6:00 p.m. on Saturdays. The project owner shall notify the residents and business owners in the vicinity of the project site prior to start of steam blow activities.

Verification: At least 15 days prior to the first steam blow, the project owner shall notify all residents and business owners within one mile of the power block for which steam blow activities are scheduled. The notification may be in the form of letters, or other effective means as approved by the CPM. The notification shall include a description of the purpose and nature of the steam blows, the planned schedule, expected sound levels at monitoring locations M1, M2, and M3 and explanation that it is a one-time activity and not part of normal plant operation.

PILE DRIVING MANAGEMENT

NOISE-8 The project owner shall perform pile driving in a manner to reduce the potential for any project-related noise and vibration complaints. The project owner shall notify the residents and business owners in the vicinity of pile driving prior to start of these activities. Vibrations from pile driving shall be limited to a peak particle velocity of 0.16 in/sec at the nearest noise-sensitive receptors, M1, M2, and M3.

Verification: At least 15 days prior to first pile driving, the project owner shall submit to the CPM a description of the pile driving technique to be employed, including calculations showing its projected noise impacts at monitoring locations M1, M2, and M3.

At least 10 days prior to first production pile driving for each power block, the project owner shall notify the residents and business owners within one mile of the pile driving. The notification may be in the form of letters, or other effective means, as approved by the CPM. In this notification, the project owner shall state that it will perform this activity in a manner to reduce the potential for any project-related noise and vibration complaints. The project owner shall submit a copy of this notification to the CPM prior to the start of pile driving for each power block.

CONCRETE POUR NOISE CONTROL

NOISE-9 When concrete work requires continuous pouring that may extend beyond the times specified in Condition of Certification **NOISE-6**, the project owner shall notify all residences in the vicinity of the project site of the commencement date and the duration of concrete pouring activities.

The average L_{eq} noise levels from these activities shall not exceed the hourly average nighttime ambient L_{eq} levels at M1, M2, and M3, by more than 5 dBA. In the event that noise complaints require resolution pursuant to Condition of Certification **NOISE-2**, the complaint will be resolved according to the procedures outlined in **NOISE-2**.

Verification: At least 10 days prior to concrete pouring activities that are anticipated to extend beyond the times specified in Condition of Certification **NOISE-6**, the project owner shall submit a statement to the CPM, specifying the time of night and the number of nights for which activities will occur, the approximate distance of activities to receptor locations M1, M2, and M3, and the expected sound levels at these receptors, stating that the expected sound levels from this activity do not exceed the nighttime noise limits specified above.

At the same time, the project owner shall notify the residents within one mile of this work. The notification may be in the form of letters, or other effective means as approved by the CPM. In this notification, the project owner shall state that it will perform this activity in a manner to ensure excessive noise is prohibited, and include a telephone number that will be staffed throughout this activity for use by the public to report any undesirable noise conditions associated with this activity. The project owner shall submit a copy of this notification to the CPM prior to the start of this work.

EXHIBIT 1 - NOISE COMPLAINT RESOLUTION FORM

Alamitos Energy Center
(13-AFC-01)

NOISE COMPLAINT LOG NUMBER ________________________

Complainant's name and address:

Phone number: ________________________

Date complaint received: ________________________
Time complaint received: ________________________

Nature of noise complaint:

Definition of problem after investigation by plant personnel:

Date complainant first contacted: ________________________

Initial noise levels at 3 feet from noise source _________ dBA Date: _____________

Initial noise levels at complainant's property: __________ dBA Date: ____________

Final noise levels at 3 feet from noise source: ________ dBA Date: _____________

Final noise levels at complainant's property: __________ dBA Date: ____________

Description of corrective measures taken:

Complainant's signature: ________________________ Date: ____________

Approximate installed cost of corrective measures: $ ____________
Date installation completed: ____________
Date first letter sent to complainant: ____________ (copy attached)
Date final letter sent to complainant: ____________ (copy attached)

This information is certified to be correct:

Plant Manager's Signature: ________________________

(Attach additional pages and supporting documentation, as required).

REFERENCES

AEC 2015d- Alamitos Suppl. AFC Appendices 5.1G to 5.10B (TN 206427-3). Submitted on October 26, 2015. CEC/Docket on October 26, 2015.

AEC 2015f- Alamitos Energy Center Supplemental AFC (TN 206427-1). Submitted on October 26, 2015. CEC/Docket on October 26, 2015.

AEC 2015s- Alamitos Data Response Set 6 (TN 207013) dated December 14, 2015. Submitted to CEC/Docket on December 14, 2015.

City of Long Beach 1975 – City of Long Beach General Plan, Noise Element.

City of Long Beach 2016 – City of Long Beach Municipal Code, Noise Ordinance, Chapter 8.80.

City of Seal Beach 2016 – City of Seal Beach Municipal Code, Noise Ordinance, Title 7: Public Peace, Morals, and Welfare, Chapter 7.15.

OCWD 2013 - Final Environmental Impact Report, Orange County Water District, Alamitos Barrier Improvement Project, State Clearinghouse No. 2012031027. February 2013.

NOISE APPENDIX A
FUNDAMENTAL CONCEPTS OF COMMUNITY NOISE

To describe noise environments and to assess impacts on noise sensitive areas, a frequency weighting measure, which simulates human perception, is customarily used. It has been found that A-weighting of sound intensities best reflects the human ear's reduced sensitivity to low frequencies and correlates well with human perceptions of the annoying aspects of noise. The A-weighted decibel scale (dBA) is cited in most noise criteria. Decibels are logarithmic units that conveniently compare the wide range of sound intensities to which the human ear is sensitive. **Noise Table A1** provides a description of technical terms related to noise.

Noise environments and consequences of human activities are usually well represented by an equivalent A-weighted sound level over a given time period (L_{eq}), or by average day and night A-weighted sound levels with a nighttime weighting of 10 dBA (L_{dn}). Noise levels are generally considered low when ambient levels are below 45 dBA, moderate in the 45 to 60 dBA range, and high above 60 dBA. Outdoor day-night sound levels vary over 50 dBA depending on the specific type of land use. Typical L_{dn} values might be 35 dBA for a wilderness area, 50 dBA for a small town or wooded residential area, 65 to 75 dBA for a major metropolis downtown (e.g., San Francisco), and 80 to 85 dBA near a freeway or airport. Although people often accept the higher levels associated with very noisy urban residential and residential-commercial zones, they nevertheless are considered to be levels of noise adverse to public health.

Various environments can be characterized by noise levels that are generally considered acceptable or unacceptable. Lower levels are expected in rural or suburban areas than what would be expected for commercial or industrial zones. Nighttime ambient levels in urban environments are about seven decibels lower than the corresponding average daytime levels. The day-to-night difference in rural areas away from roads and other human activity can be considerably less. Areas with full-time human occupation that are subject to nighttime noise, which does not decrease relative to daytime levels, are often considered objectionable. Noise levels above 45 dBA at night can result in the onset of sleep interference effects. At 70 dBA, sleep interference effects become considerable (Effects of Noise on People, U.S. Environmental Protection Agency, December 31, 1971).

In order to help the reader understand the concept of noise in decibels (dBA), **Noise Table A2** has been provided to illustrate common noises and their associated sound levels, in dBA.

Noise Table A1
Definition of Some Technical Terms Related to Noise

Terms	Definitions
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a Sound Level Meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this testimony are A-weighted.
L_{10}, L_{50}, & L_{90}	The A-weighted noise levels that are exceeded 10 percent, 50 percent, and 90 percent of the time, respectively, during the measurement period. L_{90} is generally taken as the background noise level.
Equivalent Noise Level, L_{eq}	The energy average A-weighted noise level during the Noise Level measurement period.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 4.8 decibels to levels in the evening from 7 p.m. to 10 p.m., and after addition of 10 decibels to sound levels in the night between 10 p.m. and 7 a.m.
Day-Night Level, L_{dn} or DNL	The Average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10 p.m. and 7 a.m.
Ambient Noise Level	The composite of noise from all sources, near and far. The normal or existing level of environmental noise at a given location (often used for an existing or pre-project noise condition for comparison study).
Intrusive Noise	That noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.
Pure Tone	A pure tone is defined by the Model Community Noise Control Ordinance as existing if the one-third octave band sound pressure level in the band with the tone exceeds the arithmetic average of the two contiguous bands by 5 decibels (dB) for center frequencies of 500 Hz and above, or by 8 dB for center frequencies between 160 Hz and 400 Hz, or by 15 dB for center frequencies less than or equal to 125 Hz.
Source: Guidelines for the Preparation and Content of Noise Elements of the General Plan, Model Community Noise Control Ordinance, California Department of Health Services 1976, 1977.	

Noise Table A2
Typical Environmental and Industry Sound Levels

Noise Source (at distance)	A-Weighted Sound Level in Decibels (dBA)	Noise Environment	Subjective Impression
Civil Defense Siren (100')	140-130		Pain Threshold
Jet Takeoff (200')	120		Very Loud
Very Loud Music	110	Rock Music Concert	
Pile Driver (50')	100		
Ambulance Siren (100')	90	Boiler Room	
Freight Cars (50')	85		
Pneumatic Drill (50')	80	Printing Press Kitchen with Garbage Disposal Running	Loud
Freeway (100')	70		Moderately Loud
Vacuum Cleaner (100')	60	Data Processing Center Department Store/Office	
Light Traffic (100')	50	Private Business Office	
Large Transformer (200')	40		Quiet
Soft Whisper (5')	30	Quiet Bedroom	
	20	Recording Studio	
	10		Threshold of Hearing
Source: Handbook of Noise Measurement, Arnold P.G. Peterson, 1980			

Subjective Response to Noise

The adverse effects of noise on people can be classified into three general categories:

- Subjective effects of annoyance, nuisance, dissatisfaction.
- Interference with activities such as speech, sleep, and learning.
- Physiological effects such as anxiety or hearing loss.

The sound levels associated with environmental noise, in almost every case, produce effects only in the first two categories. Workers in industrial plants can experience noise effects in the last category. There is no completely satisfactory way to measure the subjective effects of noise, or of the corresponding reactions of annoyance and dissatisfaction, primarily because of the wide variation in individual tolerance of noise.

One way to determine a person's subjective reaction to a new noise is to compare the level of the existing (background) noise, to which one has become accustomed, with the level of the new noise. In general, the more the level or the tonal variations of a new noise exceed the previously existing ambient noise level or tonal quality, the less acceptable the new noise will be, as judged by the exposed individual.

With regard to increases in A-weighted noise levels, knowledge of the following relationships can be helpful in understanding the significance of human exposure to noise.

1. Except under special conditions, a change in sound level of one dB cannot be perceived.

2. Outside of the laboratory, a three dB change is considered a barely noticeable difference.

3. A change in level of at least five dB is required before any noticeable change in community response would be expected.

4. A ten dB change is subjectively heard as an approximate doubling in loudness and almost always causes an adverse community response. (Kryter, Karl D., The Effects of Noise on Man, Academic Press, New York, 1970).

Combination of Sound Levels

People perceive both the level and frequency of sound in a non-linear way. A doubling of sound energy (for instance, from two identical automobiles passing simultaneously) creates a three dB increase (i.e., the resultant sound level is the sound level from a single passing automobile plus three dB). The rules for decibel addition used in community noise prediction are:

Noise Table A3
Addition of Decibel Values

When two decibel values differ by:	Add the following amount to the larger value
0 to 1 dB	3 dB
2 to 3 dB	2 dB
4 to 9 dB	1 dB
10 dB or more	0
Figures in this table are accurate to ± 1 dB.	

Source: Architectural Acoustics, M. David Egan, 1988

Sound and Distance

Doubling the distance from a noise source reduces the sound pressure level by six dB.

Increasing the distance from a noise source 10 times reduces the sound pressure level by 20 dB.

Worker Protection

OSHA noise regulations are designed to protect workers against the effects of noise exposure, and list permissible noise level exposure as a function of the amount of time to which the worker is exposed:

Noise Table A4
OSHA Worker Noise Exposure Standards

Duration of Noise (Hrs/day)	A-Weighted Noise Level (dBA)
8.0	90
6.0	92
4.0	95
3.0	97
2.0	100
1.5	102
1.0	105
0.5	110
0.25	115

Source: 29 C.F.R. § 1910.

PUBLIC HEALTH

Huei-An (Ann) Chu, Ph.D.

SUMMARY OF CONCLUSIONS

California Energy Commission staff has analyzed the potential human health risks associated with construction, demolition, and operation of the proposed Alamitos Energy Center (AEC). Staff's analysis of potential health impacts was based on a highly conservative health protective methodology that accounts for impacts to the most sensitive individuals in a given population. Staff concludes that there would be no significant health impacts from the project's air emissions.

INTRODUCTION

The purpose of this section of the Preliminary Staff Assessment (PSA) is to determine if emissions of toxic air contaminants (TACs) from the proposed AEC would have the potential to cause significant adverse public health impacts or to violate thresholds for the protection of public health. If potentially significant health impacts are identified, staff would identify and recommend mitigation measures necessary to reduce such impacts to insignificant levels.

In addition to the analysis contained in this **Public Health** section that focuses on potential effects to the public from emissions of toxic air contaminants, Energy Commission staff address the potential impacts of regulated, or criteria, air pollutants in the **Air Quality** section of this PSA and assess the impacts on public and workers health from accidental releases of hazardous materials in the **Hazardous Materials Management** and **Worker Safety and Fire Protection** sections. The health and nuisance effects from electric and magnetic fields are discussed in the **Transmission Line Safety and Nuisance** section. Pollutants released from the project's wastewater streams are discussed in the **Soil and Water section**. Releases in the form of hazardous and nonhazardous wastes are described in the **Waste Management** section.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

Public Health Table 1 lists the federal, state, and local laws, ordinances, regulations, and standards (LORS) applicable to the control of TAC emissions and mitigation of public health impacts for AEC. This PSA evaluates compliance with these LORS.

Public Health Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable LORS	***Description***
Federal	
Clean Air Act section 112 (Title 42, U.S. Code section 7412)	Section 112 of the Clean Air Act addresses emissions of hazardous air pollutants (HAPs). This act requires new sources that emit more than 10 tons per year of any specified HAP or more than 25 tons per year of any combination of HAPs to apply Maximum Achievable Control Technology (MACT).
40 Code of Federal Regulations (CFR) Part 63 Subpart YYYY (National Emission Standard for Hazardous Air Pollutants for Stationary Combustion Turbines)	This regulation applies to gas turbines located at major sources of HAP emissions. A major source is defined as a facility with emissions of 10 tons per year (tpy) or more of a single HAP or 25 tpy or more of a combination of HAPs based on the potential to emit.
40 Code of Federal Regulations (CFR) Part 68 (Risk Management Plan)	This regulation requires facilities storing or handling significant amounts of acutely hazardous materials to prepare and submit Risk Management Plans.
State	
California Health and Safety Code section 25249.5 et seq. (Proposition 65)	These sections establish thresholds of exposure to carcinogenic substances above which Proposition 65 exposure warnings are required.
California Health and Safety Code, Article 2, Chapter 6.95, Sections 25531 to 25541; California Code of Regulations Title 19 (Public Safety), Division 2 (Office of Emergency Services), Chapter 4.5 (California Accidental Release Prevention Program)	These sections require facilities storing or handling significant amounts of acutely hazardous materials to prepare and submit Risk Management Plans.
California Health and Safety Code section 41700	This section states that “no person shall discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause injury or damage to business or property.”

California Health and Safety Code Sections 44300 et seq.	Air Toxics Hot Spots Program requires participation in the inventory and reporting program at the local air pollution control district level.
California Health and Safety Code Sections 44360 to 44366 (Air Toxics "Hot Spots" Information and Assessment Act—AB 2588)	These sections require that, based on results of a health risk assessment (HRA) conducted per ARB (California Air Resources Board) / OEHHA (Office of Environmental Health Hazard Assessment) guidelines, toxic contaminants do not exceed acceptable levels.
California Public Resource Code section 25523(a); Title 20 California Code of Regulations section 1752.5, 2300–2309 and Division 2 Chapter 5, Article 1, Appendix B, Part (1); California Clean Air Act, Health and Safety Code section 39650, et seq.	These sections require a quantitative health risk assessment for new or modified sources, including power plants that emit one or more toxic air contaminants (TACs).
Local	
South Coast Air Quality Management District (SCAQMD) Rule 1401 (New Source Review of Toxic Air Contaminants)	This rule specifies limits for maximum individual cancer risk (MICR), cancer burden, and noncancer acute and chronic hazard index (HI) from new permit units, relocations, or modifications to existing permit units which emit toxic air contaminants (TACs).
SCAQMD Rule 1403 (Asbestos Emissions from Demolition/Renovation Activities)	This rule specifies work practice requirements to limit asbestos emissions from building demolition and renovation activities, including the removal and associated disturbance of asbestos-containing materials.
SCAQMD Rule 212(c)(3) (Permits – Public Notice)	This rule requires public notification if the maximum individual cancer risk (MICR), based on Rule 1401, exceeds one in 1 million (1×10^{-6}), due to a project's proposed construction, modification, or relocation for facilities with more than one permitted source, unless the applicant can show the total facility-wide MICR is below 10 in 1 million (10×10^{-6}).

SETTING

Characteristics of the natural environment, such as meteorology and terrain, affect the project's potential for impacts on public health. An emission plume from a facility would affect elevated areas before lower terrain areas because of reduced opportunity for atmospheric mixing. Consequently, areas of elevated terrain can often be subjected to increased pollutant impacts compared to lower-level areas. Also, the land use around a project site can influence impacts due to population distribution and density, which, in turn, can affect public exposure to project emissions. Additional factors affecting potential public health impacts include existing air quality and environmental site contamination.

SITE AND VICINITY DESCRIPTION

The proposed AEC site is located at the City of Long Beach, California, within the South Coast Air Quality Management District (SCAQMD).

According to the Application for Certification (AFC), approximately 584,644 residents live within a 6-mile radius of AEC, and the sensitive receptors within a 6-mile radius of the project site include (AEC 2015i, Section 5.9.2):

- 651 preschool/daycare centers
- 21 nursing homes
- 177 schools
- 739 hospitals, clinics, and/or pharmacies
- 8 colleges
- 1 arena
- 2 prisons

Sensitive receptors, such as infants, the aged, and people with specific illnesses or diseases, are the subpopulations which are more sensitive to the effects of toxic substance exposure. The nearest sensitive receptor is the Rosie the Riveter Charter High School, a privately owned and operated school located on the AGS site, approximately 971 feet (296 meters) from the nearest proposed stack location. The second closest sensitive receptor is Kettering Elementary, which is approximately 2,297 feet (700 meters) northwest of the nearest proposed stack location. Apart from the Rosie the Riveter Charter High School and Kettering Elementary, there are no other schools within approximately 0.5 mile of the AEC project site. The nearest residents are located approximately 1,165 feet (355 meters) west of the proposed stack locations along E. Mariquita Street and approximately 1,329 feet (405 meters) east of the proposed stack locations along Nassau Drive. The nearest businesses are located approximately 525 feet (160 meters) east of the AEC site (AEC 2015i, Section 5.9.2).

METEOROLOGY AND CLIMATE

Meteorological conditions, including wind speed, wind direction, and atmospheric stability, affect the extent to which pollutants are dispersed into the air and the direction of pollutant transport. This, in turn, affects the level of public exposure to emitted pollutants along with the associated health risks. When wind speeds are low and the atmosphere is stable, for example, dispersion is reduced and localized exposures may be increased.

Atmospheric stability is one characteristic related to turbulence, or the ability of the atmosphere to disperse pollutants from convective air movement. Mixing heights (the height marking the region within which the air is well mixed below the height) are lower during mornings because of temperature inversions. These heights increase during warm afternoons. Staff's **Air Quality** section presents a more detailed description of meteorological data for the area.

EXISTING PUBLIC HEALTH CONCERNS

The proposed AEC site is located in Los Angeles County, within the South Coast Air Basin (SCAB) and within the South Coast Air Quality Management District (SCAQMD).

When evaluating a new project, staff usually conducts a study and analysis of existing public health issues in the project vicinity (i.e. areas within the same county). This analysis is prepared in order to identify the most current status of respiratory diseases (including asthma), cancer, and childhood mortality rates in the population located within the same county or air basin of the proposed project site. Such assessment of existing health concerns provides staff with a basis on which to evaluate the significance of any additional health impacts from the proposed AEC and assess the need for further mitigation. The public health information below is the most current available.

By examining average toxic concentration levels from representative air monitoring sites, together with cancer risk factors specific to each carcinogenic contaminant, a lifetime cancer risk can be calculated to provide a background risk level for inhalation of ambient air.

Cancer

When examining such risk estimates, staff considers it important to note that the overall lifetime risk of developing cancer for the average male in the United States is about 1 in 2, or 500,000 in 1 million and about 1 in 3, or 333,333 in 1 million for the average female (American Cancer Society 2014).

From 2007 to 2011, the cancer incidence rates in California were 49.92 in 1 million for males and 39.63 for females. Also, from 2007 to 2011, the cancer death rates for California are 18.68 in 1 million for males and 13.73 in 1 million for females (American Cancer Society, Cancer Facts & Figures 2015).

By examining the State Cancer Profiles presented by the National Cancer Institute, staff found that cancer death rates in Los Angeles County have been falling between 2008 and 2012. These rates (of 15.13 per 1,000,000, combined male/female) were somewhat lower than the statewide average of 15.51 per 1,000,000 (National Cancer Institute 2016).

According to the County Health Status Profiles 2015, the death rate due to all cancers, from 2011-2013, is 14.12 in 1 million for Los Angeles County, slightly lower than the cancer death rate (15.09 in 1 million) for California (CDPH 2015).

Lung Cancer

As for lung and bronchus cancers, from 2007 to 2011 the cancer incidence rates in California were 5.8 in 1 million for males and 4.31 in 1 million for females. Also, from 2007 to 2011 the cancer death rates for California were 4.55 in 1 million for males and

3.15 in 1 million for females (American Cancer Society, Cancer Facts & Figures 2015).

According to the County Health Status Profiles 2015, the death rate due to lung cancers, from 2011-2013, is 2.98 in 1 million for Los Angeles County, slightly lower than the cancer death rate (3.36 in 1 million) for California (CDPH 2015).

From a publication of the Los Angeles County Department of Public Health (LACDPH 2011), of cancer deaths, lung cancer was the most common one (2,908 deaths; mortality rate 3.1 per 1,000,000 population) in Los Angeles County.

Asthma

The asthma diagnosis rates in Los Angeles County are lower than the average rates in California for both adults (age 18 and over) and children (ages 1-17). The percentage of adults in Los Angeles County diagnosed with asthma was reported as 6.6 percent in 2005-2007, compared to 7.7 percent for the general California population. Rates for children for the same 2005-2007 period were reported as 9.3 percent in Los Angeles County compared to 10.1 percent for the state in general (Wolstein et al. 2010).

Air Toxics Emission Estimates

There are some ambient monitoring sites for TACs in the SCAB. Air quality and health risk data in Table C-20 of California Almanac of Emissions and Air Quality – 2009 Edition (ARB 2009) are for SCAB for years 1990 - 2005. The data show a downward trend in TAC annual average concentrations, along with related cancer risks (ARB 2009). No TAC emissions and their health risks were reported in the 2013 Edition (ARB 2013).

The Multiple Air Toxics Exposure Study II and III (MATES II and III) have been conducted in the SCAB by the SCAQMD staff. MATES II and III consisted of a comprehensive monitoring program, an updated emissions inventory, and a modeling effort to characterize health risks associated with human exposures to ambient concentrations of TACs in the SCAB. Both the MATES II and MATES III studies showed that mobile sources, such as cars, trucks, trains, ships, and aircraft, represent the greatest contributors to estimated health risks in Los Angeles County.

About 70 percent of all carcinogenic risk is attributed to diesel particulate matter (DPM) emissions in MATES II, while about 84 percent of all carcinogenic risk is attributed to DPM emissions in MATES III. Overall, the general trend in risk exposure has been decreasing with the estimated cancer risk from exposure to airborne toxics (AEC 2015i, Section 5.9.2). The comparison of the county-wide population-weighted risk in Table 4-5 in the final report of MATES III showed the TAC reductions that occurred in Los Angeles County. The risk reduced from 1,047 per million in 1998 to 951 per million in 2005. SCAB data followed the same trend, showing that TACs decreased from 931 per million in 1998 to 853 per million in 2005 (MATES III 2008).

As a follow-up to the MATES II and III studies, SCAQMD commenced a fourth MATES study (MATES IV) in 2012. The final report of MATES IV was published May 1, 2015. The results of MATES IV study showed a continuing downward trend in TACs. The comparison of county-wide population-weighted risk in Table 4-5 in the final report of MATES IV shows TAC reductions that occurred in Los Angeles County, with values decreasing from 951 per million in 2005 to 415 per million in 2012. South Coast Air Basin (SCAB) data follow the same trend, with corresponding TACs decreasing from 853 per million in 2005 to 367 per million in 2012 (MATES IV 2015).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

This section discusses toxic air contaminant (TAC) emissions to which the public could be exposed during project construction/demolition and routine operation. Following the release of TACs into the air, water or soil, people would come into contact with them through inhalation, dermal contact, or ingestion via contaminated food, water or soil.

Air pollutants for which no ambient air quality standards have been established are called non-criteria pollutants. Unlike criteria pollutants such as ozone, carbon monoxide, sulfur dioxide, or nitrogen dioxide, non-criteria pollutants have no ambient (outdoor) air quality standards that specify health-based levels considered safe for everyone[1]. Since non-criteria pollutants do not have such standards, a health risk assessment (HRA) is used to determine if people might be exposed to those types of pollutants at unhealthy levels.

The standard approach currently used for a HRA involves four steps: 1) hazard identification, 2) exposure assessment, 3) dose-response assessment and 4) risk characterization (OEHHA 2003). These four steps are briefly discussed below:

1. Hazard identification is conducted to determine the potential health effects that could be associated with project emissions. For air toxics sources, the main purpose is to identify whether or not a hazard exists. Once a hazard has been identified, staff evaluates the exact toxic air contaminant(s) of concern and determines whether a TAC is a potential human carcinogen or is associated with other types of adverse health effects.

2. An **exposure assessment** is conducted to estimate the extent of public exposure to project emissions, including: (1) the worst-case concentrations of project emissions in the environment using dispersion modeling; and (2) the amount of pollutants that people could be exposed to through inhalation, ingestion, and dermal contact. Therefore, this step involves emissions quantification, modeling of environmental transport and dispersion, evaluation of environmental fate, identification of exposure routes, identification of exposed populations and sensitive subpopulations, and estimation of short-term and long-term exposure levels.

[1] Carbon dioxide (CO_2) is also a non-criteria pollutant, but it is also not considered a TAC at normal concentrations and is not evaluated in this analysis.

3. A **dose-response assessment** is conducted to characterize the relationship between exposure to an agent and incidence of an adverse health effect in exposed populations. The assumptions and methodologies of dose-response assessment are different between cancer and noncancer health effects. In cancer risk assessment, the dose-response relationship is expressed in terms of a potency (or slope) factor that is used to calculate the probability of getting cancer associated with an estimated exposure. In cancer risk assessment, it is assumed that risk is directly proportional to dose. It is also assumed that there is no threshold for carcinogenesis. In non-cancer risk assessment, dose-response data developed from animal or human studies are used to develop acute and chronic non-cancer Reference Exposure Levels (RELs). The acute and chronic RELs are defined as the concentration at which no adverse non-cancer health effects are anticipated. Unlike cancer health effects, non-cancer acute and chronic health effects are generally assumed to have thresholds for adverse effects. In other words, acute or chronic injury from a TAC would not occur until exposure to the pollutant has reached or exceeded a certain concentration (i.e., threshold).

4. Risk characterization is conducted to integrate the health effects and public exposure information and to provide quantitative estimates of health risks resulting from project emissions. Staff characterizes potential health risks by comparing worst-case exposure to safe standards based on known health effects.

Staff conducts its public health analysis by evaluating the information and data provided in the AFC by the applicant. Staff also relies upon the expertise and guidelines of the California Environmental Protection Agency (Cal/EPA) Office of Environmental Health Hazard Assessment (OEHHA) in order to identify: (1) contaminants that cause cancer or other noncancer health effects, and (2) the toxicity, cancer potency factors and non-cancer RELs of these contaminants. Staff relies upon the expertise of the California Air Resources Board (ARB) and the local air districts to conduct ambient air monitoring of TACs and on the California Department of Public Health to evaluate pollutant impacts in specific communities. It is not within the purview or the expertise of the Energy Commission staff to duplicate the expertise and statutory responsibility of these agencies.

For each project, a screening-level risk assessment is initially performed using simplified assumptions that are intentionally biased toward protection of public health. That is, staff uses an analysis designed to overestimate public health impacts from exposure to project emissions. In reality, it is likely that the actual risks from the source in question would be much lower than the risks as estimated by the screening-level assessment. The risks for such screening purposes are based on examining conditions that would lead to the highest, or worst-case, risks and then using those assumptions in the assessment. Such an approach usually involves the following:

- using the highest levels of pollutants that could be emitted from the plant;
- assuming weather conditions that would lead to the maximum ambient

concentration of pollutants;

- using the type of air quality computer model which predicts the greatest plausible impacts;
- calculating health risks at the location where the pollutant concentrations are estimated to be the highest;
- assuming that an individual's exposure to carcinogenic (cancer-causing) agents would occur continuously for 30[2] years; and
- using health-based objectives aimed to protect the most sensitive members of the population (i.e., the young, elderly, and those with respiratory illnesses).

A screening-level risk assessment would, at a minimum, include the potential health effects from inhaling hazardous substances. Some facilities would also emit certain substances (e.g. semi-volatile organic chemicals and heavy metals) that could present a health hazard from non-inhalation pathways of exposure (OEHHA 2003, Tables 5.1, 6.3, 7.1). When these multi-pathway substances are present in facility emissions, the screening-level analysis would include the following additional exposure pathways: soil ingestion, dermal exposure, consumption of locally grown plant foods, mother's milk and water ingestion[3] (OEHHA 2003, p. 5-3).

The HRA process addresses three categories of health impacts: (1) acute (short-term) health effects, (2) chronic (long-term) noncancer effects, and (3) cancer risk (also long-term). They are discussed below.

Acute Noncancer Health Effects

Acute health effects are those that result from short-term (one-hour) exposure to relatively high concentrations of pollutants. Such effects are temporary in nature and include symptoms such as irritation of the eyes, skin, and respiratory tract.

Chronic Noncancer Health Effects

Chronic noncancer health effects are those that result from long-term exposure to lower concentrations of pollutants. Long-term exposure has been defined as more than 12 percent of a lifetime, or about 8 years (OEHHA 2003, p. 6-5). Chronic noncancer health effects include diseases such as reduced lung function and heart disease.

[2] It used to be assumed 70 years. However, in 2015 Guidance, OEHHA recommends that an exposure duration (residency time) of 30 years be used to estimate individual cancer risk for the maximally exposed individual resident (MEIR). In addition, for the maximally exposed individual worker (MEIW), OEHHA now recommends using an exposure duration of 25 years to estimate individual cancer risk for off-site workers (OEHHA 2015, Table 8.5).

[3] The HRA exposure pathways for AEC included inhalation, dermal absorption, soil ingestion, home grown produce and mother's milk, not including water ingestion because water sources are not impacted by AEC.

Reference Exposure Levels (RELs)

The analysis for both acute and chronic noncancer health effects compares the maximum project contaminant levels to safe levels known as Reference Exposure Levels, or RELs. These are amounts of toxic substances to which even sensitive individuals could be exposed without suffering any adverse health effects (OEHHA 2003, p. 6-2). These exposure levels are specifically designed to protect the most sensitive individuals in the population, such as infants, the aged, and people with specific illnesses or diseases which make them more sensitive to the effects of toxic substance exposure. The RELs are based on the most sensitive adverse health effect reported in the medical and toxicological literature and include specific margins of safety. The margins of safety account for uncertainties associated with inconclusive scientific and technical information available at the time of the RELs setting. They are therefore meant to provide a reasonable degree of protection against hazards that research has not yet identified.

Concurrent exposure to multiple toxic substances would result in health effects that are equal to, less than, or greater than effects resulting from exposure to the individual chemicals. Only a small fraction of the thousands of potential combinations of chemicals have been tested for the health effects of combined exposures. In conformity with California Air Pollution Control Officers Association (CAPCOA) guidelines, the HRA assumes that the effects of each substance are additive for a given organ system (OEHHA 2003, pp. 1-5, 8-12). Other possible mechanisms due to multiple exposures include those cases where the actions would be synergistic or antagonistic (where the effects are greater or less than the sum, respectively). For these types of exposures, the health risk assessment could underestimate or overestimate the risks.

Cancer Risk and Estimation Process

For carcinogenic substances, the health assessment considers the risk of developing cancer and assumes that continuous exposure to the carcinogen would occur over a 70-year lifetime[4]. The risk that is calculated is not meant to project the actual expected incidence of cancer, but rather a theoretical upper-bound estimate based on the worst-case assumptions.

Cancer Potency Factors

Cancer risk is expressed in terms of the number of chances per million of developing cancer. It is a function of the maximum expected pollutant concentration, the probability that a particular pollutant would cause cancer (called a potency factor), and the length of the exposure period. Cancer risks for individual carcinogens are added together to yield a total cancer risk for each potential source. The conservative nature of the screening assumptions used means that the actual cancer risks from project emissions would be considerably lower than estimated.

As previously noted, the screening analysis is performed to assess the worst-case risks to public health associated with the proposed project. If the screening analysis were to predict a risk below significance levels, no further analysis would be necessary and the

[4] See footnote 3.

source would be considered acceptable with regard to carcinogenic effects. If, however, the risk were to be above the significance level, then further analysis using more realistic site-specific assumptions would be performed to obtain a more accurate estimate.

SIGNIFICANCE CRITERIA

Energy Commission staff assesses the maximum cancer impacts from specific carcinogenic exposures by first estimating the potential impacts on the maximally exposed individual. This is a person hypothetically exposed to project emissions at a location where the highest ambient impacts were calculated using the worst-case assumptions. Since the individual's exposure would produce the maximum impacts possible around the source, staff uses this risk estimate as a marker for acceptability of the project's carcinogenic impacts.

Acute and Chronic Noncancer Health Risks

As described earlier, non-criteria pollutants are evaluated for short-term (acute) and long-term (chronic) noncancer health effects, and the noted cancer impacts from long-term exposures. The significance of project-related impacts is determined separately for each of the three health effects categories. Staff assesses the noncancer health effects by calculating a hazard index. A hazard index is a ratio obtained by comparing exposure from facility emissions to the safe exposure level (i.e. REL) for that pollutant. A ratio of less than 1.0 suggests that the worst-case exposure would be below the limit for safe levels and would thus be insignificant with regard to health effects. The hazard indices for all toxic substances with the same type of health effect are added together to yield a Total Hazard Index for the source. The Total Hazard Index is calculated separately for acute effects and chronic effects. A Total Hazard Index of less than 1.0 would indicate that cumulative worst-case exposures would be not lead to significant noncancer health effects. In such cases, noncancer health impacts from project emissions would be considered unlikely even for sensitive members of the population. Staff would therefore conclude that there would be no significant noncancer project-related public health impacts. This assessment approach is consistent with risk management guidelines of both California OEHHA and U.S. EPA.

Cancer Risk

Staff relies upon regulations implementing the provisions of Proposition 65, the Safe Drinking Water and Toxic Enforcement Act of 1986, (Health & Safety Code, §§25249.5 et seq.) for guidance in establishing significance levels for carcinogenic exposures. Title 22, California Code of Regulations, section 12703(b) states that "the risk level which represents no significant risk shall be one which is calculated to result in one or less excess cancer cases within an exposed population of 100,000, assuming lifetime exposure." This risk level is equivalent to a cancer risk of 10 in 1 million, which is also written as 10×10^{-6}. In other words, under state regulations, an incremental cancer risk greater than 10 in 1 million from a project should be regarded as suggesting a potentially significant carcinogenic impact on public health. The 10 in 1 million risk level is also used by the Air Toxics “Hot Spots” (AB 2588) program as the public notification threshold for air toxic emissions from existing sources.

An important distinction between staff’s and the Proposition 65 risk characterization approach is that the Proposition 65 significance level applies separately to each cancer-causing substance, whereas staff determines significance based on the total risk from all the cancer-causing pollutants to which the individual might be exposed in the given case. Thus, the manner in which the significance level applied by staff is more conservative (health-protective) than the manner applied by Proposition 65. The significant risk level of 10 in 1 million is also consistent with the level of significance adopted by many California air districts. In general, these air districts would not approve a project with a cancer risk estimate more than 10 in 1 million.

As noted earlier, the initial risk analysis for a project is typically performed at a screening level, which is designed to overstate actual risks, so that health protection could be ensured. Staff’s analysis also addresses potential impacts on all segments of the population including the young, the elderly, people with existing medical conditions that would render them more sensitive to the adverse effects of toxic air contaminants and any minority or low-income populations that are likely to be disproportionately affected by impacts. To accomplish this goal, staff uses the most current acceptable public health exposure levels (both acute and chronic) set to protect the public from the effects of air toxics being analyzed. When a screening analysis shows the cancer risks to be above the significance level, refined assumptions would be applied for likely a lower, more realistic risk estimate. If, after using refined assumptions, the project’s risk is still found to exceed the significance level of 10 in 1 million, staff would require appropriate measures to reduce the risk to less than significant levels. If, after all feasible risk reduction measures have been considered and a refined analysis still identifies a cancer risk of greater than 10 in 1 million, staff would deem such a risk to be significant and would not recommend project approval.

DIRECT/INDIRECT IMPACTS AND MITIGATION

PROPOSED PROJECT’S CONSTRUCTION/DEMOLITION IMPACTS AND MITIGATION MEASURES

Existing Units 1 through 6 would remain in operation through much of the AEC development and construction. Given that the removal of existing Units 1 through 6 is not required for construction of the AEC, the continued operation of the AGS would not impede AEC construction. Demolition of the retired and decommissioned turbine peaking generating Unit 7 and fuel tank, ancillary equipment, small maintenance shops, and two retention basins would be required for site preparation for the construction of the AEC. Construction and site preparation activities at the AEC site are anticipated to last 56 months, from the first quarter of 2017 to the third quarter of 2021. The project would commence construction with the removal of former Unit 7’s building and ancillary equipment, fuel storage tank, tank berms, small maintenance shops and two waste water retention basins in January 2017 to make room for construction and laydown area for the AEC combined-cycle gas turbine block (CCGT). Construction of the AEC CCGT would commence during the second quarter of 2017 and would be completed by the second quarter of 2020. The AEC CCGT is expected to commence commercial operation before May 1, 2020. Construction of the AEC simple-cycle gas turbine block (SCGT) is scheduled to proceed from the second quarter of 2020 through the third quarter of 2021, and is expected to commence commercial operation in the third quarter of 2021 (CH2 2016s, Section 5.9.1). The potential construction/demolition risks are normally associated with exposure to asbestos, fugitive dust, and combustion emissions (i.e. diesel exhaust).

Asbestos

The demolition of buildings containing asbestos would cause the emission of asbestos. Structures built before 1980 are more likely to have asbestos containing materials (ACM). The AEC site buildings were constructed prior to 1980; therefore, asbestos-containing building materials and lead based paint could be present onsite (AEC 2015i, Section 5.14.1.1). Demolition of Alamitos Generating Station Unit 7 could generate approximately 150 tons of asbestos waste (AEC 2015i, Section 5.14.3.2).

Asbestos is a mineral fiber that occurs in rock and soil. Because of its fiber strength and heat resistance, it has been used in a variety of building construction materials for insulation and as a fire-retardant. Asbestos has been used in a wide range of manufactured goods, mostly in building materials (roofing shingles, ceiling and floor tiles, paper products, and asbestos cement products), friction products (automobile clutch, brake, and transmission parts), heat-resistant fabrics, packaging, gaskets, and coatings (US EPA, 2012). Thermal system insulation (formed or spray-on) is the ACM of greatest concern for response and recovery worker exposure (Occupational Safety and Health Administration [OSHA]). Exposure to asbestos and asbestos containing materials (ACM) increases workers' and residences' risk of developing lung diseases, including asbestosis, lung cancer, and mesothelioma.

To reduce the potential risk associated with the removal of asbestos and ACM, the applicant would comply with all requirements outlined in SCAQMD Rule 1403, which requires the notification and special handling of ACM during demolition activities. The applicant would comply with SCAQMD Rule 1403 by:

- Conducting a facility survey to identify and quantify the presence of all friable and non-friable Class I and Class II ACM prior to the start of demolition activities;
- Notifying the SCAQMD and the Energy Commission compliance project manager (CPM) of the intent to conduct demolition activities in a district-approved format (e.g., submittal of a Rule 1403 Plan) prior to the start of any demolition activities;
- Employing one or more of the following methods for asbestos removal: High Efficiency Particulate Air (HEPA) Filtration, Glovebag or Mini-enclosures, Dray Removal, or an alternative approved method;

- Collecting and storing ACM in a leak-tight or wrapped container to avoid releasing ACM to the atmosphere;

- Requiring an onsite representative to complete the Asbestos Abatement Contractor/Supervisor course pursuant to the Asbestos Hazard Emergency Response Act and Provision of Title 40, Code of Federal Regulations, Parts 61.145 to 61.147, 61.152, and Part 763, and be present during all ACM demolition or handling procedures; and

- Disposing of ACM wastes at a licensed waste disposal facility; ACM wastes would be hauled from the site by an appropriately licensed ACM waste transporter.

As a result of the activities listed above and in compliance with SCAQMD Rule 1403, the potential impacts associated with asbestos removal during demolition would be less than significant.

Small quantities of other hazardous wastes could also be generated during construction or demolition phases of the project. The mitigation measures needed to reduce the impacts of asbestos, ACM and other hazardous wastes from the construction or demolition phases of the project are covered in the **Waste Management** section of this PSA. As for asbestos, Conditions of Certification **WASTE-3** requires that the project owner submit the SCAQMD Asbestos Demolition Notification Form to SCAQMD and the Energy Commission CPM for review and approval prior to removal and disposal of asbestos. After receiving approval, the project owner shall remove all ACM from the site prior to demolition. This program ensures there would be no release of asbestos that could impact public health and safety. Please refer to staff's **Waste Management** section for detailed mitigation measures regarding the construction/demolition of asbestos and ACM, and information on the safe handling and disposal of these and all project-related wastes.

Fugitive Dust

Fugitive dust is defined as dust particles that are introduced into the air through certain activities such as soil cultivation, vehicles operating on open fields, or dirt roadways. Fugitive dust emissions during construction and demolition of the proposed project could occur from:

- dust entrained during site preparation and grading/excavation at the construction site;
- dust entrained during onsite movement of construction vehicles on unpaved surfaces;
- fugitive dust emitted from an onsite concrete batch plant; and
- wind erosion of areas disturbed during construction activities.

The effects of fugitive dust on public health are covered in the **Air Quality** section of this PSA which includes staff's recommended mitigation measures, including **AQ-SC3** (Construction Fugitive Dust Control) and **AQ-SC4** (Dust Plume Response Requirement) to prevent fugitive dust plumes from leaving the project boundary. As long as the dust plumes are kept from leaving the project site, there would be no significant concern of fugitive dust adversely affecting public health.

Diesel Exhaust

Emissions of combustion byproducts during construction would result from:

- exhaust from diesel construction equipment used for site preparation, grading, excavation, trenching, and construction of onsite structures;
- exhaust from water trucks used to control construction dust emissions;
- exhaust from portable welding machines, small generators, and compressors;
- exhaust from diesel trucks used to transport workers and deliver concrete, fuel, and construction supplies to construction areas; and
- exhaust from vehicles used by construction workers to commute to and from the project areas.

Construction Health Risk Assessment for Diesel Exhaust

The primary air toxic pollutant of concern from construction/demolition activities is diesel particulate matter (DPM). Diesel exhaust is a complex mixture of thousands of gases and fine particles and contains over 40 substances listed by the U.S. Environmental Protection Agency (EPA) as hazardous air pollutants (HAPs) and by ARB as toxic air contaminants. The DPM is primarily composed of aggregates of spherical carbon particles coated with organic and inorganic substances. Diesel exhaust deserves particular attention mainly because of its ability to induce serious noncancer effects and its status as a likely human carcinogen.

Diesel exhaust is also characterized by ARB as “particulate matter from diesel-fueled engines.” The impacts from human exposure would include both short- and long-term health effects. Short-term effects can include increased coughing, labored breathing, chest tightness, wheezing, and eye and nasal irritation. Effects from long-term exposure can include increased coughing, chronic bronchitis, reductions in lung function, and inflammation of the lung. Epidemiological studies strongly suggest a causal relationship between occupational diesel exhaust exposure and lung cancer. Diesel exhaust is listed by the EPA as “likely to be carcinogenic to humans” (U.S. EPA 2003).

Based on a number of health effects studies, ARB’s Scientific Review Panel (SRP) on Toxic Air Contaminants in 1998 recommended a chronic REL for diesel exhaust particulate matter of 5 micrograms per cubic meter of air ($\mu g/m^3$) and a cancer unit risk factor of 3×10^{-4} $(\mu g/m^3)^{-1}$. However, SRP did not recommend a specific value for an acute REL since available data in support of a value was deemed insufficient. Therefore, there is no acute relative exposure level (REL) for diesel particulate matter, and it was not possible to conduct an assessment for its acute health effects. In 1998, ARB listed particulate emissions from diesel-fueled engines as a toxic air contaminant and approved the panel’s recommendations regarding health effects (OEHHA 2009,

Appendix A). In 2000, ARB developed a “Risk Reduction Plan to Reduce Particulate Matter Emissions From Diesel-Fueled Engines and Vehicles” and has been developing regulations to reduce diesel particulate matter emissions since that time.

The total DPM exhaust emissions from construction/demolition activities were averaged over the 56-month construction period and spatially distributed in: (1) the area associated with construction of the AEC CCGT, and (2) the area associated with construction of the AEC SCGT (including the removal of former Unit 7’s building and ancillary equipment, fuel storage tank, tank berms, small maintenance shops, and two waste water retention basins which would occur as site preparation of the AEC CCGT and SCGT) (CH2 2016s, Section 5.9.1.3).

A screening Health Risk Assessment (HRA) for diesel particulate matter was conducted to assess the potential impacts associated with diesel emissions during the construction and demolition activities (i.e. Unit 7) at AEC. The construction HRA estimated the rolling cancer risks during a 30-year exposure duration (starting with exposure during the third trimester) for residential exposure and a 10-year exposure duration (from age 16 to 25) for worker exposure, aligned with the expected construction duration, at the PMI, MEIR, MEIW, and maximum exposed sensitive receptor. The excess cancer risks were estimated using the following (CH2 2016s, Section 5.9.1.3):

- Equations 5.4.1.1 and 8.2.4A from the *Air Toxic Hot Spots Guidance Manual for Preparation of Health Risk Assessments* (OEHHA, 2015) for residential exposure;
- Equations 5.4.1.2A, 5.4.1.2B, and 8.2.4B from the *Air Toxic Hot Spots Guidance Manual for Preparation of Health Risk Assessments* (OEHHA, 2015) for worker exposure;
- The maximum annual ground-level concentrations used to estimate risk were determined through dispersion modeling with AERMOD;

Based on the applicant’s analysis, the maximum modeled annual average concentration of diesel particulate matter was 0.01306 $\mu g/m^3$ (CH2 2016s, Appendix 5.9C, Table 5.9C.3 and Table 5.9C.4). The predicted incremental increases in cancer risk at the Point of Maximum Impact (PMI), Maximally Exposed Individual Resident (MEIR), Maximally Exposed Individual Worker (MEIW), and maximum exposed sensitive receptor associated with construction/demolition activities are 4.9 in one million, 0.89 in one million, 0.16 in one million and 1.19 in one million, respectively. The predicted chronic health index at the PMI, MEIR, MEIW, and maximum exposed sensitive receptor are 0.026, 0.00047, 0.0026, and 0.00064, respectively (CH2 2016s, Section 5.9.1.3). The results are listed in the upper portion of **Public Health Table 2**.

Public Health Table 2
Construction Hazard/Risk from DPMs calculated by the Applicant

	Receptor Type	Risk	Significance Level	Significant?
Derived Cancer Risk (per million)	PMI	4.9	10	No
	MEIR	0.89	10	No
	at a Sensitive Receptor	1.19	10	No
	MEIW	0.16	10	No
Chronic HI (dimensionless)	PMI	0.0026	1	No
	MEIR	0.00047	1	No
	MEIW	0.0026	1	No
	at a Sensitive Receptor	0.00064	1	No

Sources: CH2 2016s, Section 5.9.1.3 and Appendix 5.9C (Table 5.9C.3 and Table 5.9C.4)

Based on the results of HRA, and considering two other facts: (1) the potential exposure of DPM would be sporadic and limited in length and (2) the predicted incremental increase in cancer risk at the MEIR and MEIW and chronic health index at the PMI, MEIR, and MEIW are less than the significance thresholds of 10 in one million and 1.0, respectively, staff concludes that impacts associated with the DPM from finite construction activities would be less than significant.

Staff also regards the related condition of certification of **AQ-SC5** (Diesel-Fueled Engine Control) in the **Air Quality** section of this PSA as adequate to ensure that cancer-related impacts of diesel exhaust emissions for the public and off-site workers are mitigated during construction/demolition to a point where they are not considered significant.

The chronic hazard indices for diesel exhaust during construction/demolition activities are lower than the significance level of 1.0. This means that there would be no chronic non-cancer impacts from construction/demolition activities.

The potential levels of criteria pollutants from operation of construction-related equipment are discussed in staff's **Air Quality** section along with mitigation measures and related conditions of certification. The pollutants of most concern in this regard are particulate matter (PM), carbon monoxide (CO), sulfur dioxide (SO_2), and nitrogen dioxide (NO_2).

PROPOSED PROJECT'S OPERATIONAL IMPACTS AND MITIGATION MEASURES

Emission Sources

As previously noted, the proposed AEC would be a natural gas-fired, combined-cycle and simple-cycle, air-cooled, nominal 1,040- MW, electrical generating facility. Pollutants that could potentially be emitted are listed in **Public Health Table 3,** including both criteria and non-criteria pollutants. These pollutants include certain volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs). Criteria pollutant emissions and impacts are examined in staff's **Air Quality** analysis. Since the facility would use dry cooling, there would be no emissions of toxic metals, particulate matter, or VOCs from cooling tower mist or drift and no health risk from the potential presence of the Legionella bacterium responsible for Legionnaires' disease.

Tables 5.9-1and Table 5.9-2 of the AFC (CH2 2016s) list the specific non-criteria pollutants that would be emitted as combustion byproducts from the AEC natural-gas-fired turbines.

Air toxics emission factors for the CTGs were provided by SCAQMD, with the exception of ammonia (CH2 2016s, Section 5.9.3.1). Emissions from both the combined-cycle and simple-cycle combustion turbines were required by SCAQMD to be revised to be based on US EPS AP-42 emission factors. The auxiliary boiler was required by the SCAQMD to be revised to be based on the Ventura County Air Pollution Control District (VCAPCD) emission factors for natural gas fired external combustion equipment rated 10-100 MMBtu/hr (SCAQMD 2016b). The ammonia emission factor was based on an operating exhaust ammonia limit of 5 ppmv at 15 percent oxygen and an F-factor of 8,710 (Note: an F-factor is the ratio of the carbon dioxide generated by the combustion of a given fuel to the amount of heat produced). Additionally, polycyclic aromatic hydrocarbons (PAH) emissions were conservatively assumed to be controlled up to 50 percent through the use of an oxidation catalyst (EPA, 2000), which is proposed for use with both the AEC CCGT and the AEC SCGT (CH2 2016s, Section 5.9.3.1. and Table 5.9-1).

The health risk from exposure to each project-related pollutant is assessed using the "worst case" emission rates and impacts. Maximum hourly emissions are used to calculate acute (one-hour) noncancer health effects, while estimates of maximum emissions on an annual basis are used to calculate cancer and chronic (long-term) noncancer health effects.

Public Health Table 3
The Main Pollutants Emitted from the Proposed Project

Criteria Pollutants	Non-criteria Pollutants
Carbon monoxide (CO)	Acetaldehyde
Oxides of nitrogen (NO_x)	Acrolein
Particulate matter (PM10 and PM2.5)	Ammonia
Oxides of sulfur (SO_2)	Benzene
Volatile Organic Compounds (VOCs)	1,3-Butadiene
	Ethyl Benzene
	Formaldehyde
	Naphthalene
	Polycyclic Aromatic Hydrocarbons (PAHs)
	Propylene Oxide
	Toluene
	Xylene

Source: CH2 2016s, Table 5.9-1 and Table 5.9-2

Hazard Identification

Numerous health effects have been linked to exposure to TACs, including development of asthma, heart disease, Sudden Infant Death Syndrome (SIDS), respiratory infections in children, lung cancer and breast cancer (OEHHA 2003). According to the AEC AFC, the toxic air contaminants emitted from the natural gas-fired CTGs include acetaldehyde, acrolein, ammonia, benzene, 1,3-butadiene, ethyl benzene, formaldehyde, napthalene, polycyclic aromatics, propylene oxide, toluene and xylene. **Public Health Table 3** and **Public Health Table 4** list each such pollutant.

Public Health Table 4
Types of Health Impacts and Exposure Routes Attributed to Toxic Emissions

Substance	Oral Cancer	Oral Noncancer	Inhalation Cancer	Noncancer (Chronic)	Noncancer (Acute)
Acetaldehyde			✔	✔	✔
Acrolein				✔	✔
Ammonia				✔	✔
Benzene			✔	✔	✔
1,3-Butadiene			✔	✔	
Ethyl Benzene			✔	✔	
Formaldehyde			✔	✔	✔
Napthalene		✔	✔	✔	
Polycyclic Aromatic Hydrocarbons (PAHs)	✔		✔		
Propylene Oxide			✔	✔	✔
Toluene				✔	✔
Xylene				✔	✔

Source: OEHHA / ARB 2016b and CH2 2016s, Table 5.9-1 and Table 5.9-3

Exposure Assessment

Public Health Table 4 shows the exposure routes of TACs and how they would contribute to the total risk obtained from the risk analysis. The applicable exposure pathways for the toxic emissions include inhalation, home grown produce, dermal (through the skin) absorption, soil ingestion, and mother's milk. This method of assessing health effects is consistent with OEHHA's Air Toxics Hot Spots Program Risk Assessment Guidelines (OEHHA 2015) referred to earlier.

The next step in the assessment process is to estimate the project's incremental concentrations using a screening air dispersion model and assuming conditions that would result in maximum impacts. The applicant used the EPA-recommended air dispersion model, AERMOD, along with 5 years (2006–2009 and 2011) of compatible meteorological data from the North Long Beach meteorological station, which is approximately 6.4 miles to the northwest of the AEC site (AEC 2015i, Section 5.1.6.3 and Appendix 5.1C).

Dose-Response Assessment

Public Health Table 5 lists the toxicity values used to quantify the cancer and noncancer health risks from the project's combustion-related pollutants. It was modified from Table 5.9-3 of the AFC (CH2 2016s), excluding oral cancer potency factor and chronic oral REL. The listed toxicity values include RELs and the cancer potency factors published in the OEHHA's Guidelines (OEHHA 2015) and OEHHA/ARB Consolidation Table of OEHHA/ARB Approved Risk Assessment Health Values (ARB 2016b). RELs are used to calculate short-term and long-term noncancer health effects, while the cancer potency factors are used to calculate the lifetime risk of developing cancer.

Public Health Table 5
Toxicity Values Used to Characterize Health Risks

Toxic Air Contaminant	Inhalation Cancer Potency Factor $(mg/kg\text{-}d)^{-1}$	Chronic Inhalation REL $(\mu g/m^3)$	Acute Inhalation REL $(\mu g/m^3)$
Acetaldehyde	0.010	140	470 (1-hr) 300 (8-hr)
Acrolein	—	0.35	2.5 (1-hr) 0.7 (8-hr)
Ammonia	—	200	3,200
Benzene	0.10	60	1,300
1,3-Butadiene	0.60	20	—
Ethyl Benzene	0.0087	2,000	—
Formaldehyde	0.021	9	55 (1-hr) 9 (8-hr)
Hexane	—	7000	—
Napthalene	0.12	9.0	—
Polycyclic Aromatic Hydrocarbons (PAHs)	3.9	—	—
Propylene Oxide	0.013	3	3100
Toluene	—	300	37,000
Xylene	—	700	22,000

Sources: ARB 2016b and CH2 2016s, Table 5.9-3

Characterization of Risks from TACs

As described above, the last step in an HRA is to integrate the health effects and public exposure information, provide quantitative estimates of health risks resulting from project emissions, and then characterize potential health risks by comparing worst-case exposure to safe standards based on known health effects.

The project owner's HRA was prepared using the ARB's Hotspots Analysis and Reporting Program Version 2 (HARP2). Emissions of non-criteria pollutants from the project were analyzed using emission factors, as noted previously, obtained mainly from the SCAQMD. Air dispersion modeling combined the emissions with site-specific terrain and meteorological conditions to analyze the worst-case short-term and long-term concentrations in air for use in the HRA. Ambient concentrations were used in conjunction with cancer unit risk factors and RELs to estimate the cancer and noncancer risks from operations. In the following sub-sections, staff reviews and summarizes the work of the project owner, and evaluates the adequacy of the project owner's analysis by conducting an independent HRA.

Staff evaluated the applicant's analysis, and the results are shown below in **Public Health Table 6**. The analysis was conducted for the general population, sensitive receptors, nearby residences and the project's work force. The sensitive receptors, as previously noted, are subgroups that would be at greater risk from exposure to emitted pollutants, and include the very young, the elderly, and those with existing illnesses.

On March 6, 2015 OEHHA approved a revision to the Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments (OEHHA 2015). OEHHA developed age sensitivity factors (ASFs) to take into account the increased sensitivity to carcinogens during early-in-life exposure (OEHHA 2015, Table 8.3). This new methodology is used to reflect the fact that exposure varies among different age groups and exposure occurring in early life has a higher weighting factor.

Health risks potentially associated with ambient concentrations of carcinogenic pollutants were calculated in terms of excess lifetime cancer risks. The total cancer risk at any specific location is found by summing the contributions from the individual carcinogens. Health risks from non-cancer health effects were calculated in terms of hazard index as a ratio of ambient concentration of TACs to RELs for that pollutant.

The following is a summary of the most important elements of the HRA assessment for the AEC:

- the analysis was conducted using the latest version of ARB/OEHHA Hotspots Analysis and Reporting Program Version 2 (HARP2).[5], which incorporates methodology presented in OEHHA's 2015 Guidance;
- emissions are based upon concurrent operation of all two GE 7FA.05 combined-cycle combustion turbines, four GE LMS-100PB simple-cycle combustion turbines, and an auxiliary boiler;
- exposure pathways included inhalation, soil ingestion, dermal absorption, home grown produce, and mother's milk;
- the local meteorological data, local topography, grid, residence and sensitive receptors, source elevations, and site-specific and building-specific input parameters used in the HARP2 model were obtained from the AFC and modeling files provided by the applicant; and
- the emission factors and toxicity values used in staff's analysis of cancer risk and hazard were obtained from the AFC. The toxicity values are listed in **Public Health Table 5**;

Cancer Risk at the Point of Maximum Impact (PMI)

The most significant result of HRA is the numerical cancer risk for the maximally exposed individual (MEI) which is the individual located at the point of maximum impact (PMI) and risks to the MEI at a residence (MEIR). As previously noted, human health risks associated with emissions from the proposed project are unlikely to be higher at

[5] HARP2 can be downloaded from ARB's HARP website. http://www.arb.ca.gov/toxics/harp/harp.htm

any other location than at the PMI. Therefore, if there is no significant impact associated with concentrations at the PMI location, it can be reasonably assumed that there would not be significant impacts in any other location in the project area. The cancer risk to the MEI at the PMI is referred to as the Maximum Incremental Cancer Risk (MICR). However, the PMI (and thus the MICR) is not necessarily associated with actual exposure because in many cases, the PMI is in an uninhabited area. Therefore, the MICR is generally higher than the maximum residential cancer risk. MICR is based on 24 hours per day, 365 days per year, 30 year lifetime exposure.

As shown below in **Public Health Table 6**, total worst-case individual cancer risk for AEC was 1.44 in one million at the PMI (CH2 2016s, Table 5.9-5). As **Public Health Table 6** shows, the cancer risk value at PMI is below the significance level, 10 in one million, whether the applicant's or staff's cancer risk is used, indicating that no significant adverse cancer risk is expected.

Chronic and Acute Hazard Index (HI)

The screening HRA for the project included emissions from all sources and resulted in a maximum chronic Hazard Index (HI) of 0.0036 and a maximum acute HI of 0.019 (CH2 2016s, Table 5.9-5). As **Public Health Table 6** shows, both acute and chronic hazard indices are less than 1.0, indicating that no short- or long-term adverse health effects are expected.

Project-Related Impacts at Area Residences

Staff's specific interest in the risk to the maximally exposed individual in a residential setting is based on the MEIR (MEIR is used for this purpose because this risk most closely represents the maximum project-related lifetime cancer risk). Residential risk is presently assumed by the regulatory agencies to result from an exposure lasting 24 hours per day, 365 days per year, over a 30-year lifetime. Residential risks are presented in terms of MEIR and health hazard index (HHI) at residential receptors in **Public Health Table 6**. The cancer risk for the MEIR, is 1.11, which is below the significance level. The maximum resident chronic HI and acute HI are 0.0028 and 0.0018, respectively. They are both less than 1.0, indicating that no short- or long-term adverse health effects are expected at these residences.

Risk to Workers

The cancer risk to potentially exposed workers was presented by the applicant in terms of risk to the maximally exposed individual worker or MEIW at PMI and is also summarized in **Public Health Table 6**. The applicant's assessment for potential workplace risks uses a shorter duration exposure rather than the 70-year exposure used residential risks. Workplace risk is presently calculated by regulatory agencies using exposures of 8 hours per day, 245 days per year, over a 25- year period. As shown in **Public Health Table 6**, the cancer risk for workers at MEIW (i.e. 0.052 in 1 million) is below the significance level. All risks are below the significance level.

Risk to Sensitive Receptors

The highest cancer risk at a sensitive receptor is 1.03 in one million, the chronic HI is 0.0026 and the acute HI is 0.017. All risks are below the significance level.

In **Public Health Table 6**, it is notable that the cancer and noncancer risks from AEC operation would be below their respective significance levels. This means that no health impacts would occur within all segments of the surrounding population. Therefore, staff concludes there is no need for conditions of certification to protect public health.

Title 40 CFR Part 63

The regulation applied to gas turbines located at major sources of HAP emissions is 40CFR Part 63 Subpart YYYY. A major source is defined as a facility with emissions of 10 tons per year (tpy) or more of a single HAP or 25 tpy or more of a combination of HAPs based on the potential to emit.

The potential National Emissions Standards for Hazardous Air Pollutants (NESHAP) applicable to AEC is Subpart YYYY, which sets a formaldehyde emission limit or an operational limit of 91 part(s) per billion by volume (ppbv) for turbines. Subpart YYYY sets emissions limits and requires notifications, source testing, monitoring, and recordkeeping for gas turbines. However, EPA proposed to delist natural gas fired turbines from the NESHAP's on August 14, 2004. Therefore, in accordance §63.6095(d) of this subpart, natural gas fired turbines are exempt from all requirements other than the initial notification to the Administrator (SCAQMD 2014a and SCAQMD 2014c).

Public Health Table 6
Cancer Risk and Chronic Hazard from AEC Operations

Receptor Location	Cancer Risk (per million)	Chronic HI[d]	Acute HI[d]
PMI[a]	1.44	0.0036	0.019
Residence MEIR[b]	1.11	0.0028	0.018
Worker MEIW[c]	0.052	0.0036	0.019
Highest Value at Sensitive Receptor	1.03	0.0026	0.017
Significance level	10	1	1
Significant?	No	No	No

Source: CH2 2016s, Table 5.9-5
[a] PMI = Point of Maximum Impact
[b] MEIR = MEI of residential receptors. Location of the residence of the highest risk with a 30-year residential scenario.
[c] MEIW = MEI for offsite workers. Occupational exposure patterns assuming standard work schedule, i.e. exposure of 8 hours/day, 5 days/week, 49 weeks/year for 25 years.
[d] HI = Hazard Index

CUMULATIVE IMPACTS AND MITIGATION

A project would result in a significant adverse cumulative impact if its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (Cal. Code Regs., tit. 14, § 15130). As for cumulative impacts for cumulative hazards and health risks, if the implementation of the proposed project, as well as the past, present, and probable future projects, would not cumulatively contribute to regional hazards, then it could be considered a less than cumulatively considerable impact.

The geographic scope of analysis for cumulative effects to public health is a six-mile buffer zone around the project site. This is the same six-mile buffer zone for localized significant cumulative air quality impacts described and evaluated in the **Air Quality** section of this PSA. While MATES II and MATES III studies were discussed, cumulative impacts of the proposed project along with other projects within a 6-mile radius were not quantitatively evaluated in the AFC (CH2 2016s, Section 5.9.4).

The maximum cancer risk and non-cancer hazard index (both acute and chronic) for operations emissions from the AEC estimated independently by the applicant, staff, and the SCAQMD (SCAQMD 2016b) are all below the level of significance. While air quality cumulative impacts could occur with sources within a 6-mile radius, cumulative public health impacts are usually not significant unless the emitting sources are extremely close to each other, within a few blocks, not miles. All identified facilities are at least four miles from AEC. Staff, therefore, concludes that the proposed AEC project, even when combined with these projects, would not contribute to cumulative impacts in the area of public health.

Moreover, as previously noted, the maximum impact location would be the spot where pollutant concentrations for the proposed project would theoretically be highest. Even at this hypothetical location, staff does not expect any significant change in lifetime risk to any person, given the calculated incremental cancer risk of 1.44 in one million, which staff regards as not contributing significantly to the previously noted county-wide population-weighted risks of MATES IV, 415 per million for Los Angeles County and 367 per million for SCAB. Modeled facility-related risks would be much lower for more distant locations. Given the previously noted conservatism in the calculation method used, the actual risks would likely be much smaller. Therefore, staff does not consider the incremental risk estimate from AEC's operation as suggesting a potentially significant contribution to the area's overall or cumulative cancer risk that includes the respective risks from the background pollutants from all existing area sources.

COMPLIANCE WITH LORS

Staff has conducted a HRA for the proposed AEC and found no potentially significant adverse impacts for any receptors, including sensitive receptors. In arriving at this conclusion, staff notes that its analysis complies with all directives and guidelines from the Cal/EPA Office of Environmental Health Hazard Assessment and the California Air Resources Board. Staff's assessment is biased towards protection of public health and takes into account the most sensitive individuals in the population. Using extremely conservative (health-protective) exposure and toxicity assumptions, staff's analysis demonstrates that members of the public potentially exposed to toxic air contaminant emissions of this project, including sensitive receptors such as the elderly, infants, and people with pre-existing medical conditions, would not experience any acute or chronic significant health risk or any significant cancer risk as a result of that exposure.

Staff incorporated every conservative assumption called for by state and federal agencies responsible for establishing methods for analyzing public health impacts. The results of that analysis indicate that there would be no direct or cumulative significant public health impact on any population in the area. Therefore staff concludes that construction and operation of the AEC would comply with all applicable LORS regarding long-term and short-term project impacts in the area of public health.

Additionally, staff reviewed the **Socioeconomics Figure 1**, which shows the environmental justice population (see the **Socioeconomics** and **Executive Summary** sections of this PSA for further discussion of environmental justice) is greater than fifty percent within a six-mile buffer of the proposed AEC site. Because no members of the public potentially exposed to toxic air contaminant emissions of this project would experience acute or chronic significant health risk or cancer risk as a result, there would not be a disproportionate **Public Health** impact resulting from construction and operation of the proposed project to an environmental justice population.

CONCLUSIONS

Staff has analyzed the potential public health risks associated with construction and operation of the AEC using a highly conservative methodology that accounts for impacts to the most sensitive individuals in a given population. Staff concludes that there would be no significant health impacts from the project's air emissions. According to the results of staff's HRA, both construction/demolition and operating emissions from the AEC would not contribute significantly or cumulatively to morbidity or mortality in any age or ethnic group residing in the project area.

PROPOSED CONDITIONS OF CERTIFICATION

No public health conditions of certification are proposed by staff.

ACRONYMS

ACM	Asbestos Containing Materials
AEC	Alamitos Energy Center
AFC	Application for Certification
AGS	Alamitos Generating Station
ARB	California Air Resources Board
ATC	Authority to Construct
Btu	British thermal unit
CAA	Clean Air Act (Federal)
CAL/EPA	California Environmental Protection Agency
CAPCOA	California Air Pollution Control Officers Association
CEC	California Energy Commission (or Energy Commission)
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CTGs	Combustion Turbine Generators
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CPM	Compliance Project Manager
DPMs	Diesel Particulate Matter
FSA	Final Staff Assessment
HAPs	Hazardous Air Pollutants
HARP	Hot Spots Reporting Program
HEPA	High Efficiency Particulate Air
HRA	Health Risk Assessment
HI	Hazard Index
HRSGs	Heat Recovery Steam Generators
lbs	Pounds
LORS	Laws, Ordinances, Regulations and Standards
MACT	Maximum Achievable Control Technology
MATES	Multiple Air Toxics Exposure Study
MEIR	Maximally Exposed Individual Resident
MEIW	Maximally Exposed Individual Worker
MICR	Maximum Individual Cancer Risk
mg/m^3	Milligrams per Cubic Meter

MMBtu	Million British thermal units
MW	Megawatts (1,000,000 Watts)
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
NO_3	Nitrates
NOx	Oxides of Nitrogen *or* Nitrogen Oxides
O_2	Oxygen
O_3	Ozone
OEHHA	Office of Environmental Health Hazard Assessment
OSHA	Occupational Safety and Health Administration
PAHs	Polycyclic Aromatic Hydrocarbons
PM	Particulate Matter
PM10	Particulate Matter less than 10 microns in diameter
PM2.5	Particulate Matter less than 2.5 microns in diameter
PMI	Point of Maximum Impact
ppm	Parts Per Million
ppmv	Parts Per Million by Volume
ppmvd	Parts Per Million by Volume, Dry
PSA	Preliminary Staff Assessment (this document)
RELs	Reference Exposure Levels
SCAB	South Coast Air Basin
SCAQMD	South Coast Air Quality Management District
SIDS	Sudden Infant Death Syndrome
SO_2	Sulfur Dioxide
SO_3	Sulfate
SOx	Oxides of Sulfur
SRP	Scientific Review Panel
TACs	Toxic Air Contaminants
T-BACT	Best Available Control Technology for Toxics
TDS	Total Dissolved Solids
Tpy	Tons per Year
VOCs	Volatile Organic Compounds

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SOCIOECONOMICS

Ellen LeFevre

SUMMARY OF CONCLUSIONS

Energy Commission staff (staff) concludes that construction and operation of the Alamitos Energy Center (AEC) would not cause significant direct, indirect, or cumulative adverse socioeconomic impacts on the project area's housing, schools, law enforcement services, or parks. Staff also concludes the project would not induce a substantial population growth or displacement of population, or induce substantial increases in demand for housing, parks, or law enforcement services. Staff's proposed Conditions of Certification **SOCIO-1** and **SOCIO-2** would ensure project compliance with applicable laws, ordinances, regulations, and standards (LORS).

Staff has not identified any significant socioeconomic impacts from the proposed AEC. Therefore, there are no significant impacts to any population, including the environmental justice population represented in **Socioeconomics Figure 1** and **Table 3.**

INTRODUCTION

Staff's socioeconomics impact analysis evaluates the project's induced changes from construction and operation on the following:

- Existing population
- Employment patterns
- Local communities and their services and resources
- Law enforcement services
- Estimated beneficial economic effects

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Socioeconomics Table 1 contains socioeconomics (LORS) applicable to the proposed project.

Socioeconomic Table 1
Laws, Ordinances, Regulations, and Standards

Applicable Law	Description
State	
California Education Code, Section 17620	The governing board of any school district is authorized to levy a fee, charge, dedication, or other requirement for the purpose of funding the construction or reconstruction of school facilities.
California Government Code, Sections 65995-65998	Except for a fee, charge, dedication, or other requirement authorized under Section 17620 of the Education Code, state and local public agencies may not impose fees, charges, or other financial requirements to offset the cost for school facilities.
Local	
Long Beach Municipal Code Chapter 18.22	A Police Facilities Impact Fee is imposed on residential and nonresidential development for the purpose of assuring that the impacts created by said development pay its fair share of the costs required to support needed police facilities and related costs necessary to accommodate such development.

SETTING

The proposed AEC is located in the city of Long Beach, Los Angeles County, within the boundaries of the existing Alamitos Generating Station (AGS) industrial site (690 North Studebaker Road).

The construction workforce typically resides within a two-hour commute of the project and the operations workforce resides within a one-hour commute; for the AEC the commute area encompasses the following:

- Los Angeles-Long Beach-Glendale Metropolitan Division (MD) (Los Angeles County);
- Anaheim- Santa Ana-Irvine Metropolitan Division (MD) (Orange County); and
- Riverside-San Bernardino-Ontario Metropolitan Statistical Area (MSA) (Riverside and San Bernardino counties).

The study area for law enforcement and parks comprises the city of Long Beach; the population and housing would extend to the city of Long Beach and the nearby cities of; the indirect and induced economic impacts would extend to Los Angeles and Orange counties; impacts to environmental justice (EJ) populations would extend to a six-mile radius of the project.

USING THE 2010 US CENSUS AND US CENSUS BUREAU'S AMERICAN COMMUNITY SURVEY IN STAFF ASSESSMENTS

After the 2000 Census, the detailed social, economic, and housing information previously collected on the decennial census long form was no longer part of the decennial census and instead was now collected on the American Community Survey (ACS) (US Census 2013a). The U.S. Census Bureau's ACS is a nationwide, continuous survey that will continue to collect long-form-type information throughout the decade. Decennial census data is a 100 percent count collected once every ten years and represents information from a single reference point (April 1st). The main function of the decennial census is to provide counts of people for the purpose of congressional apportionment and legislative redistricting.

ACS collects data from a sample of the population based on information compiled continually and aggregated into one and five-year estimates ("period estimates") released every year. The primary purpose of the ACS is to measure the changing social and economic characteristics of the U.S. population. As a result, the ACS does not provide official population counts in between censuses. Instead, the Census Bureau's Population Estimates Program continues to be the official source for annual population totals, by age, race, Hispanic origin, and sex.

ACS collects data at every geography level from the largest level (nation) to the smallest level available (block group (BG)).[1] Census Bureau staff recommends the use of data no smaller than the census tract level.[2,3] Data from the five-year estimates is used for our analysis as it provides the greatest detail at the smallest geographic level. A certain level of variability is associated with the estimates because they come from a sample population. This variability is expressed as a margin of error (MOE) which is used to calculate the coefficient of variation (CV). CVs are a standardized indicator of the reliability of an estimate. While not a set rule, the US Census Bureau considers the use of estimates with a CV more than 15 percent a cause for caution when interpreting patterns in the data (US Census 2009). When CVs for estimates are high, the reliability of an estimate improves by using estimates for a larger geographic area (e.g. city or community versus census tract) or combining estimates across geographic areas.

[1] Census Block Group - A statistical subdivision of a census tract. A BG consists of all tabulation blocks whose numbers begin with the same digit in a census tract; for example, for Census 2000, BG 3 within a census tract includes all blocks numbered between 3000 and 3999. The block group is the lowest-level geographic entity for which the Census Bureau tabulates sample data from the decennial census. **Source:** http://www.census.gov/dmd/www/glossary.html.

[2] Census Tract - A small, relatively permanent statistical subdivision of a county or statistically equivalent entity, delineated for data presentation purposes by a local group of census data users or the geographic staff of a regional census center in accordance with Census Bureau guidelines. Census tracts are designed to be relatively homogeneous units with respect to population characteristics, economic status, and living conditions at the time they are established. Census tracts generally contain between 1,000 and 8,000 people, with an optimum size of 4,000 people. Census tract boundaries are delineated with the intention of being stable over many decades, so they generally follow relatively permanent visible features. **Source:** http://www.census.gov/dmd/www/glossary.html.

[3] Census Workshop: Using the American Community Survey (ACS) and The New American Factfinder (AFF) hosted by Sacramento Area Council of Governments on May 11 & 12, 2011. Workshop presented by Barbara Ferry, U.S. Census Partnership Data Services Specialist.

PROJECT-SPECIFIC DEMOGRAPHIC SCREENING

Staff's demographic screening is based on information contained in two documents: *Environmental Justice: Guidance Under the National Environmental Policy* Act (CEQ 1997) and *Final Guidance for Incorporating Environmental Justice Concerns in EPA's Compliance Analyses* (US EPA 1998). The intention is to identify minority and below-poverty-level populations potentially affected by the proposed project.

Staff's demographic screening identifies the presence of minority and below-poverty-level populations within a six-mile radius of the proposed project site. The six-mile radius is based on air quality modeling, as described in the **Air Quality** section of this document. No other technical area has identified potential impacts that might exceed this distance. Therefore, staff uses a six-mile radius from the project to obtain data to gain a better understanding of the demographic makeup of the communities potentially impacted by the project. When an EJ population is identified, staff in 11 technical disciplines consider the project's effects on this population.[4]

Due to the change of surveys generated by the U.S. Census Bureau, the screening process used by Energy Commission staff continues to rely on current (2010) decennial census data to determine the number of minority populations, and now relies on current (2010 – 2014) ACS data to evaluate the presence of individuals living below the federal poverty level.

While ACS provides more recently updated data than the 2010 decennial data, staff continues to use the current decennial data as it allows staff to accurately determine where minority populations reside in the smallest geographic area. Data at this small scale highlights where concentrations of minority populations reside so that the 11 technical staff can analyze whether any project impacts may be experienced by an EJ population. Updated minority data from the current ACS is presented for the smallest geographic area that yields reliable results so readers can see how demographics, specifically minority concentrations, have changed since the 2010 decennial data.

Minority Populations

According to *Environmental Justice: Guidance Under the National Environmental Policy Act*, minority individuals are defined as members of the following groups:

- American Indian or Alaskan Native
- Asian or Pacific Islander
- Black, not of Hispanic origin
- Hispanic

An EJ population is identified when one or more U.S. Census blocks in the six-mile radius have a minority population greater than or equal to 50 percent. **Socioeconomics**

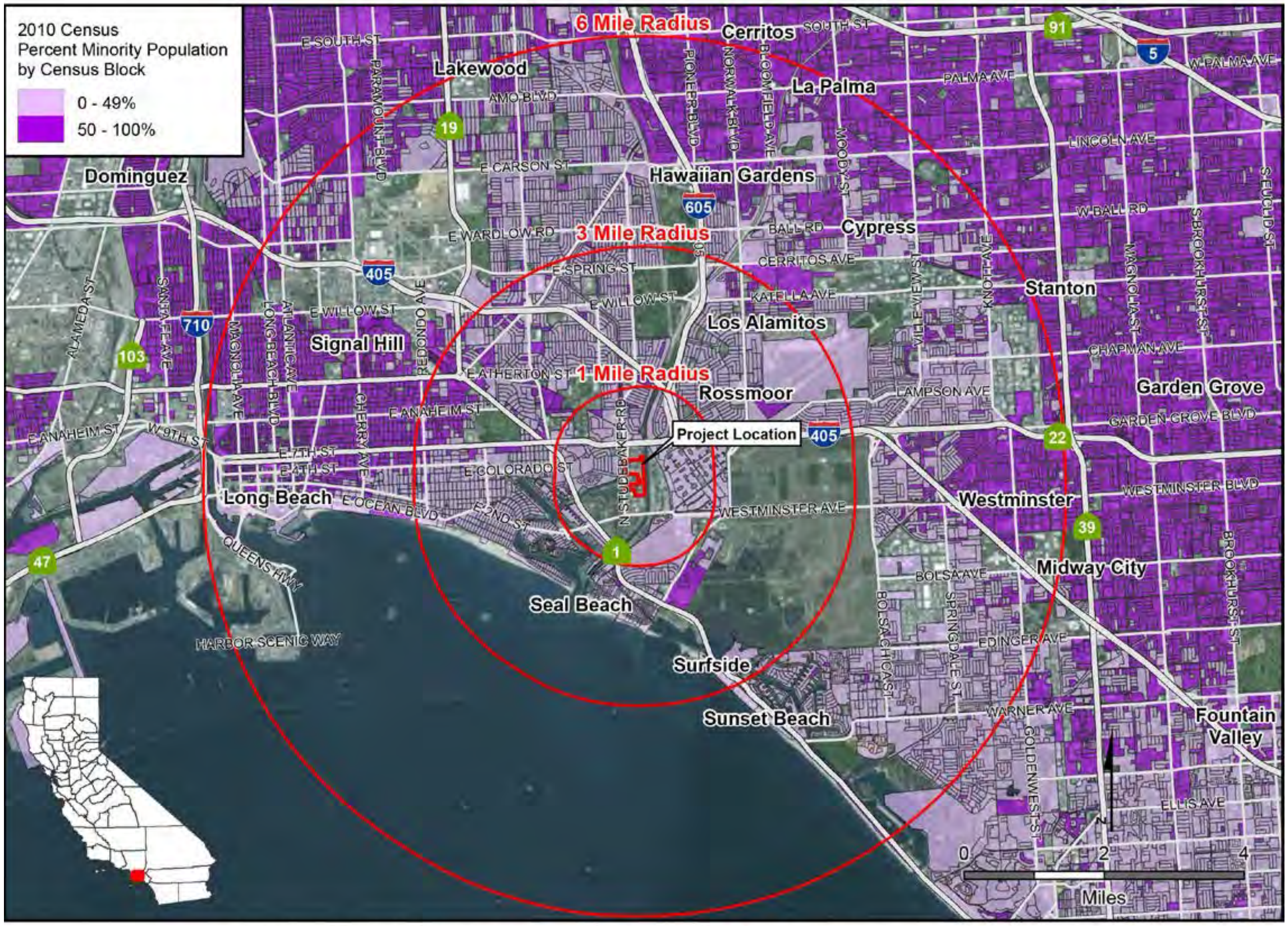
[4] The 11 technical disciplines are Air Quality, Hazardous Materials Management, Land Use, Noise and Vibration, Public Health, Socioeconomics, Soil and Water Resources, Traffic and Transportation, Transmission Line Safety and Nuisance, Visual Resources, and Waste Management.

Figure 1 (with a one-, three-, and six-mile radius) identifies the EJ population based on race and ethnicity as defined by *Environmental Justice: Guidance Under the National Environmental Policy Act.*

In an effort to update population data since the 2010 decennial U.S. Census, staff has included **Socioeconomics Table 2** to provide the reader a comparison of decennial and ACS census data for minority populations.

SOCIOECONOMICS - FIGURE 1

Alamitos Energy Center - Census 2010 Minority Population by Census Block



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Census 2010 PL 94-171 Data

Socioeconomics Table 2
Minority Population Data Within the Project Area

CITIES IN THE SIX-MILE RADIUS		Total Population	Not Hispanic or Latino: White alone	Minority	Percent Minority (%)
Cypress	**April 1, 2010 Census** [1]	47,802	20,865	26,937	**56.35**
	2010-2014 Estimate [2]	48,748 ±54	20,863 ±972	27,885 ±973	**57.20** ±2.00
Hawaiian Gardens	**April 1, 2010 Census**	14,254	1,044	13,210	**92.68**
	2010-2014 Estimate	-	-	-	**-**
Lakewood	**April 1, 2010 Census**	80,048	32,774	47,274	**59.06**
	2010-2014 Estimate	80,926 ±123	30,835 ±993	50,091 ±1001	**61.90** ±1.23
Long Beach	**April 1, 2010 Census**	462,257	135,698	326,559	**70.64**
	2010-2014 Estimate	468,594 ±158	131,481 ±2,222	337,113 ±2228	**71.94** ±0.47
Los Alamitos	**April 1, 2010 Census**	11,449	6,721	4,728	**41.30**
	2010-2014 Estimate	11,598 ±33	6,404 ±411	5,194 ±412	**44.78** ±3.55
Seal Beach	**April 1, 2010 Census**	24,168	18,580	5,588	**23.12**
	2010-2014 Estimate	24,477 ±49	18,020 ±590	6,457 ±592	**26.38** ±2.42
Signal Hill	**April 1, 2010 Census**	11,016	3,340	7,676	**69.68**
	2010-2014 Estimate	11,245 ±30	3,089 ±387	8,156 ±388	**72.53** ±2.89

Notes: Staff's analysis of the 2010 – 2014 estimates returned CV values less than 15, indicating the data is reliable. The 2010 – 2014 estimate data for Hawaiian Gardens is not reported because staff determined it to be unreliable (CV value greater than 15).**Sources:** [1] US Census 2010a and [2] US Census 2015a.

The data presented in **Socioeconomics Table 2** shows a large minority population in the six-mile radius of the project site and the highest percent minority population (using 2010 census data) in the city of Hawaiian Gardens, approximately 93 percent.[5] The percent minority population in the cities of Cypress and Long Beach has remained consistent and increased in the cities of Lakewood, Los Alamitos, Seal Beach, and Signal Hill.

Below-Poverty-Level-Populations

The official poverty thresholds do not vary by geography (e.g. state, county, etc.). The poverty thresholds are updated annually to allow for changes in the cost of living. The population for whom poverty status is determined does not include institutionalized people, people in military quarters, people in college dormitories, and unrelated individuals under 15 years old.

[5] Staff's analysis of ACS 2010-2014 data for the city of Hawaiian Gardens in **Socioeconomics Table 2** returned CV values greater than 15, indicating that the data is unreliable and may not accurately reflect local characteristics. Thus the data for the city is not reported.

Staff identified the below-poverty-level population in the project area using place level data (city) from the 2010 - 2014 ACS Five-Year Estimates from the U.S. Census (US Census 2015c). The CEQ and U.S. EPA guidance documents do not provide a numerical threshold to use when identifying below-poverty-level populations. In the absence of a threshold, staff looks at the below-poverty-level populations in the cities within the six-mile radius and compares them to other appropriate reference geographies, such as the Census County Divisions (CCDs), county, or state to determine whether the below-poverty-level populations are less than, more than, or about the same to the populations in comparison geographies. U.S. EPA guidance notes that a demographic comparison to the next larger geographic area or political jurisdiction should be presented to place population characteristics in context (US EPA 1998, pg. 12). This is consistent with staff's approach to identify below-poverty-level populations that constitute an EJ population.

Socioeconomics Table 3 shows poverty data for the cities in the project's six-mile radius and the reference geographies.

Socioeconomics Table 3
Poverty Data within the Project Area

Area	Total Population	Persons with income in the past 12 months below-poverty-level	Percent of population below-poverty-level (%)
	Estimate*	Estimate	Estimate
CITIES IN THE SIX-MILE RADIUS			
Cypress	48,608 ±112	3,289 ±632	**6.80** ±1.3
Hawaiian Gardens	14,373 ±58	4,134 ±799	**28.80** ±5.5
Lakewood	80,717 ±184	6,688 ±881	**8.30** ±1.1
Long Beach	462,140 ±544	95,719 ±3,731	**20.70** ±0.8
Seal Beach	24,214 ±198	2,208 ±390	**9.10** ±1.6
REFERENCE GEOGRAPHY			
Long Beach-Lakewood CCD	570,158 ±634	108,344 ±4,118	**19.00** ±0.7
North Coast CCD	373,008 ±1,432	42,153 ±2,396	**11.30** ±0.6
Anaheim-Santa Ana-Garden Grove CCD	1,657,735 +/2,854	257,082 +/-5,859	**15.5**0 +/-0.3

Notes: * Population for whom poverty status is determined. Staff's analysis of the 2010 – 2014 estimates returned CV values less than 15, indicating the data is reliable. Data for the cities of Los Alamitos and Signal Hill is not reported (CV values greater than 15). **Source:** US Census 2015c.

Socioeconomics Table 3 shows that cities of Hawaiian Gardens and Long Beach have a higher percentage of the population living below-poverty-level compared to the reference geographies. The below-poverty-level for Hawaiian Gardens and Long Beach is approximately ten and two percent higher, respectively, than the reference geography with the highest below-poverty-level (Long Beach-Lakewood CCD). Thus, the below-poverty-level population in the cities Hawaiian Gardens and Long Beach constitutes an

EJ population as defined by *Environmental Justice: Guidance Under the National Environmental Policy Act.*

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

The California Environmental Quality Act (CEQA) requires a list of criteria to determine the significance of identified impacts. A significant impact is defined by CEQA as “a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project” (CEQA Guidelines Section 15382).

Thresholds serve as the benchmark for determining if a project will result in a significant adverse impact when evaluated against existing conditions (e.g., "baseline" conditions). State CEQA Guidelines Section 15064(e) specifies:

> "[e]conomic and social changes resulting from the project shall not be treated as significant effects on the environment."
>
> "[w]here a physical change is caused by economic or social effects of a project, the physical change may be regarded as a significant effect in the same manner as any other physical change resulting from the project. Alternatively, economic and social effects of a physical change may be used to determine that the physical change is a significant effect on the environment. If the physical change causes adverse economic or social effects on people, those adverse effects may be used as a factor in determining whether the physical change is significant."

Staff has used Appendix G of the CEQA Guidelines for this analysis, which specifies that a project could have a significant effect on population, housing, and law enforcement services, schools and parks if it would:

- Induce substantial population growth in an area, either directly or indirectly;
- Displace substantial numbers of people and/or existing housing, necessitating the construction of replacement housing elsewhere; or
- Adversely impact acceptable levels of service for law enforcement, schools, and parks and recreation.

Staff’s assessment of the significance of any impacts on population, housing, police protection, schools, and parks and recreation are based on professional judgments, input from local and state agencies, and the industry-accepted two-hour commute range for construction workers and one-hour commute range for operational workers.

DIRECT/INDIRECT IMPACTS AND MITIGATION

<u>Induce Substantial Population Growth</u>

Staff defines “induce substantial population growth” (for purposes of this analysis) as workers moving into the project area because of project construction and operation, thereby encouraging construction of new homes or extension of roads or other infrastructure. To determine whether the project would induce population growth, staff analyzes the availability of the local workforce and the population within the region.

The construction workforce typically resides within a two-hour commute of the project and the operations workforce resides within a one-hour commute. For the AES that distance includes the following areas:

- Los Angeles-Long Beach-Glendale Metropolitan Division (MD) (Los Angeles County);
- Anaheim- Santa Ana-Irvine Metropolitan Division (MD) (Orange County); and
- Riverside-San Bernardino-Ontario Metropolitan Statistical Area (MSA) (Riverside and San Bernardino counties).

Workers with a greater commute would likely be non-local and would tend to seek lodging closer to the project site (temporarily during construction or permanently during operations).

Socioeconomics Table 4 shows the historical and projected populations for the cities in the six-mile radius, plus Los Angeles and Orange counties for reference. Population projections between 2010 and 2035 show a growth of 12 percent in the cities within and around the six-mile radius. The cities of Long Beach, Signal Hill, and the county of Los Angeles have the highest projected growth with 16, 17, and 16 percent, respectively.

Socioeconomics Table 5 shows the total labor by skill for the project study area. **Socioeconomics Table 6** shows the project labor needs for the construction compared with the total labor supply in the study area, which would be more than adequate to provide construction labor for the project.

Socioeconomics Table 4
Historical and Projected Populations

	2000[1]	2010[2]	2020[3]	2035[3]	Projected Population Change 2010-2035	
					Number	Percent
Cities in the Project Study Area: (Total)	646,901	650,994	685,400	731,400	80,406	12.35
Cypress	46,229	47,802	50,300	51,400	3,598	7.53
Hawaiian Gardens	14,779	14,254	14,800	15,600	1,346	9.44
Lakewood	79,345	80,048	80,500	80,600	552	0.69
Long Beach	461,522	462,257	491,000	534,100	71,843	15.54
Los Alamitos	11,536	11,449	12,000	12,000	551	4.81
Seal Beach	24,157	24,168	25,000	24,800	632	2.62
Signal Hill	9,333	11,016	11,800	12,900	1,884	17.10
Counties						
Los Angeles County	9,519,338	9,818,605	10,404,000[3] 10,435,991[4]	11,353,000[3] 11,123,113[4]	1,534,395*	15.63
Orange County	2,846,289	3,010,232	3,266,000[3] 3,243,261[4]	3,421,000[3] 3,410,509[4]	410,768*	13.65

Notes: *Calculated using the highest 2035 population projection. **Sources:** [1]US Census 2000, [2]US Census 2010a, [3]SCAG 2012, [4]CA DOF 2014.

Socioeconomics Table 5
Total Craft Labor by Skill in the Study Area MSAs/MD

Craft	Los Angeles-Long Beach-Glendale Metropolitan Division (Los Angeles County)				Santa Ana-Anaheim-Irvine MSA (Orange County)				Riverside-San Bernardino-Ontario MSA (Riverside & San Bernardino counties)			
	Total Workforce (2012)	Total Projected Workforce (2022)	Growth from 2012		Total Workforce (2012)	Total Projected Workforce (2022)	Growth from 2012		Total Workforce (2012)	Total Projected Workforce (2022)	Growth from 2012	
			Number	Percent			Number	Percent			Number	Percent
Boilermaker	-	-	-	-	-	-	-	-	-	-	-	-
Carpenter	17,630	21,830	4,200	23.8	11,260	14,610	3,350	29.8	9,610	14,030	4,420	46.0
Cement Finisher	1,930	2,560	630	32.6	2,160	2,880	720	33.3	1,960	3,220	1,260	64.3
Electrician	11,100	13,390	2,290	20.6	5,500	6,950	1,450	26.4	3,920	5,590	1,670	42.6
I&C Control Room	-	-	-	-	-	-	-	-	-	-	-	-
Insulation Worker	-	-	-	-	300	480	180	60.0	-	-	-	-
Ironworker	940	1,170	230	24.5	460	590	130	28.3	630	880	250	39.7
Laborer	21,320	26,310	4,990	23.4	12,170	15,530	3,360	27.6	12,310	18,180	5,870	47.7
Millwright	-	-	-	-	-	-	-	-	140	200	60	42.9
Oiler/ Mechanic[1]	2,120	2,180	60	2.8	590	720	130	22.0	860	980	120	14.0
Operating Engineer	3,130	3,570	440	14.1	2,400	2,850	450	18.8	2,990	3,920	930	31.1
Painters	8,420	11,230	2,810	33.4	4,970	7,110	2,140	43.1	3,440	5,450	2,010	58.4
Piling Crew	-	-	-	-	-	-	-	-	-	-	-	-
Pipefitter[2]	8,200	10,060	1,860	22.7	3,590	4,560	970	27.0	2,520	3,620	1,100	43.7
Plumber[2]	8,200	10,060	1,860	22.7	3,590	4,560	970	27.0	2,520	3,620	1,100	43.7
Roofers	2,290	2,800	510	22.3	2,000	2,340	340	17.0	1,280	2,020	740	57.8
Sheet Metal Worker	2,270	2,650	380	16.7	1,560	1,870	310	19.9	1,160	1,540	380	32.8
Sheetrockers[3]	3,900	5,310	1,410	36.2	3,940	5,510	1,570	39.8	2,320	3,630	1,310	56.5
Sprinkler Fitters[2]	8,200	10,060	1,860	22.7	3,590	4,560	970	27.0	2,520	3,620	1,100	43.7
Supervisors[4]	10,760	12,240	1,480	13.8	5,420	6,430	1,010	18.6	4,040	5,380	1,340	33.2
Teamster[5]	15,920	17,320	1,400	8.8	2,160	3,150	990	45.8	7,460	8,750	1,290	17.3

Notes: - No data available; [1] Maintenance Workers, Machinery; [2] Plumbers, Pipefitters, and Steamfitters; [3] Drywall and Ceiling Tile Installers; [4] Construction Managers; [5] Industrial Truck and Tractor Operators. **Sources:** AEC 2015g Appendix 5.10B, Table 5.10B; CA EDD 2014.

Socioeconomics Table 6
Total Craft Labor by Skill in the Study Area MSAs/MD versus Project Labor Needs

Study Area MSAs/MD					AEC Construction Workforce Needs- Peak Month by Phase	
			Growth from 2012		Phase	
					CCGT Power Block 1	SCGT Power Bock 2
					Construction Period	
Craft	Total Workforce (2012)	Total Projected Workforce (2022)	Number	Percent	June 2017-March 2020 34 mo.	May 2020-Aug. 2021 16 mo.
					Workforce during Peak Month(s) / Peak Workforce by Trade by Phase	
					July 2019	Jan. 2021
Boilermaker	-	-	-	-	48	28
Carpenter	38,500	50,470	11,970	31.1	0 / (24)	38
Cement Finisher	6,050	8,660	2,610	43.1	0 / (4)	
Electrician	20,520	25,930	5,410	26.4	54 / (60)	68 / (86)
I&C Control Room	-	-	-	-	8	0
Insulation Worker	300	480	180	60.0	30	16
Ironworker	2,030	2,640	610	30.0	0 / (14)	50 / (62)
Laborer	45,800	60,020	14,220	31.0	16	62
Millwright	140	200	60	42.9	12	82
Oiler/ Mechanic[1]	3,570	3,880	310	8.7	2	0
Operating Engineer	8,520	10,340	1,820	21.4	14	18 / (26)
Painters	16,830	23,790	6,960	41.4	6 / (8)	18
Piling Crew	-	-	-	-	0 / (8)	0
Pipefitter[2]	14,310	18,240	3,930	27.5	58	78
Plumber[2]	14,310	18,240	3,930	27.5	2	0
Roofers	5,570	7,160	1,590	28.5	2	0
Sheet Metal Worker	4,990	6,060	1,070	21.4	0	18
Sheetrockers[3]	10,160	14,450	4,290	42.2	4	0
Sprinkler Fitters[2]	14,310	18,240	3,930	27.5	4	0
Supervisors[4]	20,220	24,050	3,830	18.9	39*	26 / (32)*
Teamster[5]	25,540	29,220	3,680	14.4	7	10 / (22)
Total Workforce					306	512

Notes: - No data available; () Number in parenthesis represents the peak workforce by trade during construction; [1] Maintenance Workers, Machinery; [2] Plumbers, Pipefitters, and Steamfitters; [3] Drywall and Ceiling Tile Installers; [4] Construction Managers; [5] Industrial Truck and Tractor Operators. * Includes engineering contractor's staff (accountants, engineers, field inspectors, management, etc.). **Sources:** AEC 2015g Appendix 5.10B, Table 5.10B; CA EDD 2014.

The applicant expects project construction and site preparation activities to last 56 months, from the first quarter of 2017 until the third quarter of 2021.The AEC site preparation would begin in January 2017 with the removal of the retired and decommissioned Unit 7's building and ancillary equipment, fuel tank storage, tank berms, small maintenance shops, and two wastewater retention basins to make room for the onsite construction and laydown area. The applicant expects the AEC combined-cycle gas turbine (CCGT) construction to begin in the second quarter of 2017 and be completed by the second quarter of 2020. The AEC CCGT would be operational before May 1, 2020. The AEC simple-cycle gas turbine (SCGT) construction would begin in the second quarter of 2020 and would be completed in the third quarter of 2021. The applicant expects to commence commercial operation in the third quarter of 2021. No construction overlap is expected between the AEC CCGT and the AEC SCGT power blocks (AEC 2015f pg. 5.10-2).

AGS Units 1 through 6 are currently in operation and would remain in operation through much of the AEC development and construction (AEC 2015f pg. 5.10-2). Units 1, 2, and 5 would be retired when the AEC CCGT commences operation. Units 3, 4, 6 would remain in operation through at least December 31, 2020 (AEC 2015f pg. 2-2). The operation of Units 1 through 6 would not impede the construction of AEC.

The construction plan is based on a single shift composed of a 10-hour workday, Monday through Friday, and a single 8-hour shift on Saturday. Construction would typically take place between the hours of 7:00 am and 7:00 pm Monday through Friday and 9:00 am and 6:00 pm on Saturday, consistent with the city of Long Beach ordinances. Overtime and additional shift work may be used to maintain the construction schedule or to complete critical construction activities (such as pouring concrete at night during hot weather and working around time-critical shutdowns and constraints). During the commissioning and startup phase of each of the power blocks, some activities may continue 24 hours per day, 7 days per week. (AEC 2015f pg. 2-20)

Construction of the AEC would require laydown areas (approximately eight acres onsite and approximately 10-acre offsite) for offloading, laydown and storage of materials, equipment, and vehicles. The onsite laydown areas would include the parking lot north of existing Units 1 through 4 and the area between existing Units 1 and 2 and their intake canal. The offsite laydown area would be located adjacent to the AGS site south of the existing Units 5 and 6 (AEC 2015f pg. 2-20, 5.10-2). The off-site laydown area may also be used by the proposed AES Huntington Beach Energy Project (12-AFC-02) (HBEP) for equipment storage.

The primary trades required for the project would include boilermakers, carpenters, electricians, ironworkers, laborers, millwrights, operators, and pipefitters. The project's site preparation activities would average 75 workers over the five-month period and peak with 91 workers in January through March 2017. The project's construction workforce would reach a peak workforce with 512 workers in month 44 (January 2021) and have an average workforce over the 51-month period of 191 workers. The peak construction workforce and duration of construction by phase is presented in **Socioeconomics Table 6**.

The applicant assumes that 90 percent of the construction workforce would reside in Los Angeles County (AEC 2015f, pg. 5.10-11). Workers would also be drawn from the neighboring counties of Orange, Ventura, Kern, and San Bernardino, and a portion from other nearby counties in southern California (AEC 2015f, pg. 5.10-10). Workers coming from Ventura, Kern, and San Bernardino counties would be considered non-local and likely seek lodging during the week closer to the project site and return to their primary residence on weekends.

Energy Commission staff contacted the local building and construction trades council for more information about the construction workforce in Los Angeles and Orange counties, as these counties are where the workforce for the AEC would be drawn (CEC 2014j).

Staff from the Los Angeles/Orange Counties Building and Construction Trades Council (BCTC) (Ron Miller and Jim Adams) explained that information from their local unions shows there is a more than sufficient supply of union members available within commuting distance of the AEC. BCTC staff also indicated the recession has caused huge unemployment in their trades with unemployment in the local unions from 15 to 40 percent. These unemployment figures are just starting to decrease. According to the BCTC staff, construction of energy facilities requires a certain ratio of apprentices to journeyman members for staffing the job site. With the robust five-year apprentice programs, apprentices at all levels would be available for energy facility staffing at the AEC.

Based on the large local area labor pool, Energy Commission staff concludes the majority of construction workers would commute daily to the project site and a small workforce, about ten percent, would come from outside of the local commute area. During the peak construction period, approximately 52 workers could come from outside of the local commute area, with an average of 20 workers during the 51-month construction period.

The 36 operational staff needed for the AEC would come from the existing 66-member AGS staff (AEC 2015f, pg. 5.10-12). Since no new workers would be hired, no new residents would be added.

Staff concludes the project's construction and operation workforces would not directly or indirectly induce a substantial population growth in the project area, and therefore, the project would create a less than significant impact under this criterion.

Housing Supply

Socioeconomics Table 7 presents housing supply data for the project area. As of April 1, 2010, there were 246,575 housing units within a six-mile radius of the project site with a vacancy of 15,899 units, representing a 6.4 percent vacancy rate. The California Department of Finance has updated changes to population and housing stock for 2015. Year 2015 housing estimates indicated 247,250 housing units within the six-mile radius, with a vacancy of 15,876 for a vacancy rate of 6.4 percent (CA DOF 2015). The updated data show almost no change in the housing stock and vacancy rate. A five percent vacancy is a largely industry-accepted minimum benchmark for a sufficient amount of housing available for occupancy (Virginia Tech 2006). The housing counts in the project area indicate a sufficient supply of available housing units within a six-mile radius of the project site.

Socioeconomics Table 7
Housing Supply Estimates in the Project Area

Subject	Area					
	Cities in a Six Mile Radius of Project Site*		Los Angeles County		Orange County	
	Number	Percent	Number	Percent	Number	Percent
OCCUPANCY STATUS						
Total housing units	246,575	100	3,445,076	100	1,048,907	100
--Occupied housing units	230,676	93.6	3,241,204	94.1	992,781	94.6
--Vacant housing units	15,899	6.4	203,872	5.9	56,126	5.4
VACANCY STATUS						
Vacant housing units	15,899	100	203,872	100	56,126	100
--For rent	8,471	53.28	104,960	51.5	25,254	45.0
--For sale only	1,964	12.35	26,808	13.1	8,434	15.0
--For seasonal, recreational, or occasional use	1,656	10.42	19,099	9.4	10,806	19.3
--Other**	3,808	23.95	53,005	26.0	11,632	20.72

Notes: *Cities include Long Beach, Signal Hill, Lakewood, Hawaiian Gardens, Cypress, Los Alamitos, and Seal Beach.** Other includes rented, not occupied; sold, not occupied; migratory workers, and other vacant.
Source: US Census 2010b

Los Angeles County has 997 hotel/motel properties with a total of 98,135 rooms and an occupancy rate of 79.7 percent for 2014 year to date (Jan 2016) (Discover LA 2016). Orange County has a large supply of lodging options with approximately 499 hotels and 56,711 rooms (Anaheim/OC VCB 2015). Long Beach has approximately 58 hotel/motel properties with approximately 5,712 rooms. There is one recreational vehicle park within six miles of the project site with 80 sites with full hook ups; however, the park is at full capacity during much of the year (Golden Shore 2014).

Given the large supply of lodging choices in Long Beach, Los Angeles and Orange counties, and the estimated number of non-local project construction workers (peak estimate 52 workers), staff expects no new housing would be required as a result of the project. There would be no new operations workers to impact housing supply.

Staff concludes the project’s construction and operation workforce would not have a significant adverse impact on the housing supply in the project area, Long Beach, Los Angeles and Orange counties and therefore, the project would create a less than significant impact under this criterion.

Displace Substantial Numbers of Existing Housing and People

The AEC is proposed on the site of the existing AGS as a replacement to the existing power plant, and therefore, would not directly displace existing housing or people. The project would not induce substantial population growth or create the need for replacement housing to be constructed elsewhere, as previously discussed.

Staff concludes the project would have no impact on area housing as the project would not displace any people or necessitate the construction of replacement housing elsewhere.

Result in Substantial Physical Impacts to Government Facilities

As discussed under the subject headings below, the AEC would not cause significant impacts to service ratios, response times, or other performance objectives relating to law enforcement, schools, or parks.

Law Enforcement

The AEC site is located within the jurisdiction of the city of Long Beach Police Department (LBPD) East Division. The East Division substation is located at 4800 Los Coyotes Diagonal, a distance of 3.4 miles from the project site (LBPD 2014a). LBPD's East Division staff includes 105 sworn police officers and 2 civilians. The estimated response time for Priority 1 (emergency) calls in the East Division is 4.5 minutes and the estimated response time for Priority 2 (non-emergency) calls is 16 minutes. While staffing levels fluctuate, the East Division service levels currently meet the needs of the area. According to Administrative Bureau Chief Braden Phillips, LBPD has existing mutual aid agreements with all regional law enforcement agencies, and any support requests are coordinated by the Los Angeles County Sheriff's Office (CEC 2014f).

The California Highway Patrol (CHP) is the primary law enforcement agency for state highways and roads. The city of Long Beach includes a small segment of the Pacific Coast Highway (State Route 1). Both CHP and LBPD serve the portion of Pacific Coast Highway within the city of Long Beach. CHP services include law enforcement, traffic control, accident investigation and the management of hazardous material spill incidents (AFC pg. 5.10-6-5.10-7). The nearest CHP office is located in Westminster (CHP 2016). The **Hazardous Materials Management** section of this document discusses response times for hazardous material spill incidents.

Staff contacted LBPD to discuss the proposed project, ascertain their ability to provide law enforcement services to the project, and solicit comments or concerns they might have about the project. Staff included an example of two conditions of certification typically applied to projects like the AEC to address construction and operations site security and traffic management. Chief Phillips stated that based on the proposed traffic/workforce progression, additional traffic officers may be required in and around the project area because Studebaker Road is an already heavily used access route to the I-405 freeway (CEC 2014f). If repeated traffic jams occur on Studebaker Road, additional traffic officers may be required on an "as needed" basis to help unclog the thoroughfare. The LBPD could accommodate additional officers, if necessary, and would not need to increase staffing.

Chief Phillips noted that while it is possible that project-related traffic could slow some responses using Studebaker Road and/or Loynes Drive, the overall impact on average response times should be minimal. Traffic and Transportation staff has proposed Condition of Certification **TRANS-2**, which would require preparation and implementation of a traffic control plan to address the movement of workers, vehicles, and materials, including arrival and departure schedules and designated workforce and delivery routes. See the **Traffic and Transportation** section of this document for a full assessment of impacts related to traffic and transportation.

In the AFC, the applicant has addressed security measures for operations by proposing site fencing and security gate; evacuation procedures; a protocol for contacting law enforcement in the event of conduct endangering the facility, its employees, its contractors, or the public; and a fire alarm monitoring system. Also proposed are measures to conduct site personnel background checks, including employee and routine onsite contractors; site access protocol for vendors; and a protocol for hazardous materials vendors for security plan preparation and personnel background security checks. The security plan may include one or more of the following: security guards; security alarm for critical structures; perimeter breach detectors and onsite motion detectors; and video or still camera monitoring system (AEC 2015f, pg. 5.5-25).

Hazardous Materials Management staff is proposing Conditions of Certification **HAZ-7** and **HAZ-8**, which would require the preparation of site security plans to provide for security during all phases of this project. If the project is approved by the Energy Commission, the construction site security plan would be implemented before new construction commences, and includes a protocol for contacting law enforcement and the Energy Commission compliance project manager (CPM) in the event of suspicious activity or emergency. See the **Hazardous Materials Management** section of this document for a full assessment of impacts related to hazardous materials

Based on the information from Chief Phillips, staff concludes the project would not result in law enforcement response times being affected so that they exceed adopted response time goals. The project would not necessitate alterations to police station or the construction of a new police station to maintain acceptable response times for law enforcement services; therefore, no associated physical impact would result. Staff concludes that for the above reasons, the project would create a less than significant impact on law enforcement.

Education

The California Government Code sets forth the exclusive methods of considering and mitigating impacts on school facilities. Section 65995 expressly provides that "[t]he payment or satisfaction of a fee, charge, or other requirement levied or imposed pursuant to Section 17620 of the Education Code in the amount specified in Section 65995 … are hereby deemed to be full and complete mitigation of the impacts of any legislative or adjudicative act, or both, involving but not limited to, the planning, use, or development of real property, or any change in governmental organization… on the provision of adequate school facilities." Please see the discussion of school impact fees in the "Compliance with LORS" subsection below.

Parks

Long Beach has 162 parks with 26 community centers, two historic sites, two major tennis centers, a municipal golf system with five courses, the Long Beach Animal Care Services Bureau, a municipally operated marina system with 3,677 boat slips, and six miles of beaches. More than 3,100 acres within the city of Long Beach are developed for recreation (LBPRM 2015). Amenities offered at these parks include playgrounds and play equipment, skate parks, picnic areas/barbeque pits, sports courts (volleyball, basketball, tennis, roller hockey, handball/racquetball, and soccer), sports fields (baseball, softball, and football), weight room, nature trail, 18 and 9 hole golf courses, duck pond, swimming pools, peace garden, lawn bowling green, casting pond, dog park, gym, spray pool/water play features, community garden, fitness zones, archery range, and restrooms. Park facilities include community centers, teen centers, and senior centers. The closest park to the project site is the Edison Park in the city of Seal Beach. The closest park in the city of Long Beach to the project site is the Bixby Village Golf Course.

The city has a park standard of eight acres per 1,000 residents (LBPRM 2003). The 2010-2014 ACS Five-Year Estimates shows the estimated population in Long Beach as 468,594[6] (US Census 2015d). Based on this current estimate, approximately 3,749 acres of parks would be needed to meet the park standard. The city has approximately 3,100 acres of parks, equating to approximately 6.62 acres per 1,000 residents.

Staff's analysis shows there would not be a large number of workers moving into the project area during project construction and no workers moving to the project area for project operations. Therefore, there would be little, if any increase in the usage of or demand for parks or other recreational facilities.

Staff concludes the project would not result in substantial adverse physical impacts associated with the provision of new or physically altered government facilities in order to maintain acceptable service ratios, response times, or other performance objectives with respect to parks. The project would not increase the use of neighborhood or regional parks or recreational facilities to the extent that substantial physical deterioration of the facility would occur, or accelerate. The project does not propose any park facilities or necessitate the construction of new parks in the area. For the above reasons, staff concludes the project would have a less than significant impact on neighborhood or regional parks and recreational facilities.

CUMULATIVE IMPACTS AND MITIGATION

A project may result in significant adverse cumulative impacts when its effects are cumulatively considerable; that is, the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, other current projects, and probable future projects [Cal. Code of Regs., tit 14, §15065(a)(3)].

In a socioeconomic analysis, cumulative impacts could occur when more than one project in the same area has an overlapping construction schedule, thus creating a demand for workers that cannot be met locally, or when a project's demand for public services does not match a local jurisdiction's ability to provide such services. An influx

[6] The five-year ACS estimate for population in Long Beach is 468,594, with a margin of error of +/- 158, and a coefficient of variation of 0.01.

of non-local workers and their dependents can strain housing, schools, parks and recreation, and law enforcement services.

Staff used Los Angeles and Orange counties and the cities in proximity to the project site as the geographic scope for cumulative impacts. Staff considered projects within these search parameters that would likely employ a similar workforce to the AEC and that could have construction schedules overlapping with the AEC. The applicant anticipates that if the AEC is approved, the project's 56-month site preparation and construction would begin in January 2017. Staff considers the following projects in **Socioeconomics Table 8** part of the cumulative setting for socioeconomic resources.

Socioeconomics Table 8
Cumulative Projects

PROJECT NAME	PROJECT DESCRIPTION	LOCATION	DISTANCE TO PROJECT (Miles)	STATUS
Alamitos Energy Station Battery Energy Storage System (BESS)	BESS project at the AGS to include three 100 MW containment buildings, constructed in sequential phases from east to west. Each would contain two battery storage levels, electrical controls, and HVAC units. Construction proposed to start 3rd quarter 2019, after major mechanical completion of the AEC CCGT power block, with completion of the first 100-MW building planned for late 2020. The second and third 100 MW buildings to then be constructed and operational in 2021/2022.	North side of AEC project site, Long Beach	0.3	Planning Phase
Alamitos Bay Bridge Improvement Project	Improvements to the bridge are needed to enhance the safety of the structure and to maintain the level of service. Project could result in new bridge.	Project crosses the El Cerritos Channel on the Pacific Coast Highway, Long Beach	0.9	Environmental Review
CalTrans #12, San Diego Freeway I-405 Improvement Project	I-405 Improvement Project would add one general purpose lane in each direction on I-405 from Euclid Street to the I-605 interchange, plus add a tolled Express Lane in each direction of I-405 from SR-73 to SR-22 East.	I-405 between SR-73 and I-605, Costa Mesa, Seal Beach	1.0	Planning Phase
Los Alamitos Medical Center Specific Plan	Replacing and adding new buildings to the existing facility on an 18-acre site, including constructing two four-story hospital buildings. Planned in three phases with anticipated construction period of 25 years.	3751 Katella Avenue, Los Alamitos	3.2	Under Construction
Humboldt Bridge Preventative Maintenance Project	Maintenance activities on the existing Humboldt Drive bridge to restore the integrity of its original design.	Humboldt Dr. bridge, west of the intersection of Humboldt Dr. and Wimbledon Lane, Huntington Beach	3.8	Planning Phase
Douglas Park Rezone Project	Based on 2009 project description from addendum to the final EIR: Revised project to include up to approximately 3.75 million sq ft of commercial/light industrial uses (research and development uses), 250,000 sq ft of retail uses, and a hotel with 400 rooms. 10 acres of open space planned. The site covers 261 acres.	Bound by Carson Street on the north, the Airport south and southwest, Lakewood Boulevard on the east, and Lakewood Country Club Golf Course on the west.	5.0	Under Construction

PROJECT NAME	PROJECT DESCRIPTION	LOCATION	DISTANCE TO PROJECT (Miles)	STATUS
207 Seaside Way Project	Construction of 113-unit multi-family apartment complex on the 0.67-acre site. Project would include a single structure consisting of eight levels (one subterranean level and seven aboveground levels). Bottom three levels would provide 144 on-site parking spaces. Apartment structure would be 85 feet above the East Seaside Way grade. Apartment units would include a mix of studios, and one- and two-bedroom configurations. Amenities include a cafe, fitness center, retail space, and a lobby.	207 E Seaside Way Long Beach, CA 90802	5.2	Environmental Review
Urban Village on Long Beach	Project would improve three abutting parcels with a five-story building containing 129 condominium units and 175 parking stalls located in an integrated five-level parking garage.	1081 Long Beach Boulevard, Long Beach	5.3	Planning Phase
Oceanaire Apartment	Construction of a 216-unit multi-family/mixed-use apartment complex on the 1.76-acre site.	150 West Ocean Boulevard Long Beach	5.3	Under Construction
New Civic Center Project	Construction of new City Hall, new Port Building for Harbor Department administration, new and relocated Main Library, redeveloped Lincoln Park, residential development, and commercial mixed use development. Includes demolition of the former Long Beach Courthouse.	Downtown Long Beach, CA	5.5	Under Construction
442 W. Ocean Boulevard Project	Construction of a 95-unit multi-family apartment complex on the 24,000 sq ft site.	442 West Ocean Boulevard Long Beach	5.6	Environmental Review
Golden Shore Master Plan	Project includes three development options, a Residential Option and two Hotel Options, and all would be entitled through the City of Long Beach. The option ultimately constructed would be selected based on market conditions prevailing at the time entitlement is complete.	6-9 Golden Shore, Long Beach	5.9	Planning Phase
Monogram Apartments (formerly Pedigo)	Four-story with lofts apartment building consisting of 510 dwelling units, 25,815 sq. ft. public open space, 55,396 sq. ft. private open space, and approximately 5,097 sq. ft. leasing office wrapped around a six-level 862-space parking structure. (5 parcels located at the SW corner of Edinger Ave and Gothard St.)	7262 Edinger Ave. Huntington Beach	6.2	Plan check

PROJECT NAME	PROJECT DESCRIPTION	LOCATION	DISTANCE TO PROJECT (Miles)	STATUS
Huntington Beach Lofts	385 luxury residential units in five residential stories, located above approximately 10,000 square feet of street level retail and commercial uses.	7400 Center Ave Huntington Beach	6.3	Under construction
Gerald Desmond Bridge Replacement Project	The Gerald Desmond Bridge Replacement Project will provide three lanes in each direction to improve traffic flow, emergency lanes on both sides to reduce traffic delays and safety hazards, and 205 feet of vertical clearance to accommodate the world's largest, "greener" vessels.	Gerald Desmond Bridge, Port of Long Beach	7.0	In construction
Huntington Beach Energy Project	The 2014 Energy Commission licensed project is a natural gas fired, combined cycle, air-cooled 939-MW electrical generating facility. Project would require demolition of existing power plant and construction of project. The 2015 Petition to Amend the 2014 licensed project is a natural gas fired, combined cycle and simple-cycle, air-cooled 844-MW electrical generating facility.	Huntington Beach Generating Station site, Huntington Beach	10.9	Under Construction

AEC would employ an average of 75 workers per month during the five-month site preparation period and an average of 191 workers during the 51-month construction period. The construction workforce would peak during month 44 (January 2021) with 512 workers onsite. Approximately ten percent of the construction workforce would be non-local and would likely relocate closer to the project site. Once operational, the AEC would permanently employ 36 workers, drawn from the existing 66-member AGS staff. No additional staff would be required. **Socioeconomics Table 9** presents the total labor force for the crafts specifically needed for the construction of AEC. As shown in the table, the labor force within the Los Angeles-Long Beach-Glendale MD and the surrounding MD/MSAs are more than sufficient to accommodate the labor needs for construction of the AEC, including other future planned projects identified in **Socioeconomics Table 8** in the cumulative study area.

Socioeconomics Table 9
Total Labor Supply for Selected MSAs/MD

Total Labor for Selected MSAs/MD (Construction Workforce)*	Total Workforce for 2012	Total Projected Workforce for 2022	Growth from 2012	Percent Growth from 2012
Los Angeles-Long Beach-Glendale Metropolitan Division	109,930	132,620	22,690	20.6
Santa Ana-Anaheim-Irvine MSA	58,480	75,580	17,100	29.4
Riverside-San Bernardino-Ontario MSA	54,640	77,390	22,750	41.6
TOTALS	223,050	285,590	62,540	28.0

Notes: Total workforce includes only the crafts specifically needed for the AEC. *See **Socioeconomics Table 5** for a list of crafts included in the total construction workforce figures. **Source:** EDD 2014

The project would not have a significant adverse impact on area lodging or housing supply, but could have a temporary incremental impact when combined with the projects identified in **Socioeconomics Table 8**. However, as there is a large supply of lodging choices and sufficient housing supply in the city of Long Beach and in Los Angeles and Orange counties, the project's slight increase in area population during project construction would not create a significant reduction in lodging and housing supply. As no additional operational workers would be hired for the AEC, no new children would be added to the LBUSD and thus the project would not have an incremental impact on schools. The project would not have a significant adverse impact on neighborhood or regional parks or other recreational facilities. Construction workers who seek lodging closer to the project do not bring their families with them and generally return to their residences over the weekend. Because they are not likely to spend time at neighborhood parks and recreational facilities, the project would not have an incremental impact on neighborhood or regional parks or other recreational facilities. The project would not result in law enforcement response times being affected and would not increase the demand for law enforcement services. Thus, the project would not have an incremental impact on law enforcement services.

For the reasons discussed above, staff does not expect the construction or operation of the AEC to contribute to any significant adverse cumulative impacts on population, housing, schools, parks and recreation, or law enforcement.

COMPLIANCE WITH LORS

SCHOOL IMPACT FEES

School fees are applied to the new construction or reconstruction of existing building for industrial use (Cal. Education Code § 17620 (a) (2), Cal. Gov. Code § 65995 (d)). The fees are assessed on the area of covered and enclosed space and are calculated prior to the issuance of building permits during plan review. The AEC site is located within the Long Beach Unified School District (LBUSD). The rate for the 2015-2016 fiscal year for new or commercial or industrial development for the LBUSD is $0.54 per square foot of covered and enclosed, non-residential space (CLB 2015). Based on the preliminary project design, approximately 5,000 square feet of the administration building, 5250 square feet of the water treatment building, and 6,000 square feet of the warehouse would be subject to assessment. Based on this estimate, approximately $8,775 in school fees would be assessed for LBUSD. Staff is proposing Condition of Certification **SOCIO-1** to ensure the payment of fees to the school district. The project would comply with Section 17620 of the Education Code through the one-time payment of statutory school impact fees to the Long Beach Unified School District.

POLICE FACILITY IMPACT FEES

Police facility impact fees are applied to all new residential or nonresidential development in the city of Long Beach. The fees are assessed on the area of enclosed spaces at the time of issuance of the applicable building permit. The rate for the 2015/2016 fiscal year for new industrial development is $0.218 per square foot on enclosed industrial space (CLB 2015). Based on the preliminary project design, approximately 5,000 square feet of the administration building, 5,250 square feet of the water treatment building, and 6,000 square feet of the warehouse would be subject to assessment. Based on this estimate, the applicant would be assessed approximately $3,542.50 in police facility fees. Staff is proposing **SOCIO-2** to ensure payment of fees to the city of Long Beach. The project would comply with Chapter 18.22 of the Long Beach Municipal Code through the one-time payment of statutory police facility impact fees to the city of Long Beach.

NOTEWORTHY PUBLIC BENEFITS

Staff defines noteworthy public benefits (for purposes of this analysis) to include changes in local economic activity and local tax revenue that would result from project construction and operation. To assess the gross economic value of the proposed project the applicant developed an economic computer database and modeling system to create input output model, or an IMPLAN Input-Output model.

The assessment used Los Angeles County as the unit of analysis. However, the applicant acknowledged that most of the materials and supplies purchases during construction and operations would be from the greater southern California area. Thus, the economic benefits would also be realized in the neighboring counties.

Impact estimates reflect two scenarios; construction phase and the operations phase of the project. For both phases, the applicant estimated the total direct, indirect, and induced economic effects on employment and labor income.

Direct economic effects represent:

- employment,
- labor income, and
- spending associated with construction and operation of the project.

Indirect economic effects represent expenditures on intermediate goods made by suppliers who provide goods and services to the project.

Induced economic effects represent changes in household spending that occur due to the wages, salaries, and proprietor's income generated through direct and indirect economic activity.

IMPLAN Model Components

- Estimates do not represent a precise forecast, but rather an approximate estimate of the overall economic effect.
- A static model, meaning that it relies on inter-industry relationships and household consumption patterns, as they exist at the time of the analysis.
    - o (This is important because the start of construction activities would occur in the second quarter of 2017 and the AEC would not be completed until the third quarter of 2021).
- Assumes that prices remain fixed, regardless of changes in demand, and that industry purchaser-supplier relationships operate in fixed proportions.
- Does not account for substitution effects, supply constraints, economies of scale, demographic change, or structural adjustments.

Socioeconomics Table 10 reports the applicant's estimates of the economic impacts/benefits that would accrue to Los Angeles County due to project construction and operation. The applicant assumes the following:

- 100 percent of the materials and equipment spending for construction would occur within Los Angeles County.
- 90 percent of the construction labor and associated payroll would come from within Los Angeles County.
- 100 percent of the operations payroll would occur within Los Angeles County (36 operations workers coming from existing 66-member AGS workforce).
- 100 percent of the annual operations and maintenance expenditures would be made within Los Angeles County.
    - o (Note: Some portion of the annual operations and maintenance budget may be spent in neighboring counties).

Socioeconomics Table 10
AEC Economic Benefits (2014 dollars)

TOTAL FISCAL BENEFITS	
Estimated annual property taxes	Increase in property taxes - $7.9 million to $9.8 million
State and local sales taxes:	
Construction	$11.9 million total, $992,124 local
Operation	$748,080 total, $187,020 local
School Impact Fees	$8775
Police Facilities Impact Fee	$3542.50
Total Non-Fiscal Benefits	
Total capital costs	$940 million to $1.11 billion
Construction payroll (incl. benefits)	$315.55 million
Operations payroll (incl. benefits)	$4,469,090
Construction materials and supplies	$132.29 million
Operations and maintenance supplies	$8,312,000
TOTAL DIRECT, INDIRECT, AND INDUCED BENEFITS	
Estimated Direct Benefits	
Construction Jobs	191 (average), 512 (peak)
Operation Jobs	0 new jobs (36 from existing 66-member AGS workforce)
Estimated Indirect Benefits	
Construction Jobs	125
Construction Income	$6,513,950
Operation Jobs	14
Operation Income	$2,007,560
Estimated Induced Benefits	
Construction Jobs	464
Construction Income	20,168,770
Operation Jobs	13
Operation Income	$669,190
SUMMARY OF LOCAL BENEFITS (to LA County)[1]	
Estimated Direct Benefits	
Construction payroll (incl. benefits) (represents 90 percent to LA County)	$284 million
Operations payroll (incl. benefits) (represents 100 percent to LA County)	$4,469,090
Construction materials & supplies (represents 100 percent to LA County)	$132.29 million
Operations & maintenance supplies (represents 100 percent to LA County)	$8,312,000

Note: [1] Based on applicant's estimates. **Source:** AEC 2015f, pg. 5.10-09 to 5.10-14.

PROPERTY TAX

For a power plant producing 50 megawatts (MW) or greater, the Board of Equalization (BOE) has jurisdiction over the valuation of a power-generating facility for tax purposes. For a power-generating facility producing less than 50 MW, the county has jurisdiction over the valuation. The AEC would be a nominal 1,040-MW natural-gas-fired, combined-cycle and simple-cycle, air-cooled electrical generating facility, therefore, BOE is responsible for assessing property value. The property tax rate is set by the Los Angeles County Auditor-Controller's office. Property taxes are collected and distributed at the county level.

Assuming a capital cost of $940 million to $1.11 billion and a property tax rate consistent with the current rate for the existing AGS site (1.122072 percent), the project would generate $10.5 million to $12.5 million in property taxes during the first operation year of the project (CEC 2016i). The property taxes assessed on the existing AGS for FY 2011-2012 were $2.63 million. An estimated increase of approximately $7.9 million to $9.8 million would be generated by the AEC. The revenue collected from property taxes would be distributed among school districts, special districts, redevelopment agencies, unincorporated areas, and incorporated areas (cities) by Los Angeles County. The remaining property tax generated above 1 percent (0.122072 percent) would be distributed in whole to the city.

CONCLUSIONS

Staff concludes the AEC would not cause a significant adverse socioeconomic impact as a result of the construction or operation of the proposed project, or contribute to any significant cumulative socioeconomic impacts, for the following reasons:

1. The project's construction and operation workforce would not directly or indirectly induce a substantial population growth in the project area.

2. The project's construction and operation workforce would not have a significant impact on housing within the project area and would not displace any people or housing, or necessitate construction of replacement housing elsewhere.

3. The project would not result in significant physical impacts associated with the provision of new or physically altered government facilities in order to maintain acceptable service ratios, response times, or other performance objectives with respect to law enforcement service, education, or parks and recreation.

4. The project would have no significant adverse direct, indirect, and cumulative socioeconomic impacts. Therefore, the project would have a less than significant socioeconomic impact on any population, including the environmental justice population represented in **Socioeconomics Figure 1** and **Table 3**.

PROPOSED CONDITIONS OF CERTIFICATION

SOCIO-1 The project owner shall pay the one-time statutory school facility development fee to the Long Beach Unified School District required by Education Code Section 17620.

Verification: At least 30 days prior to the start of project construction, the project owner shall provide to the Compliance Project Manager (CPM) proof of payment to the Long Beach Unified School District of the statutory development fees.

SOCIO-2 The project owner shall pay the one-time statutory police facilities impact fee to the city of Long Beach required by Long Beach Municipal Code Chapter 18.22.

<u>Verification:</u> At least 30 days prior to the start of project construction, the project owner shall provide to the Compliance Project Manager (CPM) proof of payment to the city of Long Beach of the statutory development fees.

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SOIL AND WATER RESOURCES

Abdel-Karim Abulaban, P.E.

SUMMARY OF CONCLUSIONS

Based on the assessment of the proposed Alamitos Energy Center (AEC), California Energy Commission (Energy Commission) staff concludes that:

- The AEC would use potable water for construction lasting about 56 months. Use would not exceed an annual rate of about 22 acre feet per year (AFY) (about 100 AF total) and 130 AFY for operation (process and sanitary uses). Once Alamitos Generating Station (AGS) ceases operation after completion of construction of the AEC, the reduction in potable water use would be about 272 AFY, which would result in additional supplies for other beneficial uses.
- Although the project would reduce potable water use relative to baseline conditions, staff conducted additional analysis to evaluate whether reclaimed water from nearby wastewater treatment plants or the City of Long Beach could be used as an alternative supply. Staff concluded that due to the small volume of water needed for operation, long distances to treatment plants and the nearest interconnection to the city's reclaimed water distribution system, it would be economically infeasible to use reclaimed water at this time.
- The proposed project would result in a reduction of 0.24 million gallons per day (mgd) in industrial wastewater discharge to the San Gabriel River and ultimately the Pacific Ocean and a similarly proportional decrease in pollutant loading associated with industrial wastewater, which would improve the water quality in the ocean and the Alamitos Bay.
- The proposed site has a long industrial history and would not require a lot of additional soil disturbance for the new facilities and as such would result in minimal losses to soil resources. Though some small losses in sediment are expected during construction and operation from wind and water erosion, onsite management of stormwater runoff and sediment erosion as proposed by staff in Conditions of Certification **SOIL&WATER-1** and **SOIL&WATER-4** would adequately minimize soil loss.
- Staff proposes Condition of Certification **SOIL&WATER-1,** which would require the proposed project to comply with the Clean Water Act and obtain discharge permits for construction through the State Water Resources Control Board. This condition would ensure that the impacts to waters of the United States (US) from construction would be less than significant.
- Staff proposes Condition of Certification **SOIL&WATER-2**, which would require the proposed project to comply with Permit Order No. R4-2009-0068, NPDES No. CAG674001, if hydrostatic testing waters are discharged to waters of the United States (US). This condition would ensure that the impacts to waters of the US from hydrostatic testing would be less than significant.
- Groundwater at the site is relatively shallow and potentially contaminated by petroleum by-products. Trench and foundation excavations would likely encounter

shallow groundwater and dewatering would be required for stabilization. If dewatering is required for any construction activities, staff recommends that the applicant comply with Condition of Certification **SOIL&WATER-3**, which would require the applicant to apply for coverage under a Regional Water Quality Control Board permit that would allow for the discharge of petroleum-contaminated groundwater from dewatering activities.

- Staff proposes Condition of Certification **SOIL&WATER-4,** which would require the proposed project to comply with the Clean Water Act and obtain industrial discharge permits for project operation through the State Water Resources Control Board. This condition would ensure that the impacts to waters of the United States would be less than significant.
- Staff proposes Condition of Certification **SOIL&WATER-5**, requiring the proposed project to comply with the City of Long Beach code, Title 15 Chapters 4 through 28, which define regulations and permits required for discharge of wastewater to the city's wastewater system. Compliance with this condition would ensure that connections to the city's sewer system are completed appropriately and that annual fees are paid to the city.
- Long Beach Water Department (LBWD) has conducted a Water Supply Assessment and concluded that there is sufficient supply available for the project.
- The proposed project would use potable water supplied by LBWD for construction and operation. Water would be supplied through an existing connection used by the existing AGS. Staff proposes Condition of Certification **SOIL&WATER-6** to limit the amount of water used consistent with the scope of this analysis and the Water Supply Assessment. Staff also proposes Condition of Certification **SOIL&WATER-7**, which would require the applicant to install water meters on site for accurate reporting of water use.
- The proposed project is located in Zone X and is separated from the 100-year flood stage (flood with a 1 percent probability of occurrence in any year) by at least six feet.
- Recent Energy Commission studies show the project site and vicinity to be at increased risk of flooding due to relative sea level rise. However the proposed site would be sufficiently above sea level to ensure power plant reliability. Even with high-end estimates of relative sea-level rise of 61 centimeters (2.0 feet) by 2050 (relative to 2000) (Tebaldi et al. 2012, NAS, 2012), the site would still be about 4.0 feet above the current (2012) 100-year floodplain (FEMA, 2012).
- The proposed project would include use of air cooled condensers for cooling of the steam cycle. This technology significantly reduces the potential for use of other water supplies and is encouraged in accordance with the Energy Commission's water policy. Development of alternative water supplies for remaining industrial uses does not appear to be feasible. In addition, the project would use a number of systems to reuse wastewater and reduce wastewater volume. Staff believes the project water use is consistent with Energy Commission water policy.
- The proposed project would comply with SWRCB's Resolution No. 2010-0020, Policy for the Use of Coastal and Estuarine Waters for Power Plant Cooling, requiring all coastal power plants that utilize OTC to meet new (Best Technology

Available [BTA]) performance requirements through a reduction in intake volume and velocity. The proposed project achieves these goals through the elimination of once through ocean cooling, the use of dry-cooling technology, and reduction of wastewater discharge.

INTRODUCTION

The California Environmental Quality Act (CEQA) requires that the significant adverse environmental effects of a proposed project be identified and that an agency should not approve a project as proposed if there are feasible alternatives or feasible mitigation measures available which would substantially lessen the significant environmental effects of the project. (Pub. Resources Code, § 21002). CEQA defines a “significant effect” on the environment as a “substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including water” (Cal. Code Regulations., tit. 14, § 15382).

This section of the Preliminary Staff Assessment (PSA) analyzes the potential effects on soil and water resources by the proposed AEC. This assessment incorporates information gathered by the Energy Commission staff and focuses on the potential for AEC to:

- cause accelerated wind or water erosion and sedimentation;
- exacerbate flood conditions in the vicinity of the project;
- adversely affect surface or groundwater supplies; or
- cause degradation of surface or groundwater quality.

Staff’s analysis also ensures that construction and operation of the proposed project would be in compliance with all applicable laws, ordinances, regulations and standards (LORS) and state policies.

Where the potential for impacts is identified, staff proposes mitigation measures to reduce the significance of the impact and, as appropriate, recommends conditions of certification to ensure that any impacts are less than significant and the project complies with all applicable LORS.

LAWS, ORDINANCES, REGULATION, AND STANDARDS

The following federal, state, and local environmental LORS in **Soil and Water Resources Table 1** listed for the AEC and similar facilities require the best and most appropriate use and management of groundwater resources. Additionally, the requirements of these LORS are specifically intended to protect human health and the environment. Actual project compliance with these LORS is a major component of staff’s determination regarding the significance and acceptability of the AEC with respect to the use and management groundwater resources.

Soil and Water Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Federal LORS	
Clean Water Act (33 U.S.C. Section 1257 et seq.)	The Clean Water Act (CWA) (33 USC § 1257 et seq.) requires states to set standards to protect water quality, which includes regulation of stormwater and wastewater discharges during construction and operation of a facility. California established its regulations to comply with the CWA under the Porter-Cologne Water Quality Control Act.
State LORS	
California Constitution, Article X, section 2	The California Constitution requires that the water resources of the state be put to beneficial use to the fullest extent possible and states that the waste, unreasonable use or unreasonable method of use of water is prohibited.
Water Code Sections 10910-10915	Signed into law in 2001 amending Sections 10910-10915 of the California Water Code. Requires public water systems to prepare water supply assessments (WSA) for certain defined development projects subject to the California Environmental Quality Act. Lead agencies determine, based on the WSA, whether protected water supplies will be sufficient to meet project demands along with the region's reasonably foreseeable cumulative demand under average-normal-year, single-dry-year, and multiple-dry-year conditions.
The Porter-Cologne Water Quality Control Act of 1967, California Water Code Section 13000 et seq.	Requires the State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (RWQCBs) to adopt water quality criteria to protect state waters. Those regulations require that the RWQCBs issue waste discharge requirements (WDRs) specifying conditions for protection of water quality as applicable. Section 13000 also states that the state must be prepared to exercise its full power and jurisdiction to protect the quality of the waters of the state from degradation. Although Water Code 13000 et seq. is applicable in its entirety, the following specific sections are included as examples of applicable sections.
California Water Code Section 13240, 13241, 13242, 13243, & Water Quality Control Plan for the Los Angeles Region Basin (Basin Plan)	The Basin Plan establishes water quality objectives that protect the beneficial uses of surface water and groundwater in the Region. The Basin Plan describes implementation measures and other controls designed to ensure compliance with statewide plans and policies, and provides comprehensive water quality planning.
California Water Code Section 13260	This section requires filing, with the appropriate RWQCB, a report of waste discharge that could affect the water quality of the state unless the requirement is waived pursuant to Water Code section 13269.
California Water Code Section 13550	Requires the use of recycled water for industrial purposes when available and when the quality and quantity of the recycled water are suitable for the use, the cost is reasonable, the use is not detrimental to public health, and the use will not impact downstream users or biological resources.
Water Recycling Act of 1991 (Water Code 13575 et. seq.)	The Water Recycling Act states that retail water suppliers, recycled water producers, and wholesalers should promote the substitution of recycled water for potable and imported water in order to maximize the appropriate cost-effective use of recycled water in California.
Water Conservation Act of 2009 (Water Code 10608 et. seq)	This 2009 legislative package requires a statewide 20% reduction in urban per capita water use by 2020. It requires that urban water retail suppliers determine baseline water use and set reduction targets according to specified requirements, and requires agricultural water suppliers prepare plans and implement efficient water management practices.
California Code of Regulations (CCR), Title 17, Division 1, Chapter 5,Group 4,	Requires prevention measures for backflow prevention and cross connections of potable and non-potable water lines to protect a public water supply system.
California Code of Regulations, Title 20,	The regulations under Quarterly Fuel and Energy Reports (QFER) require power plant owners to periodically submit specific data to the California

Division 2, Chapter 3, Article 1	Energy Commission, including water supply and water discharge information.
California Code of Regulations, Title 22 Division 4, Chapter 3	This section of the CCR defines recycled water quality treatment standards and specifies permissible uses for each recycled water class, to protect the health and safety of the public.
SWRCB Order 2009-0009-DWQ	The SWRCB regulates stormwater discharges associated with construction affecting areas greater than or equal to one acre to protect state waters. Under Order 2009-0009-DWQ, the SWRCB has issued a National Pollutant Discharge Elimination System (NPDES) General Permit for stormwater discharges associated with construction activity. Projects can qualify under this permit if specific criteria are met and an acceptable Stormwater Pollution Prevention Plan (SWPPP) is prepared and implemented after notifying the SWRCB with a Notice of Intent.
SWRCB Order 97-03-DWQ	The SWRCB regulates stormwater discharges associated with several types of facilities, including steam electric generating facilities. Under Order 97-03-DWQ, the SWRCB has issued a NPDES General Permit for stormwater discharges associated with industrial activity. Projects can qualify under this permit if specific criteria are met and an acceptable SWPPP is prepared and implemented after notifying the SWRCB with a Notice of Intent.
Los Angeles Regional Water Quality Control Board, Permit Order No. R4-2009-0068, NPDES NO. CAG674001	The Los Angeles Regional Water Quality Control Board issued this order to regulate discharges to surface waters that pose a *de minimus* threat.
Local LORS	
City of Long Beach Code, Title 15 – Public Utilities.	Defines the process and permits required to connect to city's water supply and sewer systems.
State Policies and Guidance	
Integrated Energy Policy Report (Public Resources Code, Div. 15, Section 25300 et seq.)	In the 2003 Integrated Energy Policy Report (IEPR), consistent with SWRCB Policy 75-58 and the Warren-Alquist Act, the Energy Commission clearly outlined the state policy with regards to water use by power plants, stating that the Energy Commission would approve the use of fresh water for cooling purposes only where alternative water supply sources and alternative cooling technologies are shown to be "environmentally undesirable" or "economically unsound."
SWRCB Res. 2009-0011 (Recycled Water Policy)	This policy supports and promotes the use of recycled water as a means to achieve sustainable local water supplies and reduction of greenhouse gases. This policy encourages the beneficial use of recycled water over disposal of recycled water.
SWRCB Res. 75-58	The principal policy of the SWRCB that addresses siting of energy facilities is the Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Power Plant Cooling, adopted by the Board on June 19, 1976, by Resolution 75-58. This policy states that use of fresh inland waters should only be used for cooling if other sources or other methods of cooling would be environmentally undesirable or economically unsound.
SWRCB Res. 77-1	SWRCB Resolution 77-1 encourages and promotes recycled water use for non-potable purposes and use of recycled water to supplement existing surface and groundwater supplies.
SWRCB Res. 2010-0020	SWRCB's Resolution No. 2010-0020 and adoption of a Policy for the Use of Coastal and Estuarine Waters for Power Plant Cooling (OTC Plan), requires all coastal power plants that utilize OTC to meet new performance requirements (Best Technology Available [BTA]) through a reduction in intake volume and velocity. The proposed project complies with the OTC Plan through the conversion to dry-cooling and reduced discharge.

PROJECT DESCRIPTION

Water Supply

The proposed project would utilize dry cooling technologies, which require much less water than wet cooling methods and the OTC technology currently used by AGS. The applicant proposes to use potable water provided by the LBWD for process and potable uses. The city's water supply source is part groundwater (60 percent) from the Central Groundwater Basin and part imported surface water. The applicant considered the use of reclaimed water for project operation but it was determined to be infeasible.

The annual water requirements (process and sanitary) for AEC would be approximately 130 AFY, assuming it would operate continuously for the proposed 4,600 hours (AEC 2015). The expected range in water use rates would be between 68 and 357 gallons per minute (gpm) based on weather conditions. The project would tie into the two existing separate pipeline interconnections. Water from service connections would be directed into an existing 600,000-gallon tank. In addition, a new, 340,000-gallon would be constructed to store demineralized water. Also, two 130,000-gallon tanks would be constructed, one for condensate storage, and another one for wastewater. Of the 600,000 gallons that would be stored in the existing tank, 228,000 gallons would be dedicated for fire protection. The total storage available on site would provide approximately 5 days of operational water for the project.

The proposed AEC would employ 36 full-time employees. The expected water use for sanitary purposes would be less than 1.0 gpm (AEC 2015), equivalent to about 1.6 AFY.

The applicant also proposes to use potable water for construction. Construction uses include dust suppression. Average water use during construction would be about 18,000 gallons per day (gpd) and around 24,000 gpd during hydrostatic testing and commissioning. Commissioning is expected to take about 60 days. Average annual water use during commissioning is not expected to exceed 22 AFY.

Process Wastewater

The project would collect wash-down, general facility, and facility equipment drains in floor drains and sumps and route them to an oil/water separator system. Miscellaneous wastewaters, such as those from combustion turbine water washes and from some water treatment membrane-based system's cleaning operations would be collected in holding tanks or sumps and trucked offsite for disposal at an appropriate wastewater disposal facility. Wastewater streams that are unlikely to contain oil and grease, such as the cooler blowdown units and reverse osmosis reject, would bypass the oil/water separator. These process wastewaters would be collected in an onsite retention basin and discharged to the San Gabriel River through an existing AGS outfall. Discharge rates would range between 16 and 99 gpm, with average annual discharge equaling about 11 AFY (AEC 2015). Blowdown (condensate removed from the heat recovery steam generators (HRSG) would be discharged to an atmospheric flash tank where the condensate would be cooled and transferred to the service water storage tank for reuse. Similarly, blowdown from the combustion turbine evaporative coolers would be discharged to the plant process drain system and directed to the service water storage tank for reuse. Any unused portion would be discharged to the sewer.

Sanitary Wastewater

Sanitary wastewater would be discharged to the facility's sanitary sewer collector system which discharges to the City of Long Beach's sanitary sewer line. The point of interconnection is located 1000 feet from the project property line. A discharge of approximately 0.91 gpm, equivalent to about 1.6 AFY, is expected from the proposed project during all operating conditions. The City of Long Beach provided the applicant with a will-serve letter indicating the availability of this service.

Stormwater

The proposed project would use the existing site stormwater drainage system. Stormwater in contact with industrial equipment is routed through the oil/water separator system where it would comingle with process discharge water. Oil-free water from the oil/water separator would be discharged to the same onsite retention basin above along with non-contact stormwater before discharge to the San Gabriel River through an existing outfall.

SETTING

Groundwater

The proposed project site is located within the Central Groundwater Basin which lies inland and is adjacent to the West Coast Basin of the Los Angeles Coastal Plain Groundwater Basin. The Central Basin has a total capacity of 13,800,000 acre-feet (Department of Water Resources [DWR] 2004). The majority of the West Coast Basin is underlain by the Silverado aquifer (AEC 2013a). With a yield of 80 to 90 percent of the groundwater extracted annually, the Silverado aquifer is the most productive aquifer in the West Coast Basin (DWR 2004).

There are currently two seawater barrier projects in operation to protect the freshwater aquifer: the West Coast Basin Barrier project, which runs from the Los Angeles Airport to the Palos Verde Hills, and the Dominguez Gap Barrier project, which covers the area of the West Coast Basin bordering the San Pedro Bay. Injection wells along these barriers create a groundwater ridge, which inhibits the intrusion of salt water into the subbasin to protect and maintain groundwater elevations (DWR 2004).

Based on a background review conducted by Ninyo & Moore, (2011), historical high groundwater levels at the AEC site have been mapped at a depth of approximately ten feet (California Department of Conservation, Division of Mines and Geology [CDMG] 1997). During subsurface exploration conducted on behalf of the applicant, groundwater was encountered at depths ranging from less than one foot to approximately 14 feet below the ground surface. The variability in the depth to groundwater encountered in the borings was primarily due to the difference in the ground surface elevations of the borings. Further, Dames & Moore reportedly recorded groundwater levels in 1952 ranging from approximately two feet above to one foot below mean sea level (MSL), and URS recorded similar groundwater levels in 2001 (Ninyo & Moore 2011). Based on the reported data by Dames & Moore and URS, and the groundwater levels encountered by Ninyo & Moore (Ninyo & Moore 2011), the groundwater at the project site has been documented at an elevation ranging from approximately two feet above to one foot below MSL. Thus, groundwater may be encountered during excavation activities in the lower areas of the site (Ninyo & Moore 2011).

Surface Water

Surface watersheds in California are divided into management areas by the state's Regional Water Boards based on political and physiographic boundaries. The AEC would be within the area regulated by the Los Angeles Regional Water Quality Control Board (LARWQCB). Water quality objectives for San Gabriel River Estuary are contained in the Water Quality Control Plan for the Los Angeles Region (LARWQCB 1994). The project site is adjacent to the San Gabriel River which discharges to the Pacific Ocean near Alamitos Bay. There are five retention basins on the site that are used by AGS for onsite runoff from storm drains, boilers, and sumps. The five retention basins, located in the eastern side of the site, are lined. Any water that collects in these basins is pumped out and discharged to the San Gabriel River. The San Gabriel River Estuary, Alamitos Bay, and Los Cerritos Channel are considered impaired water bodies on the 2010 EPA-approved Total Maximum Daily Load (TMDL)[1] list. Pollutants for which the San Gabriel River Estuary, Alamitos Bay, and Los Cerritos Channel are listed as impaired are listed in Table 5.15-1 of the AFC (AEC 2013a).

DIRECT/ INDIRECT IMPACTS AND MITIGATION

This section provides an evaluation of the expected direct, indirect, and cumulative impacts to soil and water resources that could be caused by construction, operation, and maintenance of the AEC. Staff's analysis consists of the following steps: establishing thresholds of "significance" used to determine if there is a potentially "significant" impact, gathering data related to construction and operation of the project, screening the data against the thresholds of significance, and then reaching a conclusion to determine whether or not the project presents a potentially "significant" impact. If staff determines that there is a significant impact then staff provides a summary of any mitigation proposed by the applicant and a discussion of the adequacy of the proposed mitigation. If the applicant did not propose any mitigation, or if staff determines that the applicant's proposed mitigation is inadequate, staff may recommend mitigation measures or a modification of the applicant's proposed mitigation.

Soil Resources

Staff evaluated the potential impacts to soil resources including the effects of construction and operation activities that could result in erosion and downstream transportation of soils and the potential for contamination to soils and groundwater. There are extensive regulatory programs in effect that are designed to prevent or minimize these types of impacts. These programs are effective, and absent unusual circumstances, an applicant's ability to identify and implement Best Management Practices (BMPs) to prevent erosion or contamination is sufficient to ensure that these

[1] The TMDL calculates the maximum amount of a pollutant allowed to enter a waterbody so that the waterbody will meet and continue to meet water quality standards for that particular pollutant and allocates that load to point sources, (Wasteload Allocation), and nonpoint sources (Load Allocation), which include both anthropogenic and natural background sources of the pollutant.

impacts would be less than significant. The LORS and policies presented in **Soil and Water Resources Table 1** were used to determine the significance of AEC impacts.

Water Resources

Staff evaluated the potential of AEC to cause a significant depletion or degradation of surface water and groundwater resources. Staff considered compliance with the LORS and policies presented in **Soil and Water Resources Table 1** and whether there would be a significant impact under the California Environmental Quality Act (CEQA).

To determine if significant impacts to soil or water resources would occur, the following questions were addressed consistent with Appendix G of the CEQA Guidelines. Where a potentially significant impact was identified, staff or the applicant proposed mitigation to ensure the impacts would be less than significant.

- Would the project violate any water quality standards or waste discharge requirements?
- Would the project substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level?
- Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?
- Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?
- Would the project create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?
- Would the project otherwise substantially degrade water quality?
- Would the project place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?
- Would the project place within a 100-year flood hazard area structures which would impede or redirect flood flows?
- Would the project expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?
- Would the project be inundated by seiche or tsunami?
- Would the project result in substantial soil erosion or the loss of topsoil?
- Does the project have impacts that are individually limited, but cumulatively considerable?

Water Quality

Construction Stormwater Discharges

The project site comprises 21 acres of land that is part of the 71-acre AGS site. Approximately 8 acres of land within the 21-acre project site would be used for construction activities, including laydown, storage, and parking. AEC construction would use onsite laydown and construction parking areas as well as a 10-acre lot adjacent to the project site. A 1000-ft pipeline would be constructed to connect the project to the existing Long Beach City's sanitary sewer system. Limited soil disturbance would be necessary to construct the new power blocks because the project would be constructed on an industrial site that has been completely disturbed and would utilize existing infrastructure as needed.

If not managed, operations or construction activities at the project site would have the potential to contaminate stormwater runoff, resulting in an adverse impact to local surface waters, specifically the Pacific Ocean. Ocean waters in the vicinity are protected from degradation by the Los Angeles Region Basin Plan (LARBP).

The discharge for the site would be subject to regulation based on Beneficial Uses identified in the LARBP. The site would likely also be subject to the Coastal Plain of Los Angeles Groundwater Basin Plan. The Coastal Plain of Los Angeles Groundwater Basin lies inland, and is adjacent to the West Coast Subbasin Plan. The site would be subject to regulations by the LA RWQCB to protect the following beneficial uses:

- Industrial Service Supply (IND)
- Navigation (NAV)
- Water Contact Recreation (REC1)
- Non-Contact Water Recreation (REC1)
- Commercial and Sport fishing (COMM)
- Wildlife Habitat (WILD)
- Rare, Threatened, or Endangered Species (RARE)
- Spawning, Reproduction, and Development (SPWN)
- Marine Habitat (MAR)

During construction and operation, the stormwater collection system, comprising both existing and new elements, would be used to collect and process stormwater from the site. Stormwater that falls within process equipment containment areas would be collected and discharged to the existing AGS process drain system, which consists of oil/water separation sumps and two retention basins. Stormwater that falls within the plant-wide pavement areas and outside the process equipment containment areas would be routed to an onsite retention basin, which also collects briny blowdown water from the cooling system and the heat recovery steam generator (HRSG). A small portion of stormwater may fall outside of the process containment and pavement areas. This portion of stormwater would either percolate directly into the soil or drain over the surface into the retention basins to assist with the removal of suspended solids. The oil-free stormwater from the process areas and from the pavement areas would be collected in the retention basin to be discharged to the San Gabriel River via an existing outfall, which is ultimately discharged to the Pacific Ocean. Some of the discharge would likely flow into the Alamitos Bay because the San Gabriel River discharge point is adjacent to the entrance from the Pacific Ocean to the Alamitos Bay. The residual oil containing sludge would be collected via vacuum truck and disposed of as hazardous waste thus mitigating potential impacts to these water bodies. See the **WASTE MANAGEMENT** section of this PSA for details about disposal locations and quantities.

The project owner would discharge stormwater to the same outfall currently utilized by the AGS under the requirements of the Order No. R4-2000-0082, NPDES No. CA0001139.Stormwater would be discharged to the San Gabriel River via an existing and permitted outfall. The applicant would be required to obtain a construction stormwater permit during construction and would be covered by project-specific Waste Discharge Requirements issued by the LARWQCB for industrial stormwater discharges that occur during operation.

The estimated amount of soil disturbance resulting from AEC construction activities requires that it be covered under the federal General Construction Permit (GCP), SWRCB Order No. 2009-0009-DWQ, requiring the applicant to prepare a Stormwater Pollution Prevention Plan (SWPPP) for submittal to the LARWQCB. To ensure compliance with the SWRCB Order and the City of Long Beach stormwater discharge requirements, the project should be required to comply with Condition of Certification **SOIL&WATER-1** which requires a construction SWPPP for the AEC site and laydown areas. The SWPPP would specify BMPs that would prevent all construction pollutants, including erosion products, from contacting stormwater, eliminate or reduce non-stormwater discharges to waters of the Pacific Ocean, and require inspection and monitoring of BMPs.

The project would use up to 600,000 gallons (approximately 1.85 acre-feet) of water for hydrostatic testing of pipes. Hydrostatic testing often involves the use of chemicals that have the potential to impact surface waters. The project would test hydrostatic testing water for harmful constituents. If found clean then it would be disposed of in the storm drain. However, if the hydrostatic testing water is found to contain harmful constituents and the project chooses to discharge it to the waters of the United States, an additional permit may be required by the LARWQCB. Permit Order No. R4-2009-0068, NPDES No. CAG674001 provides requirements for the discharge of water that contains substances that can be harmful to surface waters. If necessary, the applicant shall comply with Condition of Certification **SOIL&WATER-2**, which would require the applicant to obtain permit coverage for hydrostatic discharges under Permit Order No. R4-2009-0068, NPDES NO. CAG674001.

Contaminated Groundwater

The Phase I Environmental Site Assessment (ESA) states that:

> "Groundwater underlying the site is known to be impacted by metals, volatile organic compounds (VOCs), and 1,4-dioxane. Groundwater is monitored as part of on-going subsurface investigations regarding former Southern California Edison operations at the site including former operation of waste-

> water retention basins (AEC 2013a, Appendix 5.14A, Phase I ESA, p. 3). These investigations are currently overseen by the Department of Toxic Substances Control. The presence of groundwater contamination represents a Recognized Environmental Condition in connection with the site."

Due to the site's long industrial history and results from the Phase 1 site assessment, it is reasonable to expect that any ground water pumped to dewater excavations will be contaminated. If not appropriately handled the contaminated groundwater could have significant impacts to the on- and off-site water resources. Staff proposes Condition of Certification **SOIL&WATER-3**, which would require any discharge of dewatering water to comply with the Los Angeles Regional Water Quality Control Board (RWQCB) and State Water Resources Control Board regulatory requirements and NPDES permits such as No.R4-2008-0032 and No. CAG994004. Coverage under Order No. R4-2008-0032, NPDES No. CAG994004 or other RWQCB permits may not be necessary if water quality tests reveal that local groundwater contamination does not exist. If tests show that groundwater is not contaminated then dewatering activities would be covered under the GCP (SWRCB Order No. 2009-0009-DWQ). If groundwater is contaminated the water would be disposed of or treated for discharge in accordance with the approved methods required in the applicable permit.

Industrial Wastewater and Stormwater Discharge

As stated above, during operation, the existing stormwater collection system would be used to collect and process stormwater from the site. The oil-free stormwater from the process areas and from the pavement areas would be discharged to the San Gabriel River via an existing outfall, and ultimately to the Pacific Ocean. Since the outfall discharges to the San Gabriel River where it flows into the Pacific Ocean adjacent to the Alamitos Bay entrance, it is likely that some of the discharge would flow into Alamitos Bay. The residual oil containing sludge would be collected via vacuum truck and disposed of as hazardous waste (AEC 2013a) thus mitigating potential impacts to these water bodies. See the **WASTE MANAGEMENT** section of this PSA for more details about waste streams.

The proposed AEC would discharge sanitary and industrial wastewater consisting of reject water from the reverse osmosis system and blowdown from the HRSG to the LBWD sanitary system, which would be ultimately conveyed to the LACSD facilities. Blowdown from the combustion turbine evaporative coolers would be discharged to the plant process drain system and directed to the service water storage tank for reuse. The unused portion would ultimately be discharged to the sewer. The discharge rate could range from 16 to 99 gpm. The average annual discharge is expected to be about 11 acre-feet per year, assuming 4,600 hours of annual operation. A will-serve letter was issued by the City of Long Beach for AEC indicating that there is sufficient capacity to receive sanitary and industrial wastewater from AEC.

Wastewater from combustion turbine water washes would be collected in combustion turbine drain tanks and then trucked offsite for disposal. Service water would be used for makeup to the combustion turbine evaporative coolers, equipment washdown, and other miscellaneous plant uses.

AGS currently collects non-contact stormwater and oil-free process wastewater in three retention basins along the east side of the project site for ultimate discharge to San Gabriel River. Grading plans show that AEC intends to collect the non-contact wastewater in the south retention basin. As discussed in the **WASTE MANAGEMENT** section, staff has recently become aware that the south retention basin is located in an area partially underlain by a buried landfill. Remediation of previous existing environmental conditions at the site is the responsibility of Southern California Edison (SCE). It is unknown to staff how these conditions will be handled by SCE or if the project owner will revise the stormwater basin design or location. Depending on the extent of the landfill and the contents, the remediation could affect the project schedule. If AES decides to use the adjacent stormwater basins, there would be sufficient volume for management. See the **WASTE MANAGEMENT** section for an analysis of impacts and mitigation.

AGS discharges 1,271 mgd of wastewater to the San Gabriel River through once-through cooling units. In addition, the existing project has been discharging up to 11.6 mgd of reverse osmosis (RO), metal cleaning, and preheating wash wastewater to the San Gabriel River. AGS is going to be demolished after construction of AEC is completed. Demolition of AGS would result in the elimination of the discharge of about 1,283 mgd of OTC and other miscellaneous wastewater to the San Gabriel River. This is a measureable reduction in pollutant loads sent to the ocean from the site. Furthermore, since the discharge point from San Gabriel River to the Pacific Ocean is adjacent to the entrance to the Alamitos Bay, it is likely that some of the discharged wastewater flows into Alamitos Bay. Elimination of this wastewater stream would result in improvement of water quality in the Bay.

The proposed project has been issued a new NPDES permit (SWRCB Order 97-03-DWQ) for operations discharge that would replace the existing Order No. R4-2000-0082, NPDES No. CA0001139. The new permit would require the implementation of Best Management Practices (BMPs) for both the project’s industrial discharge and the project’s operational stormwater discharges to the San Gabriel River. BMPs would likely include pollutant source control, pollutant containment, a monitoring and sampling protocol, and an iterative process for improving initially implemented BMPs based on monitoring and sampling results.

With implementation of BMPs and associated monitoring activities included in the LARWQCB issued WDRs, impacts to water quality from operation of the proposed AEC would be less than significant. Staff proposes Condition of Certification **SOIL&WATER-4** which would require the applicant to obtain an industrial permit for project operation from the LARWQCB, prior to beginning construction. Staff also recommends condition of Condition of Certification **SOIL&WATER-5** to ensure proper disposal of the industrial wastewater to the sanitary sewer. This condition would require the applicant to comply with the requirements for discharge to City of Long Beach Municipal Code title 15, chapters 4 through 28 and pay their necessary fees for connection and discharge.

Sanitary Wastewater

Sanitary wastewater would be discharged to the facility’s sanitary sewer collector system which discharges to the City of Long Beach’s sanitary sewer line that is 1000 feet away from the project site. A discharge of approximately 0.91 gpm is expected from the proposed project during all operating conditions. The City of Long Beach provided the applicant a will-serve letter dated September 3, 2013, indicating it has the capacity and intent to provide the site sewerage service. If the proposed AEC discharges sanitary waste as described above, the impact from its disposal should be less than significant. Staff proposes Condition of Certification **SOIL&WATER-5** which would require the applicant to pay sanitary sewer fees ordinarily assessed by the city, in accordance with the City of Long Beach Municipal Code title 15 chapters 4 through 28.

Harbor Circulation and Trash Removal

AGS currently uses once through cooling (OTC), which induces flow of trash to the intake screens during pumping for power plant cooling. This inadvertently removes significant volumes of trash thus keeping the harbor clean and clear of debris. Intake water is screened for trash and debris prior to entering the units; and an estimated 165,000 pounds of waste is collected and disposed of by the owners of the Alamitos Generating Station (Bodek 2014b). Staff from the City of Long Beach has determined that the trash in Alamitos Bay is not generated from the AGS and the Los Angeles Department of Water and Power (LADWP) Haynes generating plants. They also note that the trash gathered at AGS is in the waters of Los Angeles (LA) County and therefore in the county's jurisdiction. LA County collects and disposes the trash from the AGS debris and trash boom.

Regardless of whether the AEC is licensed or not, the AGS OTC system is scheduled to be shut down due to requirements set forth in the State Water Resources Control Board's OTC policy and section 316b of the Clean Water Act. Because the termination of the OTC pumping is not a component or part of the AEC project before the Commission or a physical change related to the AEC project, the end of the garbage removal benefits associated with OTC, would not be a direct or indirect impact of the AEC project. Therefore, no additional analysis or mitigation is required.

Staff concludes that the proposed project is not contributing to waste in the harbor and that, as discussed in the **WASTE MANAGEMENT** section of this analysis, all project construction and operation wastes would be managed and disposed of appropriately in accordance with proposed conditions of certification and LORS.

Independent of staff's environmental assessment of the AEC, the City of Long Beach commissioned a study to understand how the cooling water pumps could be re-purposed so that they continue to provide positive water quality benefits (Bodek 2014). Staff understands the applicant is now working with the City of Long Beach on an agreement to manage flows in the harbor so trash can continue to be collected and disposed of appropriately.

<u>Water Supply</u>

Construction

The applicant proposes to use potable water for dust suppression. Average water use during construction would be about 18,000 gallons per day (gpd) and around 24,000 gpd during hydrostatic testing and commissioning. Commissioning is expected to take about 60 days. Average water use during construction would not be expected to exceed 22 AFY.

The volume of water required for construction would be offset by the operational water savings during the life of the project. Construction of the project would result in a net reduction in local water use. Therefore, the project would have a positive impact in terms of water consumption during the life time of the project.

In Section 6.6.3 of the AFC, the applicant indicated that it would be infeasible to use recycled water for project construction and operation due to the long distances from the project to the three treatment plants that produce recycled water in the area. The treatment plants are 8.0 to 13.0 miles away and would require construction of 8.0- to 13.0-mile pipelines through busy areas. In addition to the cost of constructing the pipeline, the construction activities have their own environmental impacts on the areas where they would be constructed.

Operation

AEC proposes to use about 130 AFY of potable water (process and sanitary) provided by LBWD for process water. Process water would be used for the generator turbine wash, inlet air evaporative cooling blowdown makeup, water treatment, and other purposes. The AEC would employ a staff of 36 in three rotating shifts. As a result, a minimal amount of potable water would be used for sanitary use, drinking, eye wash, and safety showers, as well as fire protection water. Average use is expected to be less than 1.0 gpm, or approximately 1.6 AFY.

The project would access this water through an existing six-inch-diameter City of Long Beach potable water line serving the existing AGS. LBWD has provided a will-serve letter (AFC Appendix 2E) indicating there is sufficient supply of potable water to accommodate the AEC. The potable water that would be provided to the AEC for use as process water and domestic water is currently allocated for industrial use at the existing AGS (AEC 2013a).

Based on water volumes from 2008 through 2011, the existing AGS has historically used approximately 402 AFY while operating at only 8 percent of its annual maximum capacity. The existing AGS therefore uses more potable water than is proposed for the AEC, which would result in a net reduction of potable water use equal to 272 AFY and a net beneficial impact on local water supplies, despite a large increase in potential capacity factor and potential energy production (megawatt-hours). In order to ensure that adequate water supplies would be available throughout the life of the project, staff requested a Water Supply Assessment (WSA) from LBWD, pursuant to Water Code sections 10910-10915. LBWD completed a WSA (LBWD 2016) based on project water use of 225 AFY rather than the current proposed use of 130 AFY. The greater volume analyzed was due to LBWD’s assumption that the project would use water at the peak rate for all hours of operation. Using the greater volume LBWD found that potable water would be available in sufficient amounts during the project life.

In the LORS section below staff has analyzed the feasibility of using recycled water for all industrial applications. In summary, staff concludes that use of recycled water is infeasible.

To ensure that project water use is within the projected volumes analyzed herein, staff proposes Conditions of Certification **SOIL&WATER-6** and **-7**, which would limit potable water use for domestic and process use and require the applicant to meter and report facility water use in compliance reports. Condition of Certification **SOIL&WATER-6** would also require the applicant to pay for water supply connection fees assessed by LBWD in accordance with the LBWD connection and rate policies. If Conditions of Certification **SOIL&WATER-6** and **-7** are implemented as proposed, impacts to local water supplies would be less than significant.

Water Supply Alternatives

The applicant provided detailed information in the Alternatives section of the AFC about the availability of both secondary and tertiary treated recycled water to the project. According to the applicant, there are three possible treatment plants that produce recycled water in the region: the Los Angeles County's Joint Water Pollution Control Plant (JWPCP) located in the City of Carson, more than 13 miles away; the Los Coyotes Water Reclamation Plant (LCWRP), approximately 8.2 miles away; and the City of Los Angeles Terminal Island Water Reclamation Plant (TIWRP) located more than 12 miles from the project site. The applicant cited the distance to the treatment plants as the main reason why it would be too costly to construct a pipeline from those treatment plants to deliver the recycled water to the project.

Energy Commission staff contacted LBWD to check if the city has recycled water available to the project. Staff was informed by the city that the city has recycled water in sufficient quantity, but that the closest connection point is about 7,000 feet (1.33 miles) away from the project, which is closer than the treatment plants identified by the applicant which are located 8 to 13 miles from the project site. However, costs associated with construction of a 7000-ft pipeline for a single user like AEC are too high considering the project needs of only about 130 AFY. Based on information provided by the applicant and information from LBWD, staff concludes that it would be economically infeasible for the project to use recycled water for operation unless more customers could be developed, or the build-out of the recycled water delivery system brings the infrastructure nearer the AEC facility.

Flooding

Staff reviewed the Federal Emergency Management Agency (FEMA) Long Beach Flood Insurance Rate Map (FIRM). The proposed project is not located within the 100-year flood zone as defined by FEMA. The site is located in Zone X, which is a zone of moderate flood potential (usually the area between 100-year and 500-year floods' boundaries). In addition, siting of the proposed project would not result in any structures that would impede or redirect flood flows and no impacts would occur. Therefore, flooding impacts due to the implementation of the project are expected to be less than significant.

Projected sea-level rise has the potential to reduce the effectiveness of local flood control measures by increasing the 100-year flood stage. The local protection from inundation is projected to be reduced up to 30 centimeters (1.0 foot) by 2030 and 61 centimeters (2.0 feet) by 2050 (relative to 2000 levels) (CEC 2009; NAS 2012). The site geotechnical report (Ninyo & Moore 2011) acknowledges future sea-level rise. An

Energy Commission study (CEC 2009) also shows the project site may have reduced flood protection and inundation potential in the future. A significant rise in local sea water levels would also raise groundwater levels, and raise the fluvial base level, thereby potentially increasing the rate and extent of flooding.

The proposed project would have final grades at least 12 feet above sea level. FEMA flood maps show that the 100-year flood elevation for Long Beach area is about 6.0 feet, therefore the project site would be separated from the flood level by at least 6.0 feet. Using the current projections of sea-level rise, separation between the site and the flood elevation is estimated to be reduced by up to 2.0 feet by the year 2050. However, if the minimum separation between the site and the surrounding floodplain is reduced from six feet to four feet there would still be a sufficient level of flood protection.

Storm Surge and Wave Run-up

Storm surge is usually defined by increased ocean water levels that occur during storms. Much like precipitation events and rainfall runoff events, storm surge events can be assigned recurrence intervals, e.g., 10-year, 100-year, etc. Storms may result in ocean water level increases that create increased threats of local flooding for shoreline property.

Coastal ecosystems, development, and public access are most at risk from short term storm events, including the confluence of large waves, storm surges, and high astronomical tides during a strong El Niño climatic event (OPC 2013).

Over the next few decades, episodes of heightened sea level associated with large winter storms and anomalous short period climate patterns will be of greater concern to infrastructure and development in coastal areas than the relatively slow increases that are projected in association with global sea-level rise alone (OPC 2013). The coast of California has experienced two very large El Niño events over the past 30 years, in 1982-83 and 1997-98, when large storms resulted in hundreds of millions of dollars in storm damage to private property and public infrastructure. The damages occurred from a combination of elevated sea levels and large storm waves, especially when these factors coincided with high tides. During the 1983 El Niño event, sea levels were the highest ever recorded in San Diego, Los Angeles and San Francisco, 29.0 cm (11.4 in.), 32.3 cm (12.7 in), and 53.8 cm (21.2 in.), respectively, above predicted high tides. The water levels reached during these large, short term events have exceeded mean sea levels projected for 2030 and approach the values projected for 2050 (OPC 2013). Future sea level needs to be a starting point for project design considerations. Where feasible, consideration needs to be given to scenarios that combine extreme oceanographic conditions on top of the highest water levels projected to result from sea level rise over the expected life of the project.

Tebaldi et al. (2012) modeled the impacts of global sea level rise from climate change on storm surges and reported on the history and expected trends of storms at the Los Angeles Harbor (Gauge 9410660). The 100-year return level storms in this area result in about one meter (three feet) of local sea-level rise. Projections for local sea-level rise do not indicate that local sea-level rise has any relative influence on the magnitude of the 100-year storm surge. Therefore the 100-year storm surge in 2050 is expected to be the same as current conditions, about one meter, or three feet.

Storm surge is taken into account when FEMA conducts coastal zone flood analyses. The Base Flood Elevations (BFEs) are the sum of storm surge, wave run-up, and tidal effects. The site is not currently classified as being within the 100-year floodplain. Based on estimates stated above, the site classification could change by the year 2050. The site is vulnerable to flooding from extreme weather events and its protection may decrease in the future. However, even with high-end estimates of storm surge by 2050 (relative to 2000) (Tebaldi et al. 2012), the site would still be at least 5.5 feet above the current (2012) 100-year floodplain (FEMA 2012). This vertical separation should be sufficient to protect the project from flooding impacts.

Tsunami and Seiche

The proposed site is within the zone identified by California Emergency Management Agency (CEMA) as a tsunami inundation zone and would be located adjacent to an enclosed bay or harbor that could be subject to seiches caused by tsunamis. An analysis of hazards posed by tsunami and seiche is included in the **GEOLOGY AND PALEONTOLOGY** section of this PSA.

CUMULATIVE IMPACTS AND MITIGATION

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of reasonably foreseeable future projects (California Code of Regulations, tit. 14, §15130). The construction and operation activities of the various projects could potentially overlap and result in cumulative impacts to the same resource(s).

Potable Water Supply

The project’s use of dry cooling and other water efficiency measures as described in the **PROJECT DESCRIPTION** section and the adequacy of local water supplies as described in the WSA would ensure the project’s water use would not result in a significant adverse cumulative impact. In addition, because the existing AGS will eventually shut down, it can be expected that the cumulative local water consumption will be decreasing even with the addition of the AEC which will consume 272 AFY less than the AGS.

Water Quality

The project’s use of dry cooling and other water efficiency measures as described in the **PROJECT DESCRIPTION** section would ensure the project’s waste water disposal would not result in a significant adverse cumulative impact to water quality by reducing waste water volume and pollutant loads. In addition, because the existing AGS will eventually shut down, it can be expected that the cumulative local waste water volume and pollutant loads will be decreasing even with the addition of the AEC.

COMPLIANCE WITH LORS

The Energy Commission's power plant certification process requires staff to review each of the proposed project elements for compliance with LORS and state policies. Staff has reviewed the project elements and concludes that the proposed AEC project would comply with all applicable LORS addressing protection of water resources, stormwater management, and erosion control, as well as drinking water, use of freshwater, and wastewater discharge requirements, as long as staff's proposed conditions of certification are adopted and implemented. Summary discussions of project compliance with significant LORS and policies are provided below.

STORMWATER

Clean Water Act

Staff has determined that AEC would satisfy the requirements of the NPDES permit with the adoption of Conditions of Certification **SOIL&WATER-1** through **SOIL&WATER-4**. These conditions would ensure that the appropriate NPDES permits are obtained by the applicant.

PORTER-COLOGNE WATER QUALITY CONTROL ACT

Staff has concluded that AEC would satisfy the applicable requirements of the Porter-Cologne Water Quality Control Act and adequately protect the beneficial uses of waters of the state through implementation of federal, state, and local requirements for management of stormwater discharges and pollution prevention and compliance with local grading and erosion control requirements, and compliance with local onsite wastewater system requirements.

SWRCB Policy 75-58 and Energy Commission—Integrated Energy Policy Report (IEPR)-Power Plant Water Use and Wastewater Discharge Policy

The California Energy Commission, under legislative mandate specified in the *2003 Integrated Energy Policy Report*, (policy) and State Water Resources Control Board Resolution 75-58, will approve the use of fresh water for cooling purposes by power plants it licenses only where alternative water supply sources and alternative cooling technologies are shown to be environmentally undesirable or economically unsound. The IEPR policy also requires the use of zero-liquid discharge (ZLD) technologies unless such technologies are shown to be "environmentally undesirable" or "economically unsound."

Alternative sources were evaluated for their potential to supply the project's process water needs.

There are three possible treatment plants that produce recycled water in the region: the JWPCP located in the City of Carson, more than 13 miles away; the LCWOP, approximately 8.2 miles away; and the TIWRP located more than 12 miles from the project site. The applicant stated that it would not be economically feasible to use recycled water from those three treatment plants. The applicant cited distance to the treatment plants as the main reason why it would be too costly to obtain recycled water from them.

Energy Commission staff contacted the City of Long Beach to find out if the city has recycled water available to the project. Staff was informed by the city official in charge of water supplies that the city has recycled water in sufficient quantity, but that the closest connection point is 7,000 feet away from the project, making it still too costly to construct a pipeline to deliver the recycled water to the project given that the project needs only about 130 AFY.

Additionally, the applicant proposes to use air cooling technology to reduce the amount of water required for plant operation compared to consumption from water cooled technologies. The air-cooled condenser would significantly reduce the plant's water needs, by about 272 AFY compared to the baseline with the existing consumption from the AGS. Staff concurs with the applicant that the use of an air-cooled condenser is an economically sound practice that provides environmental benefits from significantly reduced water use. Staff also notes that although the project would include a limited amount of water use for inlet air cooling, it would also include use of dry low NOx combustors which would also conserve water use.

Furthermore, the Energy Commission's water policy also seeks to protect water resources from power plant wastewater discharges. To that end, the water policy specifies that the Energy Commission will require ZLD technologies (for management of power plant wastewaters) unless such technologies are shown to be 'environmentally undesirable' or 'economically unsound.' The AEC would not utilize ZLD technologies, because the project would allow for a substantial reduction in wastewater volume to the San Gabriel River. Staff notes that the applicant proposes a number of water reuse and wastewater reduction systems which would include the following:

- The reject water stream from the reverse osmosis system would be discharged to the City of Long Beach sanitary sewer system.
- Blowdown (condensate removed from the HRSGs to reduce water contaminants) would be discharged to an atmospheric flash tank, where the flash steam would be vented to the atmosphere and the condensate would be cooled prior to transfer to a holding tank for reuse.
- Blowdown from the combustion turbine evaporative coolers would be discharged to the plant process drain system and stored for reuse onsite; any unused portion would be discharged to the city's sewer system.
- Service water would be used for makeup to the closed-loop fluid coolers, equipment washdown, and other miscellaneous plant uses.

Therefore, staff finds that the wastewater management would be in compliance with the intent of the water policy because it eliminates the significant portion of process wastewater discharge from the facility.

WATER SUPPLY ASSESSMENT

California Water Code, Sections 10910-10915 (Senate Bill 610 of 2001)

Staff reviewed California Water Code, sections 10910-10915 to evaluate their applicability to the proposed project. The codes require public water systems to prepare WSA for certain defined development projects subject to the CEQA. Lead agencies determine, based on the WSA, whether projected water supplies will be sufficient to meet project demands along with the region’s reasonably foreseeable cumulative demand under normal, single-dry, and multiple-dry year conditions. LBWD prepared a WSA for AEC in conformance with Sections 10910-10915 (LBWD 2016). It should be noted that instead of using the design maximum annual water consumption for the project, LBWD assumed that the project would operate at its peak demand throughout its hours of operation. This resulted in an annual demand of 225 AFY, which is much larger than the design maximum annual demand of 130 AFY. However, even assuming this much larger demand, the WSA concludes that sufficient potable water is available to supply AEC under the three water year scenarios: normal, single dry and multiple dry. The WSA was approved by the City of Long Beach Board of Water Commissioners on January 21, 2016. Staff proposes Condition of Certification **SOIL&WATER-6** to limit the amount of water used consistent with the scope of this analysis and the Water Supply Assessment.

LOCAL LORS

Staff concludes that the implementation of Conditions of Certification **SOIL&WATER-5** AEC would satisfy the applicable requirements of all local LORS by paying necessary local connection fees to the City of Long Beach for potable water supply and sanitary sewer disposal services.

NOTEWORTHY PUBLIC BENEFITS

- The proposed project would reduce the amount of potable water used relative to baseline conditions. The reduction in water use would be about 272 AFY.
- The proposed project would result in approximately 0.24 mgd reduction in discharge of industrial wastewater to the San Gabriel River and ultimately the Pacific Ocean, and a similarly proportional decrease in pollutant loading, which would result in an improvement of the water quality in the Pacific Ocean and the Alamitos Bay.
- The proposed project would utilize dry cooling which significantly reduces potential water consumption. The project would also reuse a portion of the blowdown water from the HRSGs and combustion turbines which would result in reduction of water consumption and wastewater discharges. This would, along with utilization of dry cooling, significantly reduce impacts to water resources compared to older technologies such as OTC.

CONCLUSIONS

Based on the assessment of the proposed AEC, Energy Commission staff concludes that:

- The AEC would use potable water for construction lasting about 56 months. Use would not exceed an annual rate of about 22 acre feet per year (AFY) (about 100 AF total). Operation water use (process and sanitary uses) would not exceed 130 AFY. Once Alamitos Generating Station (AGS) ceases operation after completion of construction of the AEC, this would reduce the amount of potable water used relative to baseline conditions, i.e. the AGS, which would cease operation after completion of construction of the AEC. The reduction in potable water use would be about 272 AFY, which would result in additional supplies for other beneficial uses.
- Although the project would reduce potable water use relative to baseline conditions, staff conducted additional analysis to evaluate whether reclaimed water from nearby wastewater treatment plants or the City of Long Beach could be used as an alternative supply. Staff concluded that due to the small volume of water needed for operation, long distances to treatment plants and the nearest interconnection to the city's reclaimed water distribution system, it would be economically infeasible to use reclaimed water at this time.
- The proposed project would result in a reduction of 0.24 million gallons per day (mgd) in industrial wastewater discharge to the San Gabriel River and ultimately the Pacific Ocean and a similarly proportional decrease in pollutant loading associated with industrial wastewater, which would improve the water quality in the ocean and the Alamitos Bay.
- The proposed site has a long industrial history and would not require a lot of additional soil disturbance for the new facilities and as such would result in minimal losses to soil resources. Though some small losses in sediment are expected during construction and operation from wind and water erosion, onsite management of stormwater runoff and sediment erosion as proposed by staff in Conditions of Certification **SOIL&WATER-1** and **SOIL&WATER-4** would adequately minimize soil loss.
- Staff proposes Condition of Certification **SOIL&WATER-1,** which would require the proposed project to comply with the Clean Water Act and obtain discharge permits for construction through the State Water Resources Control Board. This condition would ensure that the impacts to waters of the US from construction would be less than significant.
- Staff proposes Condition of Certification **SOIL&WATER-2**, which would require the proposed project to comply with Permit Order No. R4-2009-0068, NPDES NO. CAG674001, if hydrostatic testing waters are discharged to waters of the US. This condition would ensure that the impacts to waters of the US from hydrostatic testing would be less than significant.
- Groundwater at the site is relatively shallow and potentially contaminated by petroleum by-products. Trench and foundation excavations would likely encounter shallow groundwater and dewatering would be required for stabilization. If dewatering is required for any construction activities, staff recommends that the

applicant comply with Condition of Certification **SOIL&WATER-3**, which would require the applicant to apply for coverage under a RWQCB permit that would allow for the discharge of petroleum-contaminated groundwater from dewatering activities.

- Staff proposes Condition of Certification **SOIL&WATER-4,** which would require the proposed project to comply with the Clean Water Act and obtain industrial discharge permits for project operation through the State Water Resources Control Board. This condition would ensure that the impacts to waters of the US would be less than significant.
- Staff proposes Condition of Certification **SOIL&WATER-5**, requiring the proposed project to comply with the City of Long Beach code, Title 15 Chapters 4 through 28, which define regulations and permits required for discharge of wastewater to the city's wastewater system. Compliance with this condition would ensure that connections to the city's sewer system are completed appropriately and that annual fees are paid to the city.
- LBWD has conducted a WSA and concluded that there is sufficient supply available for the project.
- The proposed project would use potable water supplied by LBWD for construction and operation. Water would be supplied through an existing connection used by the existing AGS. Staff proposes Condition of Certification **SOIL&WATER-6** to limit the amount of water used consistent with the scope of this analysis and the Water Supply Assessment. Staff also proposes Condition of Certification **SOIL&WATER-7**, which would require the applicant to install water meters on site for accurate reporting of water use.
- The proposed project is located in Zone X and is separated from the 100-year flood stage (flood with a 1 percent probability of occurrence in any year) by at least six feet.
- Recent Energy Commission studies show the project site and vicinity to be at increased risk of flooding due to relative sea level rise. However the proposed site would be sufficiently above sea level to ensure power plant reliability. Even with high-end estimates of relative sea-level rise of 61 centimeters (2.0 feet) by 2050 (relative to 2000) (Tebaldi et al. 2012, NAS 2012), the site would still be about 4 feet above the current (2012) 100-year floodplain (FEMA 2012).
- The proposed project would include use of air cooled condensers for cooling of the steam cycle. This technology significantly reduces the potential for use of other water supplies and is encouraged in accordance with the Energy Commission's water policy. Development of alternative water supplies for remaining industrial uses does not appear to be feasible. In addition, the project would use a number of systems to reuse wastewater and reduce wastewater volume. Staff believes the project water use is consistent with Energy Commission water policy.
- The proposed project would comply with SWRCB's Resolution No. 2010-0020, Policy for the Use of Coastal and Estuarine Waters for Power Plant Cooling, by the use of dry-cooling technology.

PROPOSED CONDITIONS OF CERTIFICATION

NPDES CONSTRUCTION PERMIT REQUIREMENTS

SOIL&WATER-1: The project owner shall manage stormwater pollution from construction activities by fulfilling the requirements contained in State Water Resources Control Board's (SWRCB) *National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (Order No. 2009-0009-DWG, NPDES No. CAS000002*) and all subsequent revisions and amendments. The project owner shall develop and implement a construction Stormwater Pollution Prevention Plan (SWPPP) for the construction of the project. The project owner shall submit the SWPPP to the CBO and CPM for review and SWRCB for review and approval.

<u>Verification</u>: 30 days prior to site mobilization, the project owner shall submit the construction SWPPP to the CBO and CPM for review and the SWRCB for review and approval. A copy of the construction SWPPP shall be kept accessible onsite at all times. Within ten days of its mailing or receipt, the project owner shall submit to the CPM any correspondence between the project owner and the Los Angeles RWQCB about the general NPDES permit for discharge of stormwater associated with construction and land disturbance activities. This information shall include a copy of the notice of intent and the notice of termination submitted by the project owner to the SWRCB.

HYDROSTATIC WATER DISCHARGE PERMIT REQUIREMENTS

SOIL&WATER-2: Prior to initiation of hydrostatic testing water discharge to surface waters, the project owner shall obtain a National Pollutant Discharge Elimination System permit for discharge to the Pacific Ocean. The project owner shall comply with the requirements of the Permit Order No. R4-2009-0068, NPDES No. CAG674001 for hydrostatic testing water discharge. The project owner shall provide a copy of all permit documentation sent to the Los Angeles Regional Water Quality Control Board (RWQCB) or SWRCB to the CPM and notify the CPM in writing of any reported non-compliance.

<u>Verification</u>: 30 days prior to site mobilization, the project owner shall submit to the CPM documentation that all necessary NPDES permits were obtained from the Los Angeles RWQCB or State Water Board. 30 days prior to project operation, the project owner shall submit to the CPM a copy of the relevant plans and permits received. The project owner shall submit to the CPM all copies of any relevant correspondence between the project owner and the Water Board regarding NPDES permits in the annual compliance report.

GROUNDWATER DISCHARGE PERMIT REQUIREMENTS

SOIL&WATER-3: Discharge of dewatering water shall comply with the Los Angeles Regional Water Quality Control Board (RWQCB) and State Water Resources Control Board regulatory requirements. The project owner shall submit a Report of Waste Discharge (RWD) to the compliance project manager (CPM) and RWQCB for determination of which regulatory waiver or permit applies to the proposed discharges. The project owner shall pay all necessary fees for filing and review of the RWD and all other related fees. Checks for such fees shall be submitted to the RWQCB and shall be payable to the State Water Resources Control Board. The project owner shall ensure compliance with the provisions of the waiver or permit applicable to the discharge. Where the regulatory requirements are not applied pursuant to a National Pollutant Discharge Elimination System permit, the requirements of the applicable waiver or permit shall be enforceable by both the Commission and the RWQCB. In furtherance of that objective, the Energy Commission hereby delegates the enforcement of the waiver or permit requirements, and associated monitoring, inspection, and annual fee collection authority, to the RWQCB. Accordingly, the Energy Commission and the RWQCB shall confer with each other and coordinate, as needed, in the enforcement of the requirements.

Verification: Prior to any dewatering water discharge, the project owner shall submit a RWD to the RWQCB to obtain the appropriate waiver or permit. The appropriate waiver or permit must be obtained at least 30 days prior to the discharge. The project owner shall submit a copy of any correspondence between the project owner and the RWQCB regarding the waiver or permit and all related reports to the CPM within ten days of correspondence receipt or submittal.

NPDES INDUSTRIAL PERMIT REQUIREMENTS

SOIL&WATER-4: Prior to site mobilization, the project owner shall obtain a National Pollutant Discharge Elimination System permit for industrial waste and stormwater discharge to the San Gabriel River. The project owner shall discharge to the same outfall currently utilized by the Alamitos Generating Station under the requirements of Order No. R4-2000-0082, NPDES No. CA0001139. The project owner shall provide a copy of all permit documentation sent to the Los Angeles or State Water Board to the CPM and notify the CPM in writing of any reported non-compliance.

Verification: Prior to site mobilization, the project owner shall submit to the CPM documentation that all necessary NPDES permits were obtained from the Los Angeles or State Water Board. 30 days prior to project operation, the project owner shall submit to the CPM a copy of the Industrial SWPPP. The project owner shall submit to the CPM all copies of any relevant correspondence between the project owner and the Board regarding NPDES permits in the annual compliance report.

WATER AND SEWER CONNECTIONS

SOIL&WATER-5: The project owner shall pay the City of Long Beach all fees normally associated with industrial connections to the city's sanitary sewer and water supply system as defined in Title 15 of the city code.

Verification: 30 days prior to the scheduled connection to the city's sewer and water supply system, the project owner shall submit to the CPM a copy of the application to the city to connect to the sewer and water supply system and the check submitted to pay the fees described above. Fees paid to the city shall be reported in the Annual Compliance Report for the life of the project.

WATER USE AND REPORTING

SOIL&WATER-6: Water supply for project construction and industrial uses during project construction and operation shall be potable water supplied by the City of Long Beach Water Department (LBWD). Water use for project operation shall not exceed 130 AFY, of which a maximum of 1.6 AFY shall be for sanitary purposes. Water use for construction shall not exceed 22 AFY during the 56-month construction period. A monthly summary of water use shall be submitted to the CPM.

Verification: No later than 60 days prior to construction, the project owner shall submit to the CPM two copies of the executed agreement for the supply and onsite use of potable water from LBWD.

The project owner shall submit a water use summary report to the CPM monthly during construction and annually during operations for the life of the project. The annual report shall include calculated monthly range, monthly average, daily maximum within each month and annual use by the project in both gallons per minute and acre-feet. After the first year and for subsequent years, this information shall also include the yearly range and yearly average potable water used by the project.

WATER METERING

SOIL&WATER-7: Prior to the use of potable water, the project owner shall install and maintain metering devices as part of the water supply and distribution system. The project shall monitor and record in gallons per day the total volume of potable water from LBWD. Those metering devices shall be operational for the life of the project and must be able to record the volume of construction, domestic, and process water use separately.

Verification: At least 30 days prior to use of water for project construction and operation, the project owner shall submit to the CPM evidence that metering devices have been installed and are operational. The project owner shall provide a report on the servicing, testing, and calibration of the metering devices in the annual compliance report.

REFERENCES

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TRAFFIC AND TRANSPORTATION

Lisa Worrall and James Adams

SUMMARY OF CONCLUSIONS

Energy Commission staff has analyzed the information provided in the Supplemental Application for Certification (SAFC) and acquired from other sources to determine the potential for the Alamitos Energy Center (AEC, the project) to have significant adverse traffic and transportation-related impacts. Staff assessed the potential for mitigation proposed by the applicant and conditions of certification developed by staff to reduce any potential impacts to a less-than-significant level, as well as the feasibility and enforceability of those proposed mitigations and recommended conditions.

Staff proposes Conditions of Certification **TRANS-1** through **TRANS-7** to reduce potential impacts to a less than significant level and to ensure that the project would comply with all applicable laws, ordinances, regulations, and standards (LORS) pertaining to traffic and transportation. Staff proposes Condition of Certification **TRANS-8** to promote aviation safety.

Implementation of Conditions of Certification **TRANS-1** through **TRANS-5** would reduce the potential AEC impacts to less than significant for the population within the six-mile radius of the AEC, including the environmental justice (EJ) population represented in **Socioeconomics Figure 1** and **Table 3**.

INTRODUCTION

In compliance with the California Environmental Quality Act (CEQA) and Energy Commission requirements, this analysis identifies the AEC's potential impacts to the surrounding transportation systems and proposed mitigation measures (conditions of certification) that would avoid or lessen these impacts. It also addresses the project's consistency with applicable federal, state, and local transportation-related LORS.

APPLICANT-PROPOSED IMPROVEMENTS AND TRAFFIC MITIGATION

The applicant has proposed a Construction and Demolition Transportation Management Plan (TMP) to ensure that construction and demolition activities of AEC would result in less than significant traffic impacts (AEC 2015f, pg. 5.12-18). The TMP would include:

- employee work schedule during the peak construction period to minimize arrivals during the morning peak hour when project impacts are anticipated. Specifically, the construction workforce will be scheduled to arrive at the site prior to 7:00 a.m. (Monday through Friday).
- timing of heavy equipment and building material deliveries, potential street or lane closures, signing, lighting, and traffic control device placement. Damage to any roadway caused by project construction traffic will be restored to or near its preexisting condition based on the procedures established by the TMP. The

construction contractors will work with the local agencies to prepare a schedule and mitigation plan for the roadways along the construction routes in accordance with the procedures established by the TMP.

The applicant’s proposed mitigation measures in the TMP are similar to staff’s proposed Conditions of Certification **TRANS-1** through **TRANS-3** which are discussed in greater detail in the “Direct/Indirect Impacts and Mitigation” subsection below.

SETTING

The proposed AEC would be constructed on the site of the existing AES Alamitos Generating Station (AGS). The AEC would occupy a 21-acre site within a larger 71 acre parcel in the city of Long Beach, Los Angeles County. The AEC site is located at the southeast corner of the intersection of SR-22 (Garden Grove Freeway/7th Street) and Studebaker Road. Access is provided via one primary security gated entrance on the western side of the site. The gated entrance is accessed via a signalized intersection on Studebaker Road approximately 300 feet south of the Studebaker Road/ SR 22 eastbound on-ramp.

The AGS parcel is bordered to the north by an existing Southern California Edison switchyard and SR-22, to the east by the San Gabriel River and beyond that to the Los Angeles Department of Water and Power Haynes Electrical Generating Station, to the south by the former Plains West Coast Terminals petroleum storage facility and undeveloped property, and to the west by the Los Cerritos Channel and beyond that to residences, AGS cooling-water canals, and Studebaker Road (AEC 2015f, pg. 2-4).

The AEC site is located in the southeastern most area of Long Beach within the Southeast Area Development and Improvement Plan (SEADIP) area. This portion of the SEADIP area is designated for industrial uses (AEC 2015f, pg. 5.6-15). Land uses around the project site are a mix of industrial, residential, recreational, open space areas, and sporadic commercial development (AEC 2015f, pg. 5.6-5). See the **Land Use** section for a discussion of the surrounding general plan land use designations and land uses in the AEC project area.

The project would include the use of 8-acres of temporary construction laydown area spread throughout the AEC site plus a 10-acre temporary construction laydown area, south of the AEC site within the AGS parcel (AEC 2015f, pg. 1-3). Access to the laydown areas would be via the primary Studebaker Road entrance.

Construction of the AEC would require the delivery of large components by way of heavy/oversized trucks from the Port of Long Beach to the project site. The use of heavy/oversized trucks would be subject to the permitting requirements of the California Department of Transportation (Caltrans) and the local cities and counties listed in the LORS table in **Traffic and Transportation Table 1.** The roadways that would be affected by the proposed route are discussed below.

A new 1,000-foot long, 6-inch diameter sewer pipeline would be constructed from the AEC site and connect to an existing Long Beach Water District sewer pipeline in the residential subdivision west of the project site (AEC 2015f, pg. 2-5). The new pipeline would begin at the west side of the AEC site near the intersection of Studebaker Road and the northern cooling water canal, cross under Studebaker Road, turn south to the intersection with Lyons Drive, turn west to cross under Los Cerritos Channel where the pipeline would be affixed to the bridge, and then finally turn north on East Vista Street to connect to the existing sewer line in the residential subdivision.

Refer to the **Project Description** section for a detailed discussion of the existing power generating facilities on site, project description and a description of the construction schedule.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

Traffic and Transportation Table 1 provides a general description of adopted federal, state, and local LORS pertaining to traffic and transportation that apply to this project.

Traffic and Transportation Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

APPLICABLE LAW	DESCRIPTION
FEDERAL	
Title 14, Code of Federal Regulations, Section 77.13 (1)	This regulation requires notification of the Federal Aviation Administration (FAA) of construction or alteration of more than 200 feet above the ground level at its site.
Title 14, Code of Federal Regulations, Section 77.13 (2)(i)	This regulation requires notification of the Federal Aviation Administration (FAA) of any construction or alteration of greater height than an imaginary surface extending outward and upward at a slope of 100 to 1 for a horizontal distance of 20,000 feet from the nearest point of the nearest runway of an airport with at least one runway more than 3,200 feet in length.
Title 49, Code of Federal Regulations, Parts 171-177	Requires proper handling and storage of hazardous materials during transportation.
STATE	
California Department of Transportation CA Manual of Uniform Traffic Control Devices (MUTCD) Part 6 (Traffic Manual)	Provides traffic control guidance and standards for continuity of function (movement of traffic, pedestrians, bicyclists, transit operations), and access to property/utilities when the normal function of a roadway is suspended.
California Health and Safety Code, Section 25160	Addresses the safe transport of hazardous materials.
California Streets and Highways Code, Sections 660, 670, 672, 1450, 1460, 1470, 1480 et seq., 1850-1852	Requires encroachment permits for projects involving excavation in state and county highways and city streets.
California Vehicle Code	

APPLICABLE LAW	DESCRIPTION
Sections 13369, 15275, 15278	Requires licensing of drivers and the classification of license for the operation of particular types of vehicles. A commercial driver's license is required to operate commercial vehicles. An endorsement issued by the Department of Motor Vehicles (DMV) is required to drive any commercial vehicle identified in Section 15278.
Sections 31303-31309	Requires transportation of hazardous materials to be on the state or interstate highway that offers the shortest overall transit time possible.
Sections 32100-32109	Requires shippers of inhalation hazards in bulk packaging to comply with rigorous equipment standards, inspection requirements, and route restrictions.
Sections 34000-34100	Establishes special requirements for vehicles having a cargo tank and for hazardous waste transport vehicles and containers, as defined in Section 25167.4 of the Health and Safety Code.
Section 35550-35551	Provides weight guidelines and restrictions vehicles traveling on freeways and highways.
Section 35780	Requires a single-trip transportation permit to transport oversized or excessive loads over state highways.
LOCAL	
2010 Los Angeles County Congestion Management Plan (CMP)	A required transportation planning document for urbanized areas with populations of 50,000. The Los Angeles County CMP goals are to support regional mobility and air quality objectives by reducing traffic congestion.
City of Long Beach General Plan, Mobility Element	The Mobility Element is a required chapter of the General Plan which evaluates the transportation needs of the city and provides a transportation plan to meet those needs.
City of Seal Beach General Plan, Circulation Element	The Circulation Element establishes LOS standards for local city streets and intersections.
City of Seal Beach Traffic Impact Study Guidelines	Identifies the minimum requirements for a Traffic Impact Study submitted to the city of Seal Beach. These guidelines specify increases in ICU that are considered significant and require mitigation.
City of Long Beach Municipal Code	
Title 10 Vehicles and Traffic, Chapter 10.18.10 Vehicles restricted from streets- Vehicles prohibited in central traffic district	Prohibits specific vehicles (freight vehicles) in the central traffic district between 7:00 a.m. and 6:00 p.m.
Title 10 Vehicles and Traffic, Chapter 10.41 Use of streets by Overweight Vehicles. 10.41.020 Special Permit Required	Requires an oversize vehicle permit for vehicles, mobile equipment or loads which exceed the requirements of the Vehicle Code.
Title 18 Buildings and Construction, Chapter 18.17 Transportation	Transportation Improvement Fee is imposed on new development in the city of Long Beach. The fee assures the transportation level

APPLICABLE LAW	DESCRIPTION
Improvement Fee	of service goals are met with respect to the additional demands placed on transportation system by traffic generated by new development.
City of Seal Beach, Municipal Code Title 8 Vehicles and Traffic, Section 8.10.135 Movement of Oversize Vehicles.	Requires an oversize vehicle permit for vehicles, mobile equipment or loads which exceed the requirements of the Vehicle Code.
Los Angeles County Municipal Code, Title 16- Highways, Division 1- Highway Permits, Chapter 16.22 Moving Permits, 16.22.030 Moving Permit issuance conditions for overweight loads.	Requires an oversize vehicle permit for vehicles, mobile equipment or loads which exceed the requirements of the Vehicle Code.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHODS AND THRESHOLDS FOR DETERMINING SIGNIFICANCE

Significance criteria used in this document for evaluating environmental impacts are based on the CEQA Guidelines, the CEQA Environmental Checklist for Transportation/Traffic, and applicable LORS used by other governmental agencies. Specifically, staff analyzed whether the proposed project would result in the following:

1. Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume-to-capacity ratio on roads, or congestion at intersections);

2. Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit;

3. Conflict with an applicable congestion management program, including, but not limited to, level of service standards (LOS) and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways;

4. Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment);

5. Result in inadequate emergency access;

6. Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities;

7. Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risk;

8. Produce a thermal plume or generate glare in an area where flight paths are expected to occur[1]; or

9. Have individual environmental effects which, when considered with other impacts from the same project or in conjunction with impacts from other closely related past, present, and reasonably foreseeable future projects, are considerable, compound, or increase other environmental impacts.

CRITICAL ROADS AND FREEWAYS

The city of Long Beach Mobility Element classifies roadways in the city on a context-sensitivity classification system that addresses how a street interfaces with surrounding land uses and buildings, as well as how the street will serve to mobilize people, including pedestrians, bicyclists, transit riders, and drivers (LB GP, 2013). The six roadway classifications are Regional Corridor, Boulevard, Major Avenue, Minor Avenue, Neighborhood Connector, and Local Street.

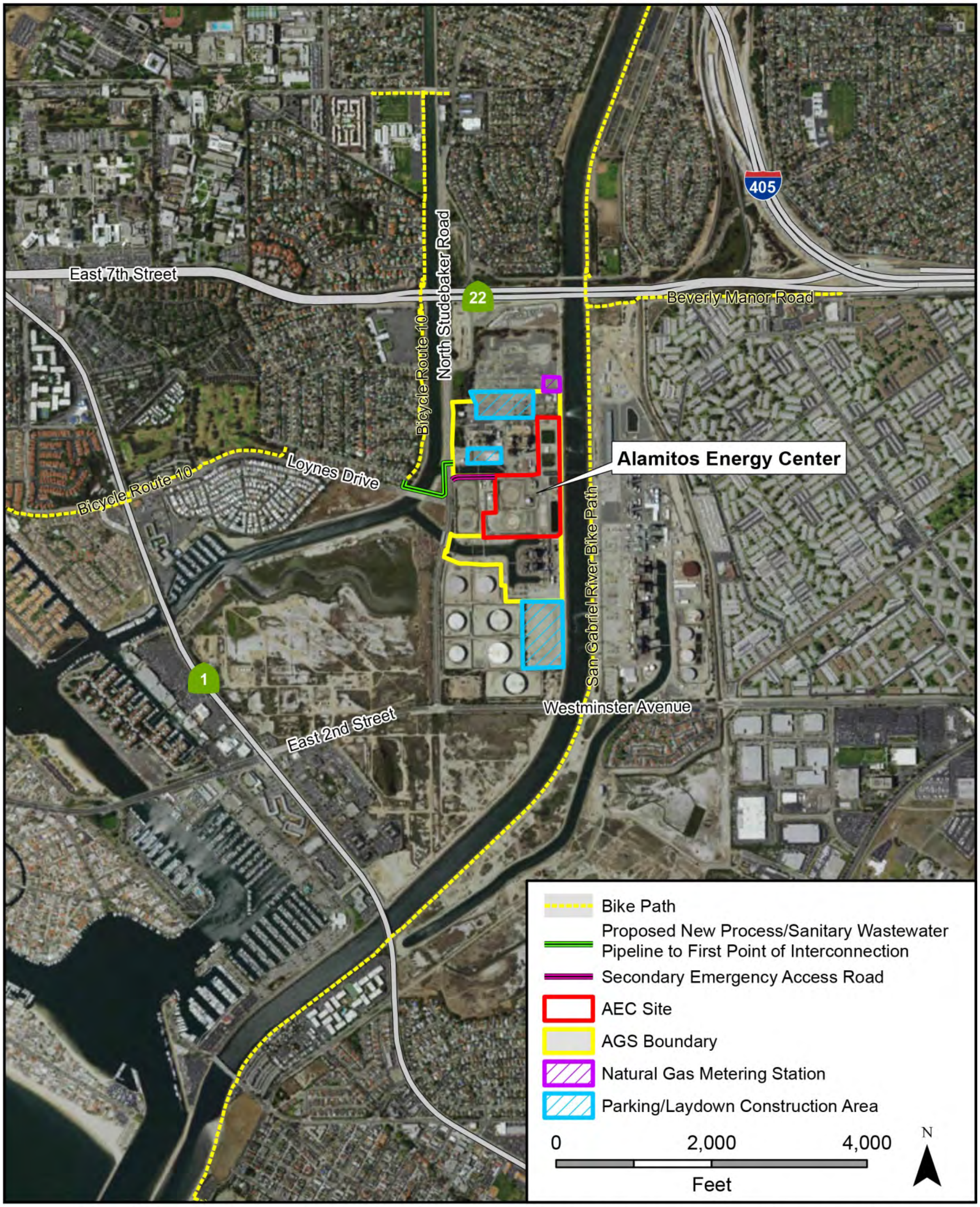
The following describes the local and regional roadways that would be used for construction and operations traffic accessing the proposed project site and for the delivery of construction materials. The regional roadways are shown in **Traffic and Transportation Figure 1.** The local roadways within project vicinity are shown in **Traffic and Transportation Figure 2**.

[1] The FAA recommends that when able, pilots should steer clear of exhaust plumes by flying on the upwind side of smokestacks or cooling towers (FAA 2015).

TRAFFIC & TRANSPORTATION - FIGURE 1
Alamitos Energy Center - Regional Transportation Network

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMETAL PROTECTION DIVISION
SOURCE: 13-AFC-01 Figure 1.1-3, AEC Data Response Set #6 Figure DR168-1, OSM, Los Angeles County, ESRI Imagery

TRAFFIC & TRANSPORTATION - FIGURE 2
Alamitos Energy Center - Local Transportation Network



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMETAL PROTECTION DIVISION
SOURCE: 13-AFC-01 Figure 1.1-3, AEC Data Response Set #6 Figure DR168-1, OSM, ESRI Imagery

Existing Regional and Local Transportation Facilities

Interstate 405 (I-405): I-405 is a north-south freeway that provides regional access to the project site. It is under the California Department of Transportation (Caltrans) jurisdiction and subject to state design standards. This heavily-traveled freeway used by commuters and freight haulers, extends north through Los Angeles County and south through Orange County, roughly following the southern Californian coastline.

Interstate 605 (I-605): I-605 is a north-south regional freeway connecting east Long Beach with the San Gabriel Valley to the north. I-605 is under the jurisdiction of Caltrans and subject to state design standards.

Pacific Coast Highway (PCH, State Highway 1): PCH is under the Caltrans jurisdiction and subject to state design standards. In the project vicinity, PCH is a four to six lane major north-south arterial connecting the city of Long Beach to Orange County coastal cities to the south. Left turn lanes are provided at major intersections. The posted speed limit in the project vicinity is generally 45 miles per hour (mph).

State Route 22 (SR-22, Garden Grove Freeway)/ East 7th Street: State Route 22 is a four to six-lane divided highway that turns into East 7th Street in the city of Long Beach. SR-22 is an east-west highway connecting the Costa Mesa Freeway (SR-55) to the east to the city of Long Beach. The posted speed limit is generally 40 mph.

Studebaker Road: Studebaker Road is a generally four-lane divided north-south roadway that connects 2nd Street to Los Coyotes Diagonal within the city of Long Beach. The posted speed limit is 45 mph. The roadway serves as a primary access to SR-22 for southeastern Long Beach and western Orange County coastal cities. North of SR-22, Studebaker Road connects residential communities to SR-22 and I-405. The AEC project site is directly accessed via a three-way signalized intersection on Studebaker Road. Studebaker Road is classified as a minor avenue from Los Coyotes Diagonal to Spring Street and Major Avenue to 2nd Street.

2nd Street: Second Street is an east-west oriented six-lane divided roadway that connects with Ocean to the west and changes name to Westminster Boulevard at the western city limits of Seal Beach. Second Street is in the city of Long Beach and classified as a boulevard.

Westminster Boulevard: Westminster Boulevard is a four-lane divided roadway that changes its name to 2nd Street in the city of Long Beach to the west and to I-405 and western Orange County to the east. Westminster Boulevard is in the city of Seal Beach and classified as a primary roadway facility.

Seal Beach Boulevard: Seal Beach Boulevard is a north-south oriented six-lane divided roadway that connects I-405/ SR-22 in the north, past PCH to Anaheim Bay at the coast. Near the intersection with Westminster Boulevard, the posted speed limit is 50 mph. Seal Beach Boulevard, provides access to notable areas such as Naval Weapons Station Seal Beach, Boeing, and the Leisure World residential development. Seal Beach Boulevard is in the city of Seal Beach and classified as a major roadway facility.

HEAVY/OVERSIZED TRUCK ROUTES

The California Vehicle Code regulates the use of trucks on state roadways and local jurisdictions regulate the use of trucks on local roadways. Various large components of the AEC (e.g. CTGs, components of the HRSGs, transformers, and other oversize and heavy components) would arrive by ship or rail from the Port of Long Beach and be delivered to the AEC site. A map of the planned truck route is shown in **Traffic and Transportation Figure 3**. These deliveries would travel to the onsite laydown area over the anticipated heavy haul route with the necessary heavy/oversized permits from associated agencies for each road section (e.g. city of Long Beach, California Department of Transportation). The following roadways along the AEC heavy haul route are designated as truck routes under Section 10.40.030 of the city of Long Beach Municipal Code (LB MC, 2016):

- Anaheim Street (west Long Beach city limits to the Long Beach Freeway, I-710)
- Ninth Street (westerly terminus to Long Beach Freeway)
- PCH (west Long Beach city limits to the east City limits)
- Santa Fe Avenue (PCH to Ninth Street)

The following roadways along the AEC heavy haul route are within the overweight corridor/harbor district and are designated as overweight vehicle special permit routes (LB 2013):

- Anaheim Street (west Long Beach city limits to Daisy Avenue)
- Ninth Street (Pico Avenue to ”I” Street)
- Pico Avenue (Harbor Plaza to Tenth Street)
- Santa Fe Avenue (Ninth Street to PCH)
- Tenth Street (Pico Avenue to Ninth Street)

These roads are discussed below in the “Direct/Indirect Impacts and Mitigation” subsection. The remaining roadways that are part of the AEC heavy haul route are not designated as truck routes.

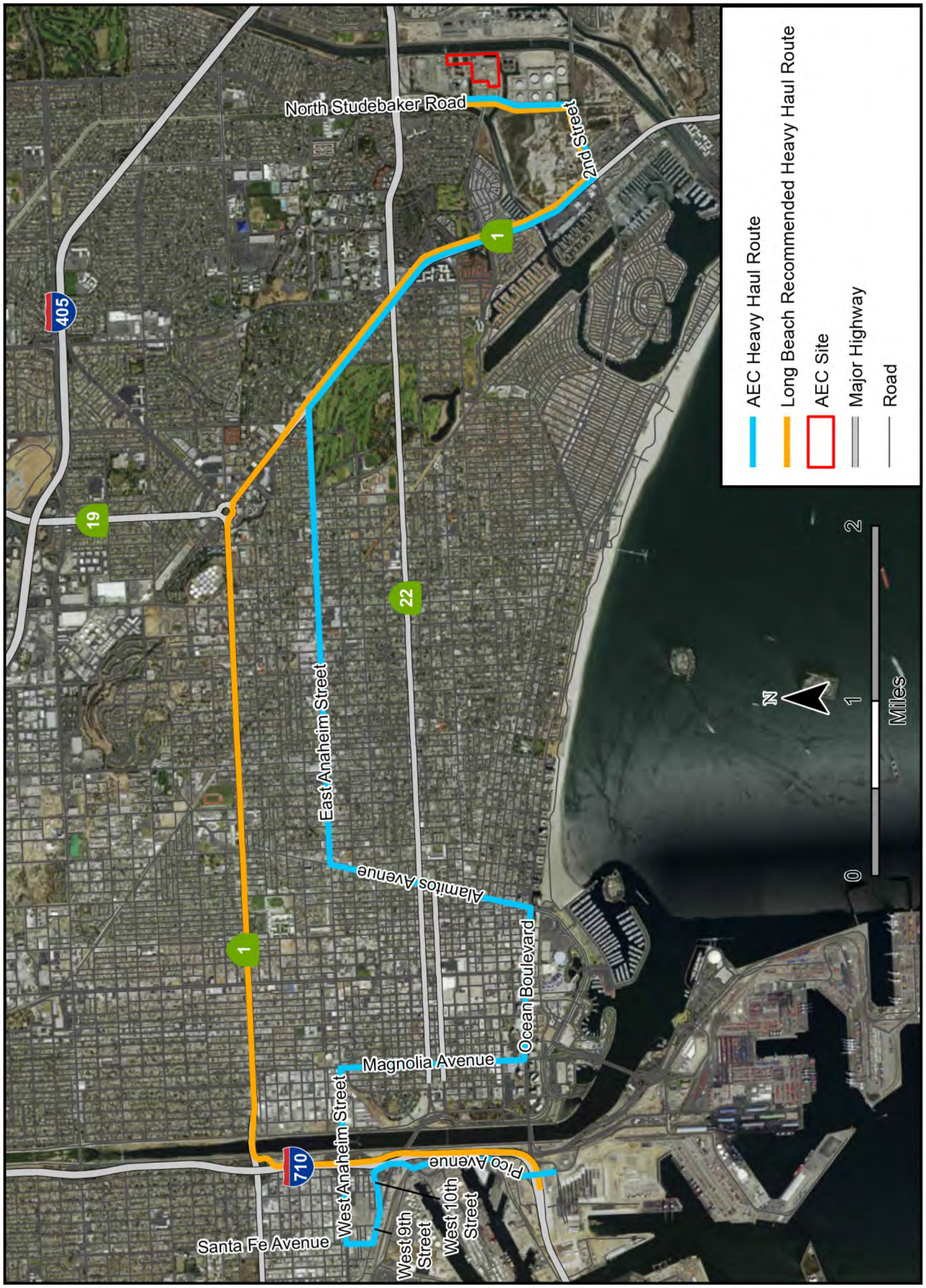
Level of Service (LOS)

To quantify the existing baseline traffic conditions, state highways, roadways, and intersections in the study area were analyzed in the SAFC to determine their operating conditions. Based on the traffic volumes, the turning movement counts, and the existing number of lanes at each intersection, the volume/capacity (v/c) ratios and levels of service (LOS) have been determined for each intersection.

LOS is a qualitative measure describing operational conditions within a traffic stream. It is used to describe and quantify the congestion level on a particular roadway or intersection and generally describes these conditions in terms of such factors as speed or vehicle movement. **Traffic and Transportation Table 2** summarizes roadway LOS for associated V/C ratios.

TRAFFIC & TRANSPORTATION - FIGURE 3

Alamitos Energy Center - Heavy Haul Routes



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: 13-AFC-01 Figure 1.1-3, AEC Data Response Set #6 Figure DR168-1, OSM, Los Angeles County, ESRI Imagery

Traffic and Transportation Table 2
Level of Service Criteria for Roadways and Intersections

LEVEL OF SERVICE	VOLUME/CAPACITY (V/C)	DESCRIPTION
A	0.000 - 0.600	Free flow; insignificant delays
B	0.601 - 0.700	Stable operation; minimal delays
C	0.701 - 0.800	Stable operation; acceptable delays
D	0.801 – 0900	Approaching unstable flow; queues develop rapidly but no excessive delays
E	0.901-1.000	Unstable operation; significant delays
F	>1.000	Forced flow; jammed conditions

Roadway Segment and Intersection LOS Standards

The level of service methodology used to identify the operating condition at roadways and intersections was from the 2010 Highway Capacity Manual. The study roadway segments were evaluated based on the v/c ratio for average daily conditions (AEC 2015f, pg. 5.12-4). Study intersections were evaluated using the Intersection Capacity Utilization (ICU) methodology, which estimates the v/c relationship based on individual v/c ratios for conflicting traffic movements. ICU represents the percent of green light signal time; equating to capacity. The use of ICU is consistent with requirements for the city of Long Beach and the Los Angeles County Congestion Management Program. LOS standards for state highways are subject to Caltrans standards. Staff used these LOS standards to evaluate potential AEC-generated traffic impacts. The following is a list of the applicable LOS standards:

- <u>California Department of Transportation (Caltrans)</u>
  Pacific Coast Highway (PCH) and State Route 22 (SR 22) are subject to Caltrans levels of service criteria. Caltrans establishes a target LOS between LOS C and D for state highways (Caltrans 2002, pg.1). If an existing State highway facility is operating at less than the appropriate target LOS, the existing measure of effectiveness (MOE) should be maintained.

- <u>Los Angeles County Congestion Management Program (CMP)</u>
  The Los Angeles County CMP, under the jurisdiction of Metro, establishes LOS E as the lowest acceptable performance standard for CMP intersections except where the base year LOS is worse than E (LA Co MTA 2010, pg. 15). In these cases, the base year LOS is the standard. The project study roadways that are CMP roadways include PCH, State Route 22, and Seventh Street between Alamitos Avenue and PCH (LA CO MTA 2010, pg. 14). There are five project study intersections with CMP roadways.

- City of Long Beach Mobility Element
  The Mobility Element is a required chapter of the city of Long Beach General Plan which evaluates the long-term transportation needs of the city and provides a plan to accommodate those needs. The Mobility Element establishes a maximum allowable peak hour LOS D for regional corridor, boulevard, and major avenues and LOS C for minor avenue and neighborhood connectors (LB GP 2013, pg. 75). Impacts are considered significant if an unacceptable LOS at any of the key intersections is projected and if the current LOS is unacceptable, the project increases traffic demand at the study intersection by 2 percent of capacity (ICU increase ≥ 0.020), causing or worsening LOS E or F (ICU ≥ 0.901) (AEC 2015f, pg. 5.12-5).
- City of Seal Beach Circulation Element
  The Circulation Element is a required chapter of the city General Plan which evaluates the long-term transportation needs of the city and provides a plan to accommodate those needs. The circulation element establishes the minimum LOS standard of D for city roadway segments and intersections during peak hours (SB GP 2003, pg. C-50).
- Seal Beach Traffic Impact Study Guidelines
  The city of Seal Beach deems specific increases in ICU as significant impacts and requires mitigation (SB Guidelines 2010, pg. 9). Intersections with lower v/c ratios for conflicting traffic movements (e.g. 0.0 to 0.69) would need to receive a larger volume of project traffic to result in a significant impact (e.g. 0.06). Conversely, intersections with high v/c ratios for conflicting traffic movements (e.g. 0.90+), would be significantly impacted with a lower volume of project traffic (e.g. 0.01).

OTHER MODES OF TRANSPORTATION

Freight and Passenger Rail

The closest freight lines to the AEC project site are approximately six miles away. One line originates from the Port of Long Beach, west of the AEC project site, and the second line is east of the project site extending its connection with a north-south route following I-5 in Anaheim, extending roughly southwest through Westminster to Huntington Beach.

The freight line extending from the Port of Long Beach is owned by Pacific Harbor Line and several rail lines spur off the main port rail line. These other freight lines are the Alameda Corridor owned by Pacific Harbor Line (PHL) and operated by PHL, Burlington Northern Santa Fe (BNSF), and Union Pacific (UP) northwest of the project site (north of the Long Beach airport). UP owns and operates a freight line east of the project site. In Huntington Beach/Westminster a freight rail line is owned and operated by UP, PHL, and BNSF. The applicant indicated that heavy and oversized components of the electrical generator sets for AEC would be transported by ship or rail to the Port of Long Beach (AEC 2015f, pg. 5.12-3). Heavy haul deliveries are discussed on page 4.10-10 of this section, and below in the “Direct/Indirect Impacts and Mitigation” subsection.

Passenger rail service in Long Beach is operated by Los Angeles County Metropolitan Transportation Authority (Metro). The only passenger rail service to Long Beach is the

Metro Blue Line, approximately 5 miles west of the project site. The Blue Line provides transit service from Downtown Long Beach north to Downtown Los Angeles. From the Blue Line, passengers can access local bus routes in Long Beach.

Bus Service

The AEC project site is located in the easternmost corner of Los Angeles County along the border with Orange County. In this area, public transit services are provided by Long Beach Transit (LBT), Los Angeles County Metropolitan Transportation Authority (Metro), Transit Torrance, and the Orange County Transportation Authority (OCTA).

Long Beach Transit operates 34 local bus service routes throughout Long Beach including Passport, a free bus service that connects to various destinations in downtown Long Beach (LBT 2015). The AquaBus and AquaLink water taxis, operated by LBT from late Spring to early Fall, ferries passengers to the most popular tourist attractions along the Long Beach harbor waterfront. Door-to-door Dial-A-Lift shared transport service for people who cannot use the fixed route transit system (e.g. disabled persons) is also operated by LBT. No direct LBT routes are located in the direct vicinity of AEC; however, Routes 121 and 131 provide service along PCH and 2nd Street.

Metro provides regional public transportation via local and express stop bus services as well as passenger rail and transit way service within the greater Long Beach and Los Angeles Metropolitan areas. There are a limited number of local buses and an express bus in the city of Long Beach (LA Co MTA 2014). The express bus (line 577) connects Long Beach northeast to El Monte. There are two stops in Long Beach along 7th street, east of the PCH intersection. Route 232 connects the Los Angeles Airport (LAX) with Downtown Long Beach. Within Long Beach Route 232 travels along Anaheim Street and south on Long Beach Boulevard to Downtown Long Beach. Route 60 operates an owl route that extends the daytime Downtown Los Angeles to Compton route to connect with Long Beach via Long Beach Boulevard to Downtown Long Beach. Owl service in Long Beach starts soon after 10 p.m. and ends just after 4 a.m.

Transit Torrance operates bus route rapid 3, a limited stop service from Redondo Beach to Downtown Long Beach (Transit Torrance 2014). From Downtown Long Beach, riders can transfer to the LBT (route 121). LBT Route 121 provides service within one mile of the AEC project site. Pedestrian access along Loynes Drive and Studebaker Road is limited.

Orange County Transit Authority's routes 1, 50, and 60 connect Orange County to roadways in close proximity to the AEC project site (PCH, Studebaker Road, and 7th Street, respectively) (OCTA 2013). OCTA Route 1 has a bus stop on Studebaker Road at Lonyes Drive. Pedestrian access along Studebaker Road is limited.

Bicycle and Pedestrian Facilities

The city of Long Beach has an extensive network of Class I bike paths (exclusive right-of-way, cross traffic minimized), Class II bike lanes (on-street, striped vehicle/bicycle separation), and Class III bike routes (non-exclusive lane, vehicles and bicycles share the road) throughout the city. Bicycle facilities on the affected roadways include a Class

I path on Loynes Drive, a Class II lane on 7th Street, and Class II lane and III route on Studebaker Road, PCH, and 2nd Street (LB GP 2013, pg. 42). Along the west bank of the Los Cerritos Channel is a Class I bike path (Los Cerritos Channel Bike Path), Long Beach Bikeway Route 10.

Several of the affected roadways extend into the city of Seal Beach, specifically PCH and Westminster Avenue (extension from 2nd Street in Long Beach). Seal Beach Boulevard is another affected roadway in the city of Seal Beach. Seal Beach Boulevard has a Class II bike lane north of PCH and a Class I bike path south of PCH, Westminster has a Class II bike lane. There is a Class I bike path along the San Gabriel River Greenbelt (east bank of the San Gabriel River).

Pedestrian facilities in Long Beach include the Shoreline Pedestrian/Bike Path, a 3.1-mile bicycle and pedestrian path extending along the beach from Alamitos Avenue to 54th Place. Long Beach pedestrian facilities include pedestrian paths, trails, passageways, and walkways through parks, public spaces, and other properties found across Long Beach.

Airports

The closest airport is the Los Alamitos Army Airfield, a military installation approximately 2.5 miles northeast of the AEC project site. Of the two runways, the longest runway at the Los Alamitos Army Airfield is 8,001 feet. The runways are oriented approximately southwest to northeast. The airport operates from sunrise to sunset. The left-hand traffic pattern altitude for helicopters and one or two engine aircraft using the airport is 1,000 feet above ground level (AGL). The traffic pattern is a couple hundred yards wide due to noise restrictions in the local area. Currently at Los Alamitos Airfield, there are seven to eight arrivals/departures per day as one military unit is deployed elsewhere. The arrivals and departures would double (at least) once the unit returns from deployment.

DIRECT/INDIRECT IMPACTS AND MITIGATION

The direct and indirect impacts of the proposed AEC on traffic and transportation system are discussed in this section and based on an analysis comparing pre-AEC and post-AEC conditions. Pre-AEC conditions consider the on-going operations at the existing AGS plant (units 1-6) (AEC 2015f, pg. 1-3). The AEC's impacts were analyzed for the peak construction month when construction activity and employment would be maximized (January 2021). The roadway segments and intersections below were selected for evaluation because they provide the most direct route to the project site and would most likely be affected by project traffic during project construction. Operation intersection and roadway segment conditions were not analyzed as the project would become operational during the same year as peak construction and would have much fewer workers (36 employees).

Construction Traffic

Traffic volumes for the affected project intersections and roadway segments were projected based on a 1.2-percent-per-year growth rate estimated in the 2012-2035 Regional Transportation Plan prepared by the Southern California Association of

Governments (SCAG) (AEC 2015f, pg. 5.12-10 and 5.12-11). The SCAG growth rate was applied to the existing traffic volumes through 2021. The existing traffic volumes for the study intersections were collected in 2009 and existing roadway segment volumes are from 2014. With the application of the SCAG growth rate to bring the volumes to 2021 volumes, the project's construction trips were then added to the affected project intersections and roadway segments and the LOS was calculated.

The project's peak construction traffic estimates were developed based on the projected size of the AEC construction and demolition workforce and the anticipated truck deliveries to the site (AEC 2015f, pg. 5-12-12). Construction and site preparation activities are anticipated to last 56 months, from the first quarter of 2017 until the third quarter of 2021 (AEC 2015f, pg. 5.12-2).

Workforce Traffic

During peak construction month in January 2021 (month 44 during the construction of the simple-cycle power block), 512 workers are anticipated, generating an estimated 1,024 daily round trips (512 workers x 2 trips per worker= 1,024 total trips) (AEC 2015f, pg. 5.12-12). It was assumed that none of the workers would carpool. Construction would typically occur between 7:00 a.m. and 7:00 p.m. Monday through Friday and between 9:00 a.m. and 6:00 p.m. on Saturday.

Truck Traffic

Heavy/Oversized Deliveries

Construction of the AEC would require the delivery of large components by heavy/oversized trucks. The large components would be delivered to the Port of Long Beach via ship or rail and then transported via truck to the project site. The potentially affected roadways based on the applicant's proposed heavy haul route are presented in **Traffic and Transportation Table 3** and graphically represented in **Traffic and Transportation Figure 3**. **Bold** text indicates the road is a designated truck route or an overweight vehicle special permit route.

Traffic and Transportation Table 3
Proposed AEC Heavy / Oversized Haul Route

ROADWAY	APPLICABLE JURISDICTION
Harbor Plaza to Pico Avenue	City of Long Beach/County of Los Angeles
Pico Avenue to West 10th Street	City of Long Beach/County of Los Angeles
10th Street to 9th Street	City of Long Beach/County of Los Angeles
9th Street to Santa Fe Avenue	City of Long Beach/County of Los Angeles
Santa Fe Avenue to West Anaheim Street*	City of Long Beach/County of Los Angeles
West Anaheim Street to Magnolia Avenue	City of Long Beach
Magnolia Avenue to East Ocean Boulevard	City of Long Beach
East Ocean Boulevard to Alamitos Avenue	City of Long Beach
Alamitos Avenue to East Anaheim Street	City of Long Beach
East Anaheim Street to **PCH**	City of Long Beach
PCH to East. 2nd Street	Caltrans
East 2nd Street to Studebaker Road	City of Long Beach

Notes: **Bold** text indicates the road is a designated truck route or an overweight vehicle special permit route.*West Anaheim Street is an overweight vehicle special permit route from the western city limits of Long Beach to Daisy Avenue and does not extend to Magnolia Avenue.

The proposed AEC heavy/oversized haul route includes several segments that are not designated as truck routes or overweight vehicle special permit routes. Chapter 10.40 of the city of Long Beach Municipal Code allows trucks to use non-truck routes if they are entering or exiting a property for business purposes or storage by the most direct route, this is echoed in the Long Beach General Plan (LB GP 2013, pg. 106). The segments of the proposed AEC heavy haul route that are not truck routes or overweight vehicle special permit routes are not the most direct route to the project site.

Staff contacted the city of Long Beach Public Works Department to discuss the applicant's proposed heavy haul route. A Traffic Engineering Associate with the Engineering Bureau at the city of Long Beach Public Works Department responded to staff's inquiry. The associate said that to be in compliance with city streets designation as truck routes, the AEC would use the 710 freeway from the port, then exit on PCH, continuing to 2nd street (CEC 2016f). By using this route, the only street not designated as a truck route is 2nd Street, but it is the shortest route to the delivery destination, as specified in the Long Beach Municipal Code. Energy Commission staff also inquired about the roads identified in the Mobility Element of the Long Beach General Plan as appropriate paths of travel for local deliveries (LB GP2013, pg. 109). Specifically, staff wondered whether these roads could accommodate heavy/oversized trucks, as several of these roads are proposed for the AEC heavy haul route. The associate responded that the streets designated in the mobility element for trucks to use are connected to streets designated as a truck routes, and are to be used for local deliveries and not for overweight loads.

Energy Commission staff discussed the city's response on their review of the AEC heavy haul plan with the applicant and requested clarification from the applicant on the route selected for transporting the AEC heavy haul components. The applicant explained that AES worked with a local heavy haul firm to identify two possible routes from the Port of Long Beach to the AEC project site (CEC 2016g). The route that became the proposed AEC heavy haul route accommodates loads 15 feet tall or more as it avoids the overhead obstructions along the second route. The second route accommodates loads less than 15 feet tall. The second route more closely follows the route recommended by city staff, with the exception of the route from the port to PCH. The second route is described below:

- Harbor Plaza to Pico Avenue
- Pico Avenue to West 10th Street (10th Street changes to 9th Street)
- West 10th Street to Santa Fe Avenue
- Santa Fe Avenue to Pacific Coast Highway
- Pacific Coast Highway to East 2nd Street
- East 2nd Street to Studebaker Road
- Studebaker Road to AEC

Staff has identified the Long Beach Public Works recommended route in **Traffic and Transportation Figure 3** as well as the applicant's proposed route.

Based on other power plant projects near Caltrans freeways, Energy Commission staff has found that the overpasses cannot accommodate the weight of the types of heavy/oversized loads typically associated with projects like the AEC. If an overpass were to receive such a load and became inoperable as a result of damage from the load, the traffic on the freeway would have to be re-routed around the damaged overpass until it could be repaired. Both of the routes identified by the heavy haul firm and discussed above avoid Interstate 710.

When the heavy/oversized permits are requested from the applicable jurisdictions, the final route would be determined and the permit(s) issued. The city of Long Beach would issue special permits for oversized loads on roadway segments in their jurisdiction for the final route. Special permits for oversized loads on Pacific Coast Highway would be issued by Los Angeles County. Heavy/oversized loads are typically permitted for late-night delivery. Staff proposes Condition of Certification **TRANS-1** requiring the applicant to obtain all necessary permits from affected jurisdictions for the transportation of heavy/oversized equipment associated with the AEC project. The applicant anticipates a maximum of two heavy/oversized deliveries per month (AEC 2015f, pg. 5.12-3). The applicant has not included a traffic analysis for these added trips as the two trips per month would be late at night when background traffic would low enough for these heavy/oversized deliveries. Staff agrees with the applicant's reasoning.

Staff proposes Condition of Certification **TRANS-2** requiring the project owner to prepare a Traffic Control Plan (TCP). The TCP includes a heavy haul plan. **TRANS-3** requires the project owner to restore all public roads, easements, and rights-of-way that have been damaged due to project-related construction activities.

Truck Deliveries

Truck deliveries of construction materials and equipment would generally occur on weekdays between 6 a.m. and 6 p.m. (AEC 2015f, pg. 5.12-12). As the AGS is an operating power plant, it is likely that plant personnel would be at the main gate off Studebaker Road to let trucks and workers on to the project site as they arrive for deliveries and the start of work.

The peak truck deliveries would occur during month 42 when 28 trucks per day (for a total of 56 truck trips/day) would transport construction equipment and materials. Although the truck trips would peak in month 42, the peak traffic generation (workforce and truck trips combined) would occur during month 44, coinciding with the peak construction workforce. The applicant assumes that two truck deliveries would occur per peak hour (four trips). A 1.5 passenger car equivalent (PCE) factor per truck trip factor was applied to the equipment deliveries and construction truck trips, consistent with the 2010 Highway Capacity Manual.

Total Construction Traffic

Workforce trips were added to the passenger car equivalent delivery truck trips to estimate the total construction trips generated by the project. Project trip estimates in **Traffic and Transportation Table 4** include the estimated average daily trips (ADT) and trips during the a.m. and p.m. peak hour.

Traffic and Transportation Table 4
One-Way Trips Generated During Construction Period

Vehicle Type	Average Daily Trips (ADT)	AM Peak Hour[3] Trips			PM Peak Hour[4] Trips		
		In	Out	Total	In	Out	Total
Delivery/ Haul Trucks in PCE (1.5)[1]	63	3	3	6	3	3	6
Workers[2]	1,024	512	0	512	0	512	512
Total Construction Traffic In PCE	1,087	515	3	518	3	515	518

Notes: [1] Passenger Car Equivalent (PCE) is a ratio of 1.5 passenger cars for each truck. [2] Worker traffic during the peak construction period. These figures assume the worst case traffic scenario of one worker per car. [3] The a.m. peak hour is 7:00 a.m.-9:00 a.m. [4] The p.m. peak hour is 4:00 p.m.-6:00 p.m. **Source:** AEC 2015f, pg. 5.12-12.

The estimated project trips were distributed onto the affected intersections based on where the workforce and trucks would come from, as described in the following assumed trip distribution (AEC 2015f, pg. 5.12-13):

- One-third of the trips would come from Long Beach, Signal Hill, and communities located west of the AEC site.

- One-third of the trips would come from Lakewood, Los Alamitos, Cyprus, Cerritos, and communities located to the north of the AEC site.
- One-third of the trips would come from Garden Grove, Westminster, Fountain Valley, and communities located east and south of the AEC site.

The trips were then distributed on the local roadways based on the routes the workforce and trucks would take. See **Traffic and Transportation Figure 5** for a graphic representation of project trip distribution. The following are a general description of assumptions of routes that would be taken to the project site (AEC 2015f, Figure 5.12-5):

- 8 percent of the trips would travel from the south on PCH to the site,
- 4 percent of the trips would travel from the northwest on PCH to the site,
- 25 percent of the trips would travel from the east on SR-22 to the site, and
- 63 percent of the trips would travel from the northeast on I-405 to the site.

Intersection and roadway traffic data corresponds with the peak construction period estimated in 2021 (January). Peak hour (a.m. and p.m.) data is presented in **Traffic and Transportation Table 5** with and without the project traffic trips.

The intersection of Pacific Coast Highway and Seal Beach Boulevard would be significantly impacted with the project traffic added during the a.m. peak hour. To avoid a worsening of the LOS at this intersection, the TCP (identified as part of staff's recommended Condition of Certification **TRANS-2**), requires the applicant to monitor this intersection and provide alternate routes, and if necessary, stagger employee shifts or limit employee use of the intersection in the a.m. peak hour to ensure minimal impacts to local roadways during project construction. The LOS standards discussed previously under the subsection "Roadway Segment and Intersection LOS Standards" are applicable to the study intersections in **Traffic and Transportation Table 5**. If several LOS standards apply, the most stringent is applied.

Traffic and Transportation Table 5
Study Intersections:
AM and PM Peak Hour Trips and LOS - Existing and Peak Construction

Intersection	Existing (2009)		2021		2021 + Project		Change in V/C	Significant Impact?
	ICU*	LOS	ICU	LOS	ICU	LOS		
AM PEAK HOUR								
PCH at 7th Street	1.090	**F**	1.235	**F**	1.235	**F**	0.000	No
Studebaker Road at SR-22 W/B Ramp	0.600	A	0.669	B	0.827	D	0.158	No
Studebaker Road at SR-22 E/B Ramp	0.492	A	0.544	A	0.669	B	0.125	No
PCH at Loynes Drive	0.907	**E**	1.023	**F**	1.036	**F**	0.013	No
Studebaker Road at Loynes Drive	0.736	C	0.826	D	0.846	D	0.020	No
Studebaker Road at 2nd Street	1.047	**F**	1.185	**F**	1.200	**F**	0.015	No
PCH at 2nd Street	0.943	**E**	1.060	**F**	1.069	**F**	0.009	No
Seal Beach Boulevard at PCH	0.865	D	0.983	**E**	0.995	**E**	**0.012**	**Yes**
PM PEAK HOUR								
PCH at 7th Street	1.012	**F**	1.145	**F**	1.149	**F**	0.004	No
Studebaker Road at SR-22 W/B Ramp	0.831	D	0.936	**E**	0.937	**E**	0.001	No
Studebaker Road at SR-22 E/B Ramp	0.674	B	0.754	C	0.754	C	0.000	No
PCH at Loynes Drive	0.796	C	0.896	D	0.896	D	0.000	No
Studebaker Road at Loynes Drive	0.692	B	0.784	C	0.794	C	0.010	No
Studebaker Road at 2nd Street	1.122	**F**	1.271	**F**	1.284	**F**	0.013	No
PCH at 2nd Street	0.906	**E**	1.018	**F**	1.032	**F**	0.014	No
Seal Beach Boulevard at PCH	0.742	C	0.841	D	0.853	D	0.012	No

Notes * ICU- Intersection capacity utilization. A method for calculating traffic congestion. **Bold** text indicates unacceptable LOS. **Sources:** CEC 2016b, AEC 2015f, pgs. 5.12-6, 5.12-7, and 5.12-15, Linscott, et. al. 2010, pgs. 9,15-17.

Traffic and Transportation Table 6 presents the LOS on the affected roadway segments for existing conditions (2014). The state highways were the only affected project roadway segments selected for analysis as no current daily traffic volumes were available for the other affected project roadways. The city of Long Beach does not identify roadway capacities for their streets so the roadway capacities for the adjacent city of Seal Beach were used due to the similarities in roadway characteristics within the two cities.

Traffic and Transportation Table 6
Study Roadway Segments - Existing Conditions

Roadway	Segment		Daily Vehicle Capacity	Existing (2014)		
	From	To		ADT*	V/C	LOS
PCH	Outer traffic circle/East Atherton Street	East Anaheim Street	37,500	32,250	0.86	D
	East Anaheim Street	SR-22	37,500	34,000	0.907	**E**
	SR-22	Bellflower Boulevard	56,300	26,000	0.462	A
	Bellflower Boulevard	Orange County Line	56,300	41,000	0.728	C
	Orange County Line	Seal Beach Boulevard	37,500	43,875	1.17	**F**
SR-22	PCH	Bellflower Boulevard	56,300	58,000	1.03	**F**
	Bellflower Boulevard	East Campus Road	56,300	61,000	1.083	**F**
	East Campus Road	Studebaker Road	56,300	68,000	1.208	**F**
	Studebaker Road	Orange County Line	79,400	96,000	1.209	**F**

Notes: * ADT- Average Daily Traffic (volume). **Bold** text indicates unacceptable LOS. **Sources:** AEC 2015f, pg.5.12-6; Caltrans 2014; CEC 2016b.

Traffic and Transportation Table 7 presents the LOS on the affected roadway segments with and without the project trips during peak construction (2021).

Traffic and Transportation Table 7
Study Roadway Segments - Peak Construction

Roadway	Segment From	Segment To	Daily Vehicle Capacity	2021 ADT*	2021 V/C	2021 LOS	Project Added Trips	2021 Plus Project ADT	2021 Plus Project V/C	2021 Plus Project LOS	Change in V/C	Significant Impact?
PCH	Outer traffic circle/ East Atherton Street	East Anaheim Street	37,500	35,058	0.935	D	41	35,099	0.936	D	0.001	No
	East Anaheim Street	SR-22	37,500	36,961	0.986	**F**	41	37,002	0.987	**F**	0.001	No
	SR-22	Bellflower Boulevard	56,300	28,264	0.502	A	41	28,305	0.503	A	0.001	No
	Bellflower Boulevard	Orange County Line	56,300	44,570	0.792	C	82	44,652	0.793	C	0.001	No
	Orange County Line	Seal Beach Boulevard	37,500	47,696	1.272	**F**	82	47,778	1.274	**F**	0.002	No
SR-22	PCH	Bellflower Boulevard	56,300	63,051	1.120	**F**	0	63,051	1.120	**F**	0.000	No
	Bellflower Boulevard	East Campus Road	56,300	66,312	1.178	**F**	0	66,312	1.178	**F**	0.000	No
	East Campus Road	Studebaker Road	56,300	73,922	1.313	**F**	0	73,922	1.313	**F**	0.000	No
	Studebaker Road	Orange County Line	79,400	104,360	1.314	**F**	901	105,261	1.326	**F**	0.011	No

Notes: * ADT- Average Daily Traffic (volume). **Bold** text indicates unacceptable LOS. **Sources:** AEC 2015f, pg. 5.12-14; CEC 2016b.

Transportation of Hazardous Materials and Waste

During construction and operations, generation of hazardous materials at the project site, such as oil, oily rags, lead batteries, asbestos waste, solvents, and paint, would be stored at the project site for less than 90 days then transported for disposal to an offsite treatment, storage, and disposal facility by a permitted hazardous waste transporter. Transportation of hazardous materials and waste would need to be carried out in accordance with Caltrans, U.S. Environmental Protection Agency, California Department of Toxic Substances Control, California Highway Patrol, and California State Fire Marshal regulations.

While the applicant has identified 42 truck trips for truck deliveries, the applicant has not specified the number of hazardous materials and waste trips estimated during construction. The applicant anticipates the likely route for these deliveries would be via I-405, to SR-22 (7th Street), west along 7th Street, and then south on Studebaker Road to the AEC entrance. Removal of hazardous wastes would occur along the same routes in the reverse direction. With the exception of Studebaker Road, this route is a designated truck route by Caltrans and the city of Long Beach. The Mobility Element in the city of Long Beach General Plan identifies Studebaker Road as an appropriate path of travel for local deliveries (LB GP 2013, pg. 109).

Hazardous materials management staff confirmed that no acutely hazardous materials would be used or stored on the AEC site during construction. Please refer to the **Hazardous Materials Management** and **Waste Management** sections for a detailed description of hazardous materials and waste associated with the project and proposed conditions of certification for the AEC. Transportation of these materials would pose a less than significant hazard to the public.

Staff proposes Condition of Certification **TRANS-4** requiring the proper permits and/or licenses from affected jurisdictions, e.g. Caltrans, Los Angeles County, and the city of Long Beach are obtained for transportation of hazardous substances.

Linear Facilities

A new 1,000-foot process/ sanitary wastewater pipeline would be installed connecting the project to the first point of interconnection with the existing Long Beach Water Department (LBWD) (AEC 2015s, pg. 3). No other offsite linear facilities are proposed. **Traffic and Transportation Figure 2** shows the proposed alignment of the new wastewater pipeline. Encroachment permits would need to be obtained for the wastewater pipeline. Staff proposes Condition of Certification **TRANS-5** to ensure necessary encroachment permits are obtained. Also, the TCP required by Condition of Certification **TRANS-2** would help minimize any possible traffic impacts due to offsite linear construction.

Parking and Laydown Area

The applicant has proposed an approximately 8-acre onsite parking and laydown area to accommodate the construction workers (512 estimated during the peak period), the laydown and storage of equipment, and an approximately 10-acre offsite laydown area. Additional parking is available throughout the project site. The onsite parking and laydown area is in the northern portion of the project site and the offsite laydown area is adjacent to the southern project boundary and the San Gabriel River. The proposed onsite and offsite parking and laydown areas are shown in **Traffic and Transportation Figure 2**. No on-street parking is anticipated, with the exception of workers and construction equipment needed for the offsite wastewater pipeline. The applicant anticipates limited construction equipment and workers parking along East Vista Street (AEC 2015f, pg. 5.12-17). Staff estimates construction of the wastewater pipeline would take no longer than a month to complete. Parking needs for the AEC should be easily met with the proposed onsite and offsite parking.

Potential HBEP Use of AEC Laydown Area

The recently licensed Huntington Beach Energy Project (HBEP, 12-AFC-01) (November 2014) and amended project, now under consideration by the Commission, would store heavy and oversized components that have been transported by ship or rail to the Port of Long Beach on an undeveloped 16-acre portion of AGS (HBEP 2014, pg. 6.2-6). According to the AEC project applicant, approximately 24 deliveries, out of the 112 total HBEP deliveries (port and rail) would arrive via the Port of Long Beach (CH2 2014f, pg.5). Once the HBEP is ready to receive the heavy/oversized deliveries, these deliveries would continue to the HBEP site. The AEC applicant notes that the first preference for the HBEP heavy/oversized deliveries would be to time the arrival of HBEP deliveries at the Port of Long Beach so they are moved only once- from the Port of Long Beach directly to the HBEP site. The Petition to Amend the license proposes more construction laydown area than previously licensed (HBEP 2015a, pg. 2-14). With the additional storage, the amendment includes the use of the AGS property as a contingency plan. The heavy haul route identified for HBEP deliveries from the Port of Long Beach to the AEC site is the same route proposed for AEC. The HBEP project owner would need to obtain permits from the appropriate jurisdictions along the proposed for heavy/oversized truck route. The potential need of laydown area to accommodate HBEP deliveries added to the laydown and parking needs of the AEC should be more than adequate to accommodate needs of both projects. As previously noted, Condition of Certification **TRANS-2** requires the project owner to prepare a TCP to ensure all construction worker parking is in appropriate areas. With implementation of the plan, construction workforce parking impacts would be less than significant.

Emergency Vehicle Access

Emergency vehicles would be able to access the project site through the main entrance off Studebaker Road. There is a secondary emergency access road off Studebaker Road with a locked gate and concrete aprons (AEC 2015s, pg. 27). See **Traffic and Transportation Figure 1** for the location of the existing secondary emergency access road. This access road would be widened and upgraded for AEC. See the **Worker Safety and Fire Protection** section for more discussion about emergency vehicle access.

Airports

Title 14, Part 77.9 of the Code of Federal Regulations requires FAA notification for any construction or alteration within 20,000 feet of a public use or military airport which exceeds a 100:1 surface from any point on the runway of each airport with at least one runway more than 3,200 feet.

Because the longest runway at the Los Alamitos Army Airfield is 8,001 feet, FAA would require notification if a construction feature penetrates the navigable airspace of this airport. As noted earlier, the Los Alamitos Army Airfield is approximately 2.5 miles from the AEC; therefore, the navigable airspace above the AEC begins at 132 feet AGL. There are two exhaust stacks at 140 feet AGL that would penetrate the Los Alamitos Army Airfield navigable airspace. All other structures are below 132 feet AGL. The other two exhaust stacks at 80 feet AGL and the air cooled condenser (ACC) at 104 feet AGL would not penetrate this airspace. If any construction equipment used at AEC is 132 feet or taller, Form 7460-1 (Notice of Proposed Construction or Alteration) would need to be filed with the FAA. Staff proposes Condition of Certification **TRANS-6** requiring this FAA notification.

The applicant submitted Form 7460-1 (Notice of Proposed Construction or Alteration) to the FAA for the exhaust stacks and air cooled condenser and received a Determination of No Hazard to Air Navigation (Determination), provided FAA Form 7460-2 (Notice of Actual Construction or Alteration) is e-filed any time the project is abandoned or within five days after the construction reaches its greatest height (7460-2, Part 2) (AEC 2015s, Attachment DR159-1). The Determination also stated that lighting and marking are not necessary for aviation safety.

Part 77.9 requires Federal Aviation Administration (FAA) notification for any proposed structure that is 200 feet AGL or taller, regardless of the distance from an airport. At 140 feet, the tallest structure proposed for the AEC would be less than 200 feet AGL (AEC 2015h, Appendix 3B). Activities occurring during construction could require the use of tall equipment, such as cranes and derricks, on the project site. The applicant does not know at this time whether any construction equipment used for construction of AEC would be 200 feet AGL or taller. The applicant explained that the Engineering Procurement Construction contractor (EPC) would determine the particular crane needed. If the height of any piece of construction equipment used for the AEC exceeds FAA notification criteria (200 feet AGL or taller), the EPC contractor would file FAA Form 7460 (Notice of Construction or Alteration). Staff proposed Condition of Certification **TRANS-6** requires FAA notification for any construction equipment 132 feet AGL or taller, which complies with the 200-foot height notification.

Also, in accordance with FAA Advisory Circular, 70/7460-1 L, Chapter 2.1, any temporary or permanent structure, including all appurtenances, that exceeds an overall height of 200 feet AGL or exceeds any obstruction standard contained in 14 CFR Part 77, should be marked and/or lighted. Therefore, staff proposes Condition of Certification **TRANS-7** requiring marking and/or lighting in accordance with 70/7460-1 L Chapter 2.1, for any construction equipment used for AEC that is 200 feet AGL or taller.

Staff reviewed the approach and departure procedures for the Los Alamitos Army Airfield and concluded they do not pass over the AEC project site (AirNav 2015). Staff confirmed with an Air Traffic Control Specialist with the Los Alamitos Army Airfield that the flights would turn left before reaching the AEC (CEC 2016h).

AEC Construction Impacts Conclusion

With implementation of the proposed conditions of certification discussed in this analysis, construction of the AEC would result in less than significant impacts to the traffic and transportation system in the vicinity of the project.

Operational Traffic

The peak construction period (January 2021) is estimated in the same year the project is fully operational. Operations of the AEC would employ 36 operations staff, a decrease from the 66 staff members currently employed at the AGS (AEC 2015f, pg. 5.10-12). During project operations, it is estimated that the project would generate 44 daily trips and 24 peak hour trips, which is significantly fewer than the project-related construction trips (AEC 2015f, pg. 5.12-13). The applicant has not modeled operational traffic. Because peak construction traffic is much higher than operations traffic and is estimated to occur in the same year, staff does not need calculations of intersection and roadway segment LOS impacts to conclude that operations traffic would have a less than significant impact.

Truck Traffic

Two deliveries per day are estimated for project operations. According to the applicant, this is the same number of trips or less than currently required by the existing AGS. (AEC 2015f, pg. 5.12-18). Approximately 32 deliveries per month of hazardous materials associated with plant operation are anticipated (AEC 2015f, pg. 5.12-16). The "Transportation of Hazardous Materials and Waste" discussion below provides more detail about these deliveries. The routes used for truck and hazardous materials transportation for project operations are the same as described for project construction.

Transportation of Hazardous Materials and Waste

Similar to current operations at the AGS, the AEC would require deliveries of aqueous ammonia (AEC 2015f, pg. 5.12-15). Deliveries of this substance are subject to Section 32100.5 of the California Vehicle Code (CVC), regulating the transportation of hazardous materials that pose an inhalation hazard. Also, various cleaning chemicals, diesel fuel, lubricants, sulfuric acid, and other hazardous materials associated with plant operation would be delivered via truck. Approximately 32 truck deliveries would be made per month along a route selected by the supplier, consistent with the requirements of federal and state law (AEC 2015f, pg. 5.12-16). See the "Transportation of Hazardous Materials and Waste" discussion earlier in this section for a list of the various CVC sections that are applicable during both construction and project operation. These regulations ensure the transportation of hazardous materials and waste are carried out in accordance with state law. As described previously for construction, the routes used would be via I-405 to SR-22 (7th Street) to 7th Street then to Studebaker Road and the AEC site. This route is consistent with the city of Long Beach truck routes and the most direct route to the site from the highway.

Delivery of aqueous ammonia may be hazardous to the public if a spill were to occur. Condition of Certification **TRANS-4** would ensure the project owner contracts with licensed hazardous materials and waste hauler companies that comply with all applicable regulations. For more information on the risks associated with the management and transportation of hazardous materials during project operation and staff's proposed conditions of certification to minimize these risks, see the **Hazardous Materials Management** section of this document.

For the reasons discussed above, the transportation of hazardous materials during project operation of the AEC would pose a less than significant hazard to the public with the incorporation of Condition of Certification **TRANS-4**.

Parking

Operations of the AEC would employ 36 operations staff, a decrease from the 66 staff members currently employed at the AGS (AEC 2015f, pg. 5.10-12). No impacts from operational workforce parking are anticipated as, according to Land Use staff, existing parking at the AGS exceeds the minimum required parking. See the **Land Use** section of this document for additional information regarding parking and site plan configurations.

Emergency Vehicle Access

Energy Commission staff does not anticipate emergency access issues to the project site. The site is directly accessed via a signalized intersection on Studebaker Road which would not present any obstructions or design challenges for emergency vehicles to access the site. A secondary emergency access road off Studebaker Road, shown on **Traffic and Transportation Figure 2**, would be widened and upgraded for the AEC. Condition of Certification **TRANS-2** requires a TCP demonstrating and ensuring sufficient access. Onsite circulation of emergency vehicles would be subject to a site plan review by the city of Long Beach Fire Department per conditions of certification in the **Worker Safety and Fire Protection** section of this document.

Thermal Plumes

The AEC gas turbines (exhaust stacks), ACC, and proposed auxiliary boiler have the potential to generate thermal plumes during worst case conditions. These conditions would occur during full operation of the AEC during periods of calm winds and/or cool temperatures. Thermal plume velocities would be greatest at the discharge point, with plume velocities decreasing with increasing altitude. High velocity thermal plumes have the potential to affect aviation safety and the FAA has amended the Aeronautical Information Manual to establish thermal plumes as flight hazards (FAA 2015). Aircraft flying through thermal plumes may experience significant air disturbances, such as turbulence and vertical shear. When able, a pilot should fly upwind of possible thermal plumes. Since there is one airport within 2.5 miles of the AEC, there is a potential for low flying aircraft to be affected by the thermal plumes.

Energy Commission staff uses a 4.3 meters per second (m/s) vertical velocity threshold for determining whether a plume may pose a hazard to aircraft. This velocity generally defines the point at which aircraft begin to experience moderate to severe turbulence. Exhaust plumes with high vertical velocities may damage aircraft airframes and/or engine damage/failure (FAA 2015).

Energy Commission Air Quality staff modeled plume velocity for the project structures that could generate plumes in excess of 4.3 m/s. Staff found that the most severe thermal plume would be generated by the air cooled condenser exceeding 4.3 m/s up to an altitude of 2,180 feet AGL. At altitudes higher than approximately 2,180 feet AGL, thermal plume-average velocity was below the critical 4.3 m/s. Refer to **Appendix TT-1** for a complete a thermal plume analysis documenting the method used to estimate worst-case vertical plume velocities.

Under the FAA's amended Aeronautical Information Manual, pilots are advised to fly upwind of sources of exhaust plumes, such as smokestacks or cooling towers. To assist pilots to see and avoid possible thermal plumes generated by the AEC, staff proposes Condition of Certification **TRANS-8** to alert pilots to the location of the AEC and presence of possible thermal plumes generated by the AEC. The applicant would request the FAA to file notices advising pilots of the potential overflight hazard associated with thermal plumes generated by the AEC. Notices filed with the FAA may include issuance of a Notice to Airmen (NOTAM), revision to the Los Angeles Sectional Chart, and addition of a new remark to the Automatic Terminal Information Service (ATIS) for the Los Alamitos Army Airport.

The Alamitos Generating Station and nearby Haynes Generating Station power plants have been in operation for many years and have likely been generating thermal plumes. Pilots would be aware of the presence of these power plants and may have even encountered thermal plumes. The AEC would not be introducing an unusual land use to this area. As discussed previously, Alamitos Army Airfield operates sunrise to sunset. Considering these factors, there is not a need to light and mark the exhaust stacks and ACC to identify the thermal plume sources at night.

Impacts to aviation safety are less than significant. Staff has proposed **TRANS-8** to assist pilot's ability to identify the power plant site and avoid direct overflight consistent with the Aeronautical Information Manual.

AEC Operation Impacts Conclusion

Project traffic, emergency access, parking, hazardous materials and waste transportation, and truck deliveries for operation of the AEC would have a less than significant impact with the implementation of the traffic and transportation conditions of certification proposed by staff. Impacts to aviation safety, including impacts from thermal plumes, would be less than significant.

CUMULATIVE IMPACTS

A project may result in significant adverse cumulative impacts when its effects are cumulatively considerable; that is, the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, other current projects, and probable future projects [Cal. Code Regs., tit.14, § 15065 (a)(3)].

In a traffic and transportation analysis, cumulative impacts could occur when projects generate traffic that contributes to increased traffic volumes on the AEC study intersections and roadways. Projects with overlapping construction activities with the AEC could pose a cumulative impact through additional construction traffic and project-related road closures or rerouting of traffic. Projects generating a large number of trips during operation can contribute to higher traffic volumes along AEC study roadway segments and at study intersections.

Staff reviewed the AEC Master Cumulative Project List for projects that would contribute traffic on the AEC study intersections and roadways or create impacts from traffic detours onto AEC study intersections and roadways. Staff considers the following projects in **Traffic and Transportation Table 11** as part of the cumulative setting for Traffic and Transportation.

Traffic and Transportation Table 11
Development Considered in the Cumulative Condition

Project Number	Project	Project Description	Distance from Project Site (miles)	Status of Project	Estimated Construction Start Date and Duration
1	AGS Units 1 through 6	Existing units to remain operational during AEC construction. It was stated by the applicant's representative at the December 17 status conference that these AGS units are part of the project's baseline conditions. After construction of the AEC, demolition of the existing Units 1–6 to occur according to MOU with the City.	0.2	Schedule of demolition of Units 1–6 is unknown.	Unknown
3	AES Battery Energy Storage System (BESS)	BESS project at the AGS to include three 100-MW containment buildings, constructed in sequential phases from east to west. Each building to be 50 ft tall x 270 ft long x 165 ft wide (44,550 sq ft, or a little over 3 acres). Each to contain: two battery storage levels, electrical controls, and HVAC units. Construction proposed to start 3rd quarter 2019, after major mechanical completion of the AEC CCGT power block, with completion of the first 100-MW building planned for late 2020. The second and third 100-MW buildings to then be constructed and operational in 2021 and 2022.	0.3	Conceptual site plan submitted to City. Project is still in entitlement process. City anticipates receiving revised open space, landscape, and parking plans. City staff expects to consider the AEC proposal together with the battery storage project to assess consistency with City development requirements.	3rd quarter 2019 through 2022.
4	Alamitos Barrier Improvement Project	Project involves construction and operation of up to 20 injection wells, four monitoring wells, and four piezometers along the existing alignment of the Alamitos Barrier. Wells located in Seal Beach. The injection wells and three nested monitoring wells will be constructed on the narrow (17 ft–20 ft wide) western access roadway of the Orange County Flood Control District Los Alamitos Channel. Existing and required structures and equipment will present work area constraints.	0.4	Under construction	Multiple phase project spanning from 2013 to 2019

5	Los Angeles Dept. of Water and Power Haynes Generating Station	Addition of six LMS100 simple-cycle gas turbines and two emergency diesel-powered generators.	0.6	Under construction.	Multiple phase project spanning from 2013 to 2019
6	SR 1 Alamitos Bay Bridge Improvement Project	Improvements to the bridge are needed to enhance the safety of the structure and to maintain the level of service. Four alternatives being considered include: (1) No Build Alternative –no changes to existing bridge; (2) Bridge Retrofit Alternative –existing bridge repaired and strengthened to meet current seismic standards; (3) Bridge Replacement Alternative - existing bridge replaced with a new, wider bridge that meets current American Association of State Highway and Transportation Officials standards and California Department of Transportation seismic standards; and (4) Bridge Replacement Alternative with Limited Width Design- new bridge would be approximately 103 ft. wide.	0.9	Scoping meeting held 8/5/2015. California Department of Transportation to prepare CEQA/National Environmental Policy Act document (Initial Study (IS)/Environmental Assessment) fall 2016. Mitigated Negative Declaration/Finding of No Significant Impact to be published spring 2017.	Unknown
7	PCH & 2nd	The proposed project involves demolition of the existing Seaport Marina Hotel and construction of a commercial center totaling approximately 250,000 sq. ft. of retail and restaurant space and a three-level enclosed parking structure.	0.9	IS published March 2014. Potentially significant impacts identified for most environmental topic areas. Comment period on Notice of Preparation of a draft Environmental Impact Report (EIR) ended 4/17/14.	Unknown
8	CalTrans #12, San Diego Freeway I-405 Improvement Project	I-405 Improvement Project would add one general purpose lane in each direction on I-405 from Euclid Street to the I-605 interchange, plus add a tolled Express Lane in each direction of I-405 from SR-73 to SR-22 East. I-405 between SR-73 & I-605, Costa Mesa, Seal Beach	1.0	Approved. Notice of Determination June 17, 2015	Design and build 2017-2022

9	Rehabilitation of Western Regional Sewers, Project No. 3-64	Orange County Sanitation District proposes to rehabilitate and/or replace entire lengths of the Orange Western Sub-Trunk, Los Alamitos Sub-trunk, Westside Relief Interceptor, and the Seal Beach Interceptor regional pipelines. In addition to pipeline and manhole replacement and/or rehabilitation, project includes rehabilitation/replacement of the Westside Pump Station force main, reconstruction of the Westside Pump Station wet well, and construction of a new vent line from the wet well to the downstream manhole or construction of an odor control scrubber. The project primarily follows public rights-of-way (streets and easements). Public rights-pf-way affected near AEC include in the cities of Los Alamitos (Katella Avenue and Los Alamitos/Seal Beach Boulevard) and Seal Beach (Seal Beach Boulevard and Beverly Manor Road), and Rossmoor (unincorporated Orange County).	1.3	Draft EIR scheduled for publication at the end of March 2016.	3-year construction period planned from the 4th quarter 2018 through 2021.
10	Alamitos Bay Marina Rehabilitation Project	Project would renovate the existing Marina facilities & enhance existing recreational boating facilities in the Marina. The project encourages boating use by providing upgraded ADA-compliant facilities, upgraded restrooms, & dredged basins to ensure safe navigation. Project would provide longer average slip lengths. The existing 1,967 slips in Basins 1 through 7 would be replaced by 1,646 slips in these Basins, at a loss of approximately 321 slips. Improvements associated with the project include: (1) dredging the Marina basins down to original design depths and/or original basin depths; (2) replacing and/or upgrading 13 restrooms & their associated water & sewer laterals; (3) repairing the sea wall where necessary to reestablish the rock revetment along the slope to the basin floor; (4) completing dock & piling replacement; & (5) replacing the pavement in the Marina's parking lots. The project includes two construction staging areas: one located in a parking lot on Marina Drive near Basin 2; & the other in a parking lot on Marina Drive near Basin 3, adjacent to the Marina Shipyard.	1.3	Construction of basin 2 is almost complete.	Basin 3 construction over next two years (2016-2017)

15	Belmont Pool Revitalization	The project proposes the demolition of the existing Belmont Pool complex (the indoor and outdoor features) & construction & operation of a replacement indoor/outdoor pool complex. Spectator seating for approximately 3,500 people through a combination of permanent & portable seating.	2.7	Preparing Draft EIR	Construction estimated to take 1–2 years. New Belmont Pool expected to open by 2017.
56	Huntington Beach Energy Project	The 2014 Energy Commission licensed project is a natural gas fired, combined cycle, air-cooled 939-MW electrical generating facility. Project would require demolition of existing power plant and construction of project. The 2015 Petition to Amend (PTA) the 2014 licensed project is a natural gas fired, combined cycle and simple-cycle, air-cooled 844-MW electrical generating facility. Project would require demolition of existing power plant and construction of project.	10.9	Licensed 2014. Demo start estimated in the first quarter of 2015 with project completion 7.5 years later in the third quarter of 2022. PTA license submitted to Energy Commission is currently under review. Demo started in the first quarter of 2016 with project completion estimated 10 years later in the fourth quarter of 2025.	Unknown whether the PTA is approved. Between the licensed project and the PTA, demolition/construction would occur in 2016 and extend at least 7.5 years.

AEC construction would typically occur between 7:00 a.m. and 7:00 p.m. Monday through Friday and between 9:00 a.m. and 6:00 p.m. on Saturday. Peak AEC traffic generation would occur during January 2021. The intersection of Pacific Coast Highway and Seal Beach Boulevard would be significantly impacted by the project construction traffic during the a.m. peak hour. The AEC construction traffic would contribute to the failing LOS at the following six study intersections and six study roadway segments:

- PCH at 7th Street in a.m. and p.m. peak hours
- Studebaker Road at SR-22 W/B Ramp in p.m. peak hour
- PCH at Loynes Drive in a.m. peak hour
- Studebaker Road at 2nd Street in a.m. and p.m. peak hours
- PCH at 2nd Street in a.m. and p.m. peak hours
- Seal Beach Boulevard at PCH in a.m. peak hour
- Pacific Coast Highway
    - East Anaheim Street to SR-22
    - Orange County line to Seal Beach Boulevard
- SR-22
    - Pacific Coast Highway to Bellflower Boulevard
    - Bellflower Boulevard to East Campus Road
    - East Campus Road to Studebaker Road
    - Studebaker Road to Orange County line

Trips generated by the cumulative projects listed above occur within the transportation network used by AEC and may combine with AEC trips to result in cumulative impacts to the level-of-service (LOS) of nearby highways, roadways, and intersections. Staff considered the potential for cumulatively considerable impacts during peak construction period (January 2021) for the AEC. Any incremental increase in traffic at these intersections and roadway segments, listed above, could result in unacceptable LOS standards and significant impacts. Proposed Condition of Certification **TRANS-2** requires the applicant to prepare and implement a Traffic Control Plan, which would help with the movement of AEC workers, vehicles, and materials, including arrival and departure schedules related to the AEC. With this condition of certification the incremental cumulative construction impacts of the AEC would be reduced to a less than cumulatively considerable level.

COMPLIANCE WITH LORS

Traffic and Transportation Table 12 provides an assessment of the AEC's compliance with applicable laws, ordinances, and regulations (LORS) pertaining to traffic and transportation.

Traffic and Transportation Table 12
Project Compliance with Adopted Traffic and Transportation LORS

APPLICABLE LAW	DESCRIPTION	AEC Consistency
FEDERAL		
Title 14, Code of Federal Regulations, Section 77.13 (1)	This regulation requires notification of the Federal Aviation Administration (FAA) of construction or alteration of more than 200 feet above the ground level at its site.	**Consistent. TRANS-6** requires the project owner or contractor(s) to notify FAA for any construction equipment for AEC 200 feet above ground level or taller.
Title 14, Code of Federal Regulations, Section 77.13 (2)(i)	This regulation requires notification of the Federal Aviation Administration (FAA) of any construction or alteration of greater height than an imaginary surface extending outward and upward at a slope of 100 to 1 for a horizontal distance of 20,000 feet from the nearest point of the nearest runway of an airport with at least one runway more than 3,200 feet in length.	**Consistent.** The applicant submitted FAA Form 7460-1 for the two 140-ft and two 80-ft. exhaust stacks and the 104-ft. air cooled condenser proposed for AEC. The applicant received a Determination of No Hazard to Aviation. The applicant may file another 7460-1 form if the construction crane is 132 feet above ground level or taller.
Title 49, Code of Federal Regulations, Parts 171-177	Requires proper handling and storage of hazardous materials during transportation.	**Consistent. TRANS-4** requires the project owner to contract with licensed hazardous material and waste hauler companies.
STATE		
California Department of Transportation CA Manual of Uniform Traffic Control Devices (MUTCD) Part 6 (Traffic Manual)	Provides traffic control guidance and standards for continuity of function (movement of traffic, pedestrians, bicyclists, transit operations), and access to property/utilities when the normal function of a roadway is suspended.	**Consistent. TRANS-2** requires the project owner to prepare and implement a Traffic Control Plan.
California Health and Safety Code, Section 25160	Addresses the safe transport of hazardous materials.	**Consistent. TRANS-4** requires the project owner to secure the proper permits and/or licenses from the California Highway Patrol, Caltrans and all other relevant jurisdictions for the transport of hazardous materials.
California Streets and Highways Code, Sections 660, 670, 672, 1450, 1460, 1470, 1480 et seq., 1850-1852	Requires encroachment permits for projects involving excavation in state and county highways and city streets.	**Consistent. TRANS-5** requires the project owner to coordinate with all relevant jurisdictions, obtain all required encroachment permits, and comply with all applicable regulations.
California Vehicle Code		

APPLICABLE LAW	DESCRIPTION	AEC Consistency
Sections 13369, 15275, 15278	Requires licensing of drivers and the classification of license for the operation of particular types of vehicles. A commercial driver's license is required to operate commercial vehicles. An endorsement issued by the Department of Motor Vehicles (DMV) is required to drive any commercial vehicle identified in Section 15278.	**Consistent.** **TRANS-1** requires the project owner to comply with driver licensing limitations.
Sections 31303-31309	Requires transportation of hazardous materials to be on the state or interstate highway that offers the shortest overall transit time possible.	**Consistent.** **TRANS-4** requires the project owner to secure the proper permits and/or licenses from the California Highway Patrol, Caltrans and all other relevant jurisdictions for the transport of hazardous materials. As part of the permitting process, the proposed route would be reviewed for the shortest overall transit time.
Sections 32100-32109	Requires shippers of inhalation hazards in bulk packaging to comply with rigorous equipment standards, inspection requirements, and route restrictions.	**Consistent.** **TRANS-4** requires the project owner to secure the proper permits and/or licenses from the California Highway Patrol, Caltrans and all other relevant jurisdictions for the transport of hazardous materials. As part of the permitting process, route restrictions could be imposed.
Sections 34000-34100	Establishes special requirements for vehicles having a cargo tank and for hazardous waste transport vehicles and containers, as defined in Section 25167.4 of the Health and Safety Code.	**Consistent.** **TRANS-4** requires the project owner to secure the proper permits and/or licenses from the California Highway Patrol, Caltrans and all other relevant jurisdictions for the transport of hazardous materials. The permits and/or licenses would incorporate the necessary special requirements.
Section 35550-35551	Provides weight guidelines and restrictions vehicles traveling on freeways and highways.	**Consistent.** **TRANS-1** requires the project owner to comply with limitations on vehicle sizes and weights, driver licensing, and truck routes.
Section 35780	Requires a single-trip transportation permit to transport oversized or excessive loads over state highways.	**Consistent.** **TRANS-1** requires the project owner to comply with limitations on vehicle sizes and weights, driver licensing, and truck routes.

APPLICABLE LAW	DESCRIPTION	AEC Consistency
LOCAL		
2010 Los Angeles County Congestion Management Program (CMP)	LOS E is the lowest acceptable performance standard for CMP intersections except where the base year LOS is worse than E. In these cases, the base year LOS is the standard.	**<u>Consistent.</u>** The AEC would not cause a project study intersection with a CMP roadway to become worse than the lowest acceptable performance standard.
City of Long Beach General Plan, Mobility Element	The Mobility Element is a required chapter of the General Plan which evaluates the transportation needs of the city and provides a transportation plan to meet those needs.	**<u>Consistent.</u>** The addition of AEC project trips to the traffic volumes estimated on the study roadways and intersections in the city of Long Beach during the AEC peak construction period (January 2021) does not create a significant impact. The AEC is consistent with LOS standards for the city of Long Beach.
City of Seal Beach General Plan, Circulation Element	The Circulation Element establishes LOS standards for local city streets and intersections.	**<u>Consistent with compliance with TRANS-2.</u>** The addition of AEC project trips to the traffic volumes estimated on the study roadways and intersections in the city of Seal Beach during the AEC peak construction period (January 2021) creates a significant impact for one intersection (PCH and Seal Beach Boulevard) during the a.m. peak period. While the AEC is not consistent with LOS standards for the city of Seal Beach, the impact would be temporary and **TRANS-2** requires the project owner to stagger the arrival time of the workforce during the a.m. peak period, so that impacts are reduced the a less than significant level.
City of Seal Beach Traffic Impact Study Guidelines	Identifies the minimum requirements for a Traffic Impact Study submitted to the city of Seal Beach. These guidelines specify increases in ICU that are considered significant and require mitigation.	**<u>Consistent with compliance with TRANS-2.</u>** See the previous explanation.
City of Long Beach Municipal Code		
Title 10 Vehicles and Traffic, Chapter 10.18.10 Vehicles restricted from streets- Vehicles prohibited in central traffic district	Prohibits specific vehicles (freight vehicles) in the central traffic district between 7:00 a.m. and 6:00 p.m.	**<u>Consistent.</u>** While the applicant's proposed heavy haul route includes the use of the section of Ocean Boulevard in the central traffic district, heavy haul trips are

APPLICABLE LAW	DESCRIPTION	AEC Consistency
		typically permitted for late night and would be outside of the restricted hours for this district.
Title 10 Vehicles and Traffic, Chapter 10.41 Use of streets by Overweight Vehicles. 10.41.020 Special Permit Required	Requires an oversize vehicle permit for vehicles, mobile equipment or loads which exceed the requirements of the Vehicle Code.	**Consistent.** **TRANS-1** requires the project owner to obtain necessary transportation permits from all relevant jurisdictions.
Title 18 Buildings and Construction, Chapter 18.17 Transportation Improvement Fee	Transportation Improvement Fee is imposed on new development in the city of Long Beach. The fee assures the transportation level of service goals are met with respect to the additional demands placed on transportation system by traffic generated by new development.	**Consistent.** The Transportation Improvement Fee would be collected at the time an encroachment permit is obtained. **TRANS-5** requires consultation with the city of Long Beach to obtain an encroachment permit.
City of Seal Beach, Municipal Code Title 8 Vehicles and Traffic, Section 8.10.135 Movement of Oversize Vehicles.	Requires an oversize vehicle permit for vehicles, mobile equipment or loads which exceed the requirements of the Vehicle Code.	**Consistent.** **TRANS-1** requires the project owner to obtain necessary transportation permits from all relevant jurisdictions.
Los Angeles County Municipal Code, Title 16- Highways, Division 1- Highway Permits, Chapter 16.22 Moving Permits, 16.22.030 Moving Permit issuance conditions for overweight loads.	Requires an oversize vehicle permit for vehicles, mobile equipment or loads which exceed the requirements of the Vehicle Code.	**Consistent.** See the previous explanation.

CONCLUSIONS AND RECOMMENDATIONS

Staff has analyzed the proposed AEC's impacts to the nearby traffic and transportation system. The AEC would comply with all applicable LORS related to traffic and transportation. The AEC would result in less than significant impacts to the traffic and transportation system.

Implementation of Conditions of Certification **TRANS-1** through **TRANS-5** would reduce the potential AEC impacts to less than significant, which also reduces the impacts for the population in the six-mile radius of the AEC, including the environmental justice population represented in **Socioeconomics Figure 1** and **Table 3**.

1. Implementation of Condition of Certification **TRANS-1** would require the applicant to comply with applicable jurisdictions' requirements of vehicle size and weights, vehicle licensing, truck routes and other applicable limitations. The applicant would also be required to obtain all necessary transportation permits for roadway use.

2. Implementation of Condition of Certification **TRANS-2** would require the applicant to prepare and implement a traffic control plan (TCP) that would ensure sufficient parking during project construction and operation. The TCP would require that the

applicant obtain all necessary permits for the transport of construction-related materials during site mobilization and maintain adequate emergency access for the duration of project construction and operation.

3. Implementation of Condition of Certification **TRANS-3** would require the project applicant to restore any road, easement or right-of-way damaged by project construction.

4. Implementation of Condition of Certification **TRANS-4** would require the applicant to obtain the necessary permits for the transport of all hazardous waste associated with the project.

5. Implementation of Condition of Certification **TRANS-5** would require the applicant to obtain the necessary encroachment permits from applicable jurisdictions.

6. Implementation of Condition of Certification **TRANS-6** would require the applicant to file FAA Form 7460-1 for any construction equipment 132 feet above ground level or taller.

7. Implementation of Condition of Certification **TRANS-7** would require the applicant to mark and light any construction equipment 200 feet above ground level or taller in accordance with FAA Advisory Circular, 70/7460-1 L, Chapter 2.1 or as updated.

8. Implementation of Condition of Certification **TRANS-8** would require the applicant to request the FAA and airport manager to advise pilots of the location of the power plant and the potential aviation hazards associated with thermal plumes and to avoid overflight of the facility below 2,180 feet above ground level, consistent with the Aeronautical Information Manual.

PROPOSED CONDITIONS OF CERTIFICATION

TRANS-1 Roadway Use Permits and Regulations

The project owner shall comply with limitations imposed by the Department of Transportation (Caltrans) and other relevant jurisdictions, including the city of Long Beach and Los Angeles County, on vehicle sizes and weights, driver licensing, and truck routes. In addition, the project owner or its contractor(s) shall obtain necessary transportation permits for roadway use from all relevant jurisdictions.

Verification: In the Monthly Compliance Reports (MCRs), the project owner shall report permits received during that reporting period. In addition, the project owner shall retain copies of permits and supporting documentation on-site for Compliance Project Manager (CPM) inspection if requested.

TRANS-2 Traffic Control Plan, Heavy Hauling Plan, and Parking/Staging Plan

Prior to the start of construction, the project owner shall prepare and implement a Traffic Control Plan (TCP) for the project’s construction and operations traffic. The TCP shall address the movement of workers, vehicles, and materials, including arrival and departure schedules and designated workforce and delivery routes.

The project owner shall consult with the Department of Transportation (Caltrans) District 7 office, the city of Long Beach and other applicable local jurisdictions in the preparation and implementation of the TCP. The project owner shall submit the proposed TCP to these agencies in sufficient time for review and comment, and to the Compliance Project Manager (CPM) for review and approval prior to the proposed start of construction and implementation of the plan.

The TCP shall include:

1. Routes used for construction-related trips for workers, deliveries, and heavy-haul trucks.

2. Timing of construction-related trips for workers, deliveries, and heavy-haul trucks, with trips scheduled for off-peak hours if possible, and staggered when possible.

3. Stagger the arrival time of vehicles (workforce and delivery) to times outside of the a.m. peak period, particularly to avoid a worsening of LOS for the intersection of PCH and Seal Beach Boulevard during the a.m. peak.

4. Allow access to the AEC site for any delivery trucks or workers that arrive at the site prior to allowable construction start time (7 a.m. on weekdays and 9:00 a.m. on Saturdays) to be parked on the AEC project site.

5. Parking/Staging Plan (PSP) for all phases of project construction and operation to require all project-related parking to be on the AEC project site with the exception of offsite parking related to construction of the wastewater linear (workers and construction equipment). The PSP must comply with the city of Long Beach's parking regulations by providing sufficient onsite parking.

6. Provisions for redirection of construction traffic with a flag person as necessary to ensure traffic safety and minimize interruptions to non-construction related traffic flow.

7. Placement of necessary signage, lighting, and traffic control devices at the project construction site and laydown areas;

8. A heavy-haul plan addressing the transport and delivery of heavy and oversized loads requiring permits from the California Department of Transportation (Caltrans), other state or federal agencies, and/or the affected local jurisdictions including Los Angeles County and the city of Long Beach;

9. Details regarding temporary closure of travel lanes or disruptions to street segments and intersections during construction activities.

10. Traffic diversion plans (in coordination with Caltrans and any applicable local agencies) to ensure access during temporary lane/road closures.

11. Means of access to residential and/or commercial property located near construction work and truck traffic routes.

12. Means of access for emergency vehicles to the project site.

13. Advance notification to residents, businesses, emergency providers, and hospitals that would be affected when roads may be partially or completely closed.

14. Identify safety procedures for exiting and entering the site access gate;

Verification: At least 60 calendar days prior to the start of construction, the project owner shall submit the TCP to the applicable agencies for review and comment and to the CPM for review and approval. The project owner shall also provide the CPM with a copy of the transmittal letter to the agencies requesting review and comment.

At least 30 calendar days prior to the start of construction, the project owner shall provide copies of any comment letters received from the agencies, along with any changes to the proposed development plan, to the CPM for review and approval.

The project owner shall report in the Monthly Compliance Reports (MCRs) the arrival time of construction workers and construction delivery trucks, ensuring arrival at the AEC site is outside of the am peak hour (7 a.m. – 9 a.m.). Documentation of worker and truck delivery arrival time may include worker timesheets and security sign in sheets, or other documentation method approved by the CPM.

TRANS-3 Restoration of All Public Roads, Easements, and Rights-of-Way

The project owner shall restore all public roads, easements, rights-of-way, and any other transportation infrastructure damaged due to project-related construction activities. Restoration shall be completed in a timely manner to the infrastructure's original condition. Restoration of significant damage which could cause hazards (such as potholes, deterioration of pavement edges, or damaged signage) shall take place immediately after the damage has occurred.

Prior to the start of site mobilization, the project owner shall notify the relevant agencies, including the city of Long Beach, Los Angeles County, and Caltrans, of the proposed schedule for project construction. The purpose of this notification is to request that these agencies consider postponement of any planned public right-of-way repairs or improvement activities in areas affected by project construction until construction is completed, and to coordinate any concurrent construction-related activities that cannot be postponed.

Verification: Prior to the start of site mobilization, the project owner shall videotape all public roads, easements, right-of-way segment(s), and intersections along the route construction vehicles would take in the vicinity of the project site. The project owner shall provide the videotapes to the CPM.

If damage to any public road, easement, or right-of-way occurs during construction, the project owner shall notify the CPM and the affected agency/agencies to identify the sections to be repaired. At that time, the project owner and CPM shall establish a schedule for completion and approval of the repairs. Following completion of any repairs, the project owner shall provide the CPM with letters signed by the affected agency/agencies stating their satisfaction with the repairs.

TRANS-4 Hazardous Materials

The project owner shall contract with licensed hazardous materials delivery and waste hauler companies in order to obtain the necessary permits and/or licenses from the California Highway Patrol, Caltrans, and any relevant local jurisdictions for the transportation of hazardous materials. The project owner shall ensure compliance with all applicable regulations and implementation of the proper procedures.

Verification: In the Monthly Compliance Reports (MCRs) during construction and the Annual Reports during operation, the owner shall provide copies of all permits/licenses obtained for the transportation of hazardous materials.

At least 30 days prior to the start of construction, the project owner shall provide copies of any comment letters received from the relevant agencies , along with any resulting changes in plans for transportation of hazardous materials.

TRANS-5 Encroachment into Public Rights-of-Way

Prior to any ground disturbance, improvements, or obstruction of traffic within any public road, easement, or right-of-way, the project owner shall coordinate with all applicable jurisdictions, including the city of Long Beach, Los Angeles County, and Caltrans, to obtain necessary encroachment permits and comply with all applicable regulations, including applicable road standards.

Verification: At least 10 days prior to ground disturbance, improvements, or interruption of traffic in or along any public road, easement, or right-of-way, the project owner shall provide copies of all permit(s), relevant to the affected location(s), received from Caltrans or any other affected jurisdiction/s to the CPM. In addition, the project owner shall retain copies of the issued/approved permit(s) and supporting documentation in its compliance file for a minimum of 180 calendar days after the start of commercial operation.

TRANS-6 Notification of FAA for Construction Equipment at or Exceeding 132 feet AGL

The project owner or its contractor(s) shall file Form 7460 (construction or alteration of airspace) with the FAA for any construction equipment at the project site 132 feet above ground level (AGL) or taller.

Verification: At least 60 days prior to the presence of any construction equipment onsite 132 feet AGL or taller, the project owner shall submit to the CPM for review, supporting documentation that Form 7460 is filed with the FAA. Once FAA issues a hazard determination, the project owner shall provide a copy to the CPM for review.

TRANS-7 Obstruction Marking and Lighting for Construction Equipment

The project owner shall install blinking obstruction marking and lighting on any construction equipment 200 feet AGL or taller, in accordance with FAA requirements, as expressed in FAA Advisory Circular 70/7460-1L or as updated.

Lighting shall be operational 24 hours a day, 7 days a week for the duration of project construction. Upgrades to the required lighting configurations, types, location, or duration shall be implemented consistent with any changes to FAA obstruction marking and lighting requirements.

Verification: At least 60 days prior to the presence of any construction equipment onsite which is or exceeds 200 feet in height, the project owner shall submit to the Compliance Project Manager for approval of final design plans for construction equipment depicting the required air traffic obstruction marking and lighting.

TRANS-8 Pilot Notification and Awareness

The project owner shall initiate the following actions to ensure pilots are aware of the project location and potential hazards to aviation:

1. Submit a letter to the Federal Aviation Administration (FAA) requesting a Notice to Airmen (NOTAM) be issued advising pilots of the location of the power plant and recommending avoidance of overflight of the project site below 2,180 feet above ground level (AGL). The letter should also request that the NOTAM be maintained in active status until status until all navigational charts and Airport Facility Directories (AFDs) have been updated.

2. Submit a letter to the FAA requesting a power plant depiction symbol be placed at the power plant site location on the Los Angeles Sectional Chart with a notice to “avoid overflight below 2,180 feet AGL”.

3. Submit a request to the FAA and the Los Alamitos Army Airfield Manager to add a new remark to the Automatic Terminal Information Service (ATIS) identifying the location of the power plant and advising pilots to avoid direct overflight below 2,180 feet AGL as they approach or depart the airport.

4. Submit aerodrome remarks describing the location of the power plant and advising against direct overflight below 2,180feet AGL to the:

   a. FAA Airport/Facility Directory – Southwest U.S.

   b. Jeppesen (Airway Manual Services - Western U.S. Airport Directory)

   c. Pilots Guide to California Airports

Verification: Within 60 days prior to start of construction, the project owner shall submit draft language for the letters of request to the FAA and Los Alamitos Army Airfield to the Compliance Project Manager (CPM) for review and approval. The letters should request a response within 30 days that includes a timeline for implementing the required actions.

Within 60 days after CPM approval of draft language, the project owner shall submit the required the letters of request to the FAA, Los Alamitos Army Airfield, and the identified publications. The project owner shall submit copies of these requests to the CPM. A copy of any resulting correspondence shall be submitted to the CPM within 10 days of receipt. If the FAA, Los Alamitos Army Airfield, or the listed publications do not respond within 30 days, the project owner shall contact the CPM.

REFERENCES

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APPENDIX TT-1: PLUME VELOCITY ANALYSIS

Nancy Fletcher and Wenjun Qian, Ph.D., P.E.

INTRODUCTION

The following analysis assesses exhaust stack plume vertical velocities of the proposed Alamitos Energy Center (AEC) combustion turbines, auxiliary boiler, air cooled condenser (ACC) and fin fan coolers. Staff completed calculations to determine the worst-case vertical plume velocities at different heights above the ground based on the project owner's proposed facility design, with staff corrections to some of the operational data. The purpose of this appendix is to provide documentation of the method used to estimate worst-case vertical plume velocity estimates to assist evaluation of the project's impacts on aviation safety in the vicinity of the AEC.

PROJECT DESCRIPTION

The AEC is a proposed natural-gas-fired, combined-cycle and simple-cycle, air-cooled electrical generating facility located on the site of the Alamitos Generating Station (AGS) in Long Beach, California. AGS consists of six operating natural gas fired boilers and one retired unit. The AGS totals 1,950 megawatts (MW), permitted through the South Coast Air Quality Management District and is not licensed through the Energy Commission. The proposed AEC would consist of two power blocks. Power Block 1 includes two General Electric (GE) Frame 7FA.05 combustions turbine generators (CTGs), two heat recovery steam generators (HRSGs), one steam turbine generator (STG), an air-cooled condenser (ACC), an auxiliary boiler, and related ancillary facilities. Power Block 2 includes four simple cycle GE LMS-100PB CTGs with fin-fan coolers/air-cooled heat exchangers and ancillary facilities.

PLUME VELOCITY CALCULATION METHOD

SPILLANE APPROFACH

Staff uses a calculation approach from a technical paper (Best 2003) to estimate the worst-case plume vertical velocities for vertical turbulence from plumes such as the AEC stacks and cooling system. The calculation approach, known as the "Spillane approach", is based on calm wind conditions to assess average plume vertical velocity as a function of height. Calm wind conditions are considered the worst-case wind conditions for worst case plume rise and velocities. The Spillane approach uses the following equations to determine vertical velocity for single stacks during dead calm wind (i.e., wind speed = 0) conditions:

(1) $(V*a)^3 = (V*a)_o^3 + 0.12*F_o*[(z-z_v)^2-(6.25D-z_v)^2]$

(2) $(V*a)_o = V_{exit}*D/2*(T_a/T_s)^{0.5}$

(3) $F_o = g*V_{exit}*D^2*(1-T_a/T_s)/4$

(4) $Z_v = 6.25D*[1-(T_a/T_s)^{0.5}]$

Where: V = vertical velocity (meters per second [m/s]), plume-average velocity
a = plume top-hat radius (m, increases at a linear rate of $a = 0.16*(z- z_v)$
F_o= initial stack buoyancy flux m^4/s^3
z = height above stack exit (m)
z_v= virtual source height (m)
V_{exit}= initial stack velocity (m/s)
D = stack diameter (m)
T_a= ambient temperature (K)
T_s= stack temperature (K)
g = acceleration of gravity (9.8 m/s^2)

Individual plumes can be broken into three stages. The first stage describes plume conditions close to the stack exit where the plume momentum remains relatively unaffected by ambient and plume buoyancy conditions. This momentum rise stage describes the plume as it travels to a height of 6.25D. In the second stage, the plume responds to differences between ambient and plume buoyancy conditions. Cooler and less turbulent ambient air interacts with the plume and impacts the plume's vertical velocity. The dilution of the stack exhaust is sensitive to ambient wind speed. Therefore the calm wind conditions are considered to be conservative and yield worst case conditions. In the third stage, the plume rise is largely impacted by the buoyancy of the plume and continues until turbulence within and outside the plume equalizes. This generally takes place at large heights and distances from the stack where the plume vertical velocity is close to zero.

Equation (1) is solved for V at any given height above ground that is above the momentum rise stage for single stacks (where z > 6.25D) and at the end of the plume merged stage for multiple plumes. This solution provides the plume-average velocity for the area of the plume at a given height above ground; the peak plume velocity would be two times higher than the plume-average velocity predicted by this equation. The stack buoyancy flux (Equation 3) is a prominent part of Equation (1). The calm condition calculation basis represents the worst-case conditions, and the vertical velocities will decrease substantially as wind speeds increase.

For multiple stack plumes, where the stacks are equivalent as is the case for AEC, the multiple stack plume velocity during calm winds is calculated by staff in a simplified fashion, presented in the Best Paper as follows:

(5) $V_m = V_{sp}*N^{0.25}$

Where: V_m = multiple stack combined plume vertical velocity (m/s)
V_{sp} = single plume vertical velocity (m/s), calculated using Equation (1)
N = number of stacks

This simplified multiple stack plume velocity calculation method predicts somewhat lower velocity values than the full Spillane approach methodology for multiple plumes as given in data results presented in the Best paper (Best 2003). However, for a long linear set of plumes, such as the ACC grid designed for the AEC project, it is very unlikely that all plumes can merge fully to allow this velocity given the stack separation and the height/atmospheric conditions needed for them to fully merge. Therefore the use of this approach will likely over predict the combined plume velocities in this case.

MITRE EXHAUST PLUME ANALYZER

On September 24, 2015, the Federal Aviation Administration (FAA) released a guidance memorandum (FAA 2015) recommending that thermal plumes be evaluated for air traffic safety. FAA determined that the overall risk associated with thermal plumes in causing a disruption of flight is low. However, it determined that such plumes in the vicinity of airports may pose a unique hazard to aircraft in critical phases of flight (such as take-off and landing). In this memorandum a new computer model, different than the analysis technique used by staff and identified above as the Spillane approach, is used to evaluate vertical plumes for hazards to light aircraft. It was prepared under FAA funding and available for use in evaluating exhaust plume impacts.

This new model, the MITRE Corporation's Exhaust Plume Analyzer (MITRE 2012), was identified by the FAA as a potentially effective tool to assess the impact that exhaust plumes may impose on flight operations in the vicinity of airports (FAA 2015). The Exhaust Plume Analyzer was developed to evaluate aviation risks from large thermal stacks, such as turbine exhaust stacks. The model provides output in the form of graphical risk probability isopleths ranging from 10^{-2} to 10^{-7} risk probabilities for both severe turbulence and upset conditions for four different aircraft sizes. However, at this time the Exhaust Plume Analyzer model cannot be used to provide reasonable risk predictions on variable exhaust temperature thermal plume sources, such as cooling towers and air cooled condensers.

The FAA has not provided guidance on how to evaluate the risk probability isopleth output of the Exhaust Plume Analyzer model, but states in their memorandum that they intend to update their guidance on near-airport land use, including evaluation of thermal exhaust plumes, in fiscal year 2016. However, MITRE Corporation is suggesting that a probability of severe turbulence at an occurrence level of greater than 1×10^{-7} (they call this a Target Safety Level) should be considered potentially significant. This is equivalent to one occurrence of severe aircraft turbulence in 10 million flights. For the past 50 years, the MITRE Corporation has provided air traffic safety guidance to FAA, and their recommended Target Safety Level is based on this experience (MITRE 2016).

Additionally, the MITRE model has a probability of occurrence plot limitation. While it provides output for predict plumes up to a maximum height of 3,500 feet above ground, the meteorological data that is used by the model is currently limited to a maximum height of 3,000 feet. Outputs corresponding to the higher altitudes simply reuse the 3,000 foot meteorological data. The model was developed with the assumption that a plume would not rise higher than 3,000-3,500 feet above ground level, and therefore the modeling output was terminated at that height. There is uncertainty if there will be any effort to expand the data set and model to work properly at altitudes above 3,000 feet above ground level at this point. The results obtained by staff using the Spillane approach suggest that this limitation would not apply to the AEC.

At this time staff does not believe the MITRE model should be used for final work products until the significance threshold is verified by the FAA and the model capabilities are enhanced to include other thermal plume sources such as cooling towers and air-cooled condensers.

STAFF ANALYSIS

This appendix uses the Spillane approach method to be consistent with staff assessments done for other projects and because the Spillane approach is described in the FAA materials as providing similar risk assessments for light aircraft. As stated above, staff will consider using the new MITRE method to the extent that it is applicable after conducting further review of the FAA methodology and once FAA develops guidance on how to evaluate the output of the Exhaust Plume Analyzer.

EQUIPMENT DESIGN AND OPERATING PARAMETERS

GE 7FA.05 COMBUSTION GAS TURBINE DESIGN AND OPERATING PARAMETERS

The design and operating parameter data for the GE 7FA.05 CTGs were used to calculate the plume rise and velocity. Four operating scenarios detailed in the performance data and operational data sheets in Supplemental Application for Certification (AFC) Appendix 5.1B and Appendix 5.1C (AEC 2015h) were selected for analysis. The four scenarios evaluate three separate ambient temperatures across the range of operation for the CTGs. Operating parameters used to compute worst-case vertical plume velocities include ambient temperatures of 28, 65.3, and 107 degree Fahrenheit (ºF) at maximum turbine loads without inlet air cooling. In addition, inlet air cooling was analyzed at the 107 ºF ambient temperature scenario. The exhaust operating parameters used for analysis are provided in **Plume Velocity Table 1**.

Plume Velocity Table 1
GE 7FA.05 CTG Exhaust Parameters

Parameter	GE 7FA.05			
Stack Height	140 ft. (42.70 meters)			
Stack Diameter	20 ft. (6.10 meters)			
CTG Load (%)	100			
Operating Scenario #	1	5	8	9
Ambient Temperature (°F)	28	65.3	107	
With Inlet Air Cooling	No	No	Yes	No
Exhaust Temperature (°F)	216	215	221	223
Exhaust Velocity (ft/s)	67.0	66.2	66.3	59.9
Exhaust Flow Rate (1000 lb/hr)	4,368	4,298	4,266	3,858

Source: AEC 2015h

GE LMS-100PB COMBUSTION GAS TURBINE DESIGN AND OPERATING PARAMETERS

The design and operating parameter data for the GE LMS-100PB CTGs were used to calculate the plume rise and velocity. Several operating scenarios detailed in the performance data and operational data sheets in Supplemental AFC Appendix 5.1B and Appendix 5.1C (AEC 2015h) were evaluated. The three worst case operating scenarios at low mid and high ambient temperatures were selected for analysis. Operating parameters used to compute worst-case vertical plume velocities include ambient temperatures of 28 ºF, 65.3 ºF, and 107ºF at maximum turbine loads. Inlet air cooling was analyzed at 65.3 ºF and 107 ºF. The exhaust operating parameters used for analysis are provided in **Plume Velocity Table 2**.

Plume Velocity Table 2
GE LMS-100PB CTG Exhaust Parameters

Parameter	GE LMS-100PB		
Stack Height	80 ft. (24.38 meters)		
Stack Diameter	13.5 ft. (4.11 meters)		
CTG Load (%)	100		
Operating Scenario #	1	4	8
Ambient Temperature (°F)	28	65.3	107
With Inlet Air Cooling	No	Yes	Yes
Exhaust Temperature (°F)	789	797	837
Exhaust Velocity (ft/s)	109	109	99.2
Exhaust Flow Rate (1000 lb/hr)	1,755	1,726	1,525

Source: AEC 2015h

AUXILIARY BOILER DESIGN AND OPERATING PARAMETERS

The 70.8 million British thermal units per hour (MMBtu/hr) auxiliary boiler proposed for AEC is not large enough to expect a significant thermal plume however for completeness the auxiliary boiler is included in the analysis. **Plume Velocity Table 3** shows the design and operating parameter data for the auxiliary boiler stack, which were provided by the project owner in the Supplemental AFC (AEC 2015h). Staff chose the operating parameters (shown in **Plume Velocity Table 3**) which correspond to the maximum heat input case to compute worst-case vertical plume velocities.

Plume Velocity Table 3
Auxiliary Boiler Exhaust Parameters

Parameter	Auxiliary Boiler	
Stack Height	80 ft. (24.38 meters)	
Stack Diameter	3 ft. (0.91 meters)	
Exhaust Temperature (°F)	256	318
Exhaust Velocity (ft/s)	16.2	69.5
Exhaust Flow Rate (Actual Cubic Feet per Minute [ACFM])	6,860	29,473

Source: AEC 2015h and staff calculations

AIR-COOLED CONDENSER DESIGN AND OPERATING PARAMETERS

The design and operating parameter data for the air-cooled condenser (ACC) for the combined-cycle power block are included in **Plume Velocity Table 4**. The project owner provided design and operating parameters for the ACCs in Data Responses Set 7 (CH2 2016e). The data provided for the outlet air flow rates, outlet air exit velocities, and cell dimensions of the ACC are internally inconsistent with each other. Revised information was provided (CH2 2016v). Staff calculated the outlet air exit velocities using the project owner-provided heat rejection and fan diameter. Staff-calculated outlet air exit velocities included in **Plume Velocity Table 4** are denoted with an asterisk symbol (*).

Plume Velocity Table 4
Air Cooled Condenser Parameters

Parameter	**Combined-Cycle Air-Cooled Condenser**			
Number of Cells	35			
Cell Height (ft)	53.1			
Cell Diameter (ft)	43.9 (L) x 43.1 (W)			
Fan Diameter (ft)	36			
Distance Between Cells (ft)	0 ft (adjoining cells share a single column)			
Ambient Temperature (°F)	28	65.3	107	
Evaporative Cooling	No	No	No	Yes
Ambient Relative Humidity (%)	76	87	11	11
Number of Cells in Operation	13	35	33	33
Heat Rejection (MW)	369.6	378.8	369.7	388.9
Outlet Air Temperature (°F)	89.2	88.6	135.8	137.1
Outlet Air Exit Velocity (ft/s) [a]	24.99*	24.96*	22.71*	22.90*

Source: CH2 2016v and independent staff analysis

Note: [a] Staff calculated the outlet air exit velocities based on the project owner provided heat rejection and fan diameter.

FIN FAN COOLER DESIGN AND OPERATING PARAMETERS

Plume Velocity Table 5 shows the design and operating parameter data for each of the fin fan coolers for the simple-cycle power block. The project owner originally provided the data for the fin fan coolers in Data Responses Set 7 (CH2 2016e). However, staff noticed that the project owner-provided data are internally inconsistent with each other. Staff requested the project owner to provide performance data sheets from the vendor and clarify the inconsistencies. The project owner provided follow-up vendor data sheets and explanations (CH2 2016v, CH2 2016w) for the fin fan coolers. The project owner provided the exit velocities based on the size of the tube bundle openings, not the fan diameter. Staff recalculated the outlet air exit velocities for each fan based on the project owner provided outlet air flow and the fan diameter. The staff-calculated values are shown in **Plume Velocity Table 5** with an asterisk symbol (*).

Plume Velocity Table 5
Fin Fan Cooler Exhaust Parameters

Parameter	Simple-Cycle Fin Fan Cooler		
Number of Cells (Fans)	60 total		
Cell Height (ft)	32		
Cell Diameter (ft)	12		
Ambient Temperature (ºF)	28	65.3	107
Ambient Relative Humidity	76%	87%	11%
Number in Operation	24 fans	60 fans	60 fans
Heat Rejection (MW)	65.3	65.3	65.7
Outlet Air Temperature (ºF)	75.11	84.06	125.56
Outlet Air Exit Velocity/fan (ft/s) [a]	27.20*	27.21*	29.77*
Outlet Air Flow (lb/hr)	19,674,564	49,186,410	49,186,410

Source: CH2 2016v, CH2 2016w, and independent staff analysis
Note:
[a] Staff calculated the exit velocities of each fan based on the project owner provided outlet air flow and the fan diameter.

PLUME VELOCITY CALCULATION RESULTS

Using the Spillane approach, the plume average vertical velocities at different heights above ground were determined by staff for calm conditions for the proposed gas turbines, auxiliary boiler, air-cooled condenser (ACC) and fin fan coolers. Staff evaluated the potential for plume merging using the following stack-to-stack distances: (1) the distance between the two GE 7FA.05 combined-cycle turbine stacks would be about 44.1 meters (m [144.7 ft]), (2) the distance between a set of two GE LMS-100PB simple-cycle turbine stacks would be about 15.3 m (50.2 ft) and the distance between the two pairs would be about 112 m (367.5 ft). Plumes begin merging when the radius of each of the two plumes added together equals the distance between the stacks. As a rule of thumb they are considered fully merged when the sum of the plume radii adds to equal twice the distance between stacks.

As explained in the **Transportation and Traffic** section, a plume average vertical velocity of 4.3 m/s has been determined by staff to be the critical velocity of concern to light aircraft. This is based on the Australian Civil Aviation Safety Authority (CASA) advisory circular (CASA 2003). Vertical velocities below this level are not of concern to light aircraft.

The combined-cycle power block would have two GE 7FA.05 combined-cycle turbine stacks, with a spacing of about 44.1 m or 144.7 ft from each other. When the spacing between the stacks is not large enough to prevent plume merging, the exhaust plumes may spread enough to significantly merge prior to the velocity lowering to vertical velocities below levels of concern. Staff evaluated the potential for plume merging using a stack-to-stack distance for the CTGs/HRSGs of 44.1 m or 144.7 ft. Staff calculated plume average vertical velocities for all four operating cases shown in **Plume Velocity**

Table 1 for the GE 7FA.05 turbines and determined that the worst-case predicted plume velocities would occur at full load operation without inlet air cooling at the 28°F ambient temperature condition. Staff's calculated worst-case plume average velocity values are provided in **Plume Velocity Table 6**. Height above ground is determined by adding the physical stack height to z, the height above stack exit.

The GE 7FA.05 gas turbine plume average velocity is calculated to drop below 4.3 m/s at a height of approximately 810 feet above ground for the single turbine plume (N=1). The plume diameter at this height would be around 63.5 meters, which would be larger than the distance between the two GE7FA.05 gas turbine stacks (44.1 meters). Therefore the merging of the adjacent turbine plumes should be considered. In the case of two plumes fully merging (N=2), the average velocity is calculated to drop below 4.3 m/s at the height of 1,230 feet above ground.

Plume Velocity Table 6
GE 7FA.05 Turbine Plume Size (m) and Vertical Plume Velocities (m/s)

Height Above Ground Level (Feet)	Plume Diameter (m) [a]	Number of Merged Stacks	Plume Velocity (m/s)
300	13.76	1.00	8.47
400	23.52	1.00	6.36
500	33.27	1.00	5.47
600	43.02	1.11	5.08
700	52.78	1.33	4.93
800	62.53	1.56	4.82
900	72.29	1.78	4.73
1,000	82.04	2.00	4.66
1,100	91.79	2.00	4.49
1,200	101.55	2.00	4.34
1,300	111.30	2.00	4.20
1,400	121.05	2.00	4.08
1,500	130.81	2.00	3.98
1,600	140.56	2.00	3.88
1,700	150.32	2.00	3.79
1,800	160.07	2.00	3.72
1,900	169.82	2.00	3.64
2,000	179.58	2.00	3.57
2,100	189.33	2.00	3.51

Notes:
a – The separation between the two stacks would be about 44.1 meters and the plumes will begin to merge when the plume diameter is the same as the separation and is assumed to be fully merged when the plume diameter is twice the stack separation.

The simple-cycle power block would have four GE LMS-100PB simple-cycle turbine stacks. The four stacks would be in two pairs. The distance between one set of two GE LMS-100PB simple-cycle turbine stacks would be about 15.3 m (50.2 ft) and the distance between the two sets would be about 112 m (367.5 ft). Staff calculated plume average vertical velocities for all three operating cases shown in **Plume Velocity Table 2** for the GE LMS-100PB turbines and determined that the worst-case predicted plume velocities would occur at 100 percent load operation without inlet air cooling at the 28°F ambient temperature condition. Staff's calculated worst-case plume average velocity values are provided in **Plume Velocity Table 7**.

The GE LMS-100PB gas turbine plume average velocity is calculated to drop below 4.3 m/s at a height of approximately 1,140 feet above ground for the single turbine plume (N=1). The plume diameter at this height would be around 100.3 meters, which would be larger than the distance of 15.3 m between one set of two GE LMS-100PB gas turbine stacks, but would be less than the distance of 112 m between the two sets. Therefore the merging of the two adjacent turbine plumes should be considered but staff believes that it is unlikely that the two sets of plumes, with a distance of 112 m, would be merged. Staff assumes the worst case merging scenario would be two plumes fully merged (N=2). With two plumes fully merged, the average velocity is calculated to drop below 4.3 m/s at the height of 1,825 feet above ground.

Plume Velocity Table 7
GE LMS-100PB Turbine Plume Size (m) and Vertical Plume Velocities (m/s)

Height Above Ground Level (Feet)	Plume Diameter (m) [a]	Number of Merged Stacks	Plume Velocity (m/s)
300	18.37	1.47	8.72
400	28.12	2.00	7.95
500	37.87	2.00	7.13
600	47.63	2.00	6.58
700	57.38	2.00	6.17
800	67.14	2.00	5.85
900	76.89	2.00	5.58
1,000	86.64	2.00	5.36
1,100	96.40	2.00	5.17
1,200	106.15	2.00	5.01
1,300	115.90	2.00	4.86
1,400	125.66	2.00	4.73
1,500	135.41	2.00	4.61
1,600	145.16	2.00	4.51
1,700	154.92	2.00	4.41
1,800	164.67	2.00	4.32
1,900	174.43	2.00	4.24
2,000	184.18	2.00	4.16
2,100	193.93	2.00	4.09

Notes:
a – The separation between two adjacent stacks would be about 15.3 meters and the plumes will begin to merge when the plume diameter is the same as the separation and is assumed to be fully merged when the plume diameter is twice the stack separation.

Staff also calculated plume average vertical velocities for the auxiliary boiler using the operating parameters shown in **Plume Velocity Table 3**. **Plume Velocity Table 8** shows the worst-case plume average velocity values for the auxiliary boiler. The auxiliary boiler plume average velocity is calculated to drop below 4.3 m/s at a height of approximately 128 feet above ground.

Plume Velocity Table 8
Auxiliary Boiler Plume Size (m) and Vertical Plume Velocities (m/s)

Height Above Ground Level (Feet)	Plume Diameter (m)	Plume Velocity (m/s)
100	1.57	9.82
110	2.55	6.37
120	3.52	4.91
121	3.62	4.81
122	3.72	4.72
123	3.81	4.63
124	3.91	4.54
125	4.01	4.46
126	4.11	4.39
127	4.20	4.32
128	4.30	4.25
129	4.40	4.18
130	4.50	4.12

Staff calculated plume average vertical velocities for all four operating cases shown in **Plume Velocity Table 4** for the combined-cycle's air-cooled condenser and determined that the worst-case height at which the plume velocities would drop below 4.3 m/s would occur at 28°F ambient temperature condition. Staff assumed that the plumes from all cells in operation would be fully merged. Staff's calculated worst-case plume average velocity values are provided in **Plume Velocity Table 9**. The combined-cycle air-cooled condenser plume average velocity is calculated to drop below 4.3 m/s at a height of approximately 2,180 feet above ground.

Plume Velocity Table 9
Combined-Cycle Air-Cooled Condenser Vertical Plume Velocities (m/s)

Height Above Ground Level (Feet)	Plume Velocity (m/s)
400	7.45
500	7.11
600	6.73
700	6.39
800	6.11
900	5.86
1,000	5.65
1,100	5.46
1,200	5.30
1,300	5.15
1,400	5.02
1,500	4.90
1,600	4.79
1,700	4.69
1,800	4.59
1,900	4.51
2,000	4.43
2,100	4.35
2,200	4.28
2,300	4.22
2,400	4.16
2,500	4.10

Finally, staff calculated plume average vertical velocities for all three operating cases shown in **Plume Velocity Table 5** for the simple-cycle fin fan coolers determined that the worst-case height at which the plume velocities would drop below 4.3 m/s would occur at 28°F ambient temperature condition. Staff assumed that the plumes from all cells in operation would be fully merged. Staff's calculated worst-case plume average velocity values are provided in **Plume Velocity Table 10**. The combined-cycle air-cooled condenser plume average velocity is calculated to drop below 4.3 m/s at a height of approximately 370 feet above ground.

Plume Velocity Table 10
Simple-Cycle Fin Fan Cooler Vertical Plume Velocities (m/s)

Height Above Ground Level (Feet)	Plume Velocity (m/s)
100	9.88
200	5.71
300	4.68
310	4.62
320	4.55
330	4.50
340	4.44
350	4.39
360	4.34
370	4.29
380	4.24
390	4.20
400	4.15

The velocity values listed above in **Plume Velocity Table 6** through **Plume Velocity Table 10** are plume average velocities across the area of the plume. The maximum plume velocity, based on a normal Gaussian distribution, is two times the plume average velocities shown in the tables.

It should be noted that additional thermal plume merging between the gas turbine stacks, the air-cooled condenser, the auxiliary boiler, and the fin fan coolers could occur and increase the plume heights where vertical velocities of 4.3 m/s are exceeded under worst case conditions. The model used for this analysis is not able to add different kinds of thermal plumes together. However, the approach is still conservative given the conservatism built in the model.

WIND SPEED STATISTICS

The **Air Quality** section of this document uses meteorological data from North Long Beach station, which is located 6.4 miles northwest of the project site. The wind roses and wind frequency distribution data collected from the North Long Beach station were considered to be representative for the project site location. The project owner provides the calm wind speed statistics for North Long Beach station from ground-level meteorological data collected for 2006 to 2009 and 2011 (AEC 2015h). Calm winds for the purposes of the reported monitoring station statistics are those hours with average wind speeds below 0.5 m/s. Calm or very low wind speeds can also occur for shorter periods of time within each of the monitored average hourly conditions. However, the shortest time resolution for the available meteorological data is one hour. The threshold wind speed used by the South Coast Air Quality Management District for air quality modeling was 0.5 m/s. Therefore, the wind roses provided by the project owner show 0 percent of calm wind conditions. However, there are about 3 percent of hours with wind speeds at 0.5 m/s.

CONCLUSIONS

The worst case calm wind condition vertical plume average velocities from the proposed GE 7FA.05 combined-cycle turbine stacks are predicted to drop below 4.3 m/s at the height of 1,230 feet assuming two plumes fully merged. The worst case calm wind condition vertical plume average velocities from the proposed GE LMS-100PB turbine stacks are predicted to drop below 4.3 m/s at the height of 1,825 feet assuming two plumes fully merged. The worst case auxiliary boiler plume average velocity is calculated to drop below 4.3 m/s at a height of approximately 128 feet. The worst case air-cooled condenser plume average velocity is calculated to drop below 4.3 m/s at a height of approximately 2,180 feet. The worst case plume average velocity for the fin fan coolers is calculated to drop below 4.3 m/s at a height of approximately 370 feet. Thus, the thermal plume from the proposed air-cooled condenser would cause greatest risk to light aircraft.

Also, there is the potential for additional thermal plume merging between the gas turbine stacks and the air-cooled condenser or fin fan coolers that could increase the plume heights where vertical velocities of 4.3 m/s are exceeded under worst case conditions. Calm/low wind speed conditions (wind speeds less than or equal to 0.5 m/s) conducive to the formation of worst-case thermal plume velocities would occur on average approximately 3 percent of the time.

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TRANSMISSION LINE SAFETY AND NUISANCE

Huei-An (Ann) Chu, Ph.D.

SUMMARY OF CONCLUSIONS

The applicant, AES Alamitos Energy, LLC (AES), proposes to build two new single-circuit or double-circuit 230-kilovolt (kV) lines to connect the proposed Alamitos Energy Center (AEC) to the existing California Independent System Operator (CAISO)-operated and Southern California Edison (SCE)-owned 230-kV substation located within the site of the existing Alamitos Generating Station (AGS). The proposed lines would lie entirely within the boundaries of the AGS site and no offsite lines would be necessary. Since the proposed 230-kV lines would be operated within the SCE service area, they would be designed, constructed, operated, routed, and maintained according to SCE's guidelines for line safety and field management which conform to applicable laws, ordinances, regulations and standards. The proposed lines would lie within the boundaries of an existing, operating power plant that would cease operations once AEC construction is complete. Since this is an existing power plant site and the connecting transmission lines would be short in length with no nearby residences, there would be no potential for the residential electric and magnetic field exposures which have been of some health concern . With the four proposed conditions of certification, any safety and nuisance impacts from construction and operation of the proposed line would be less than significant.

INTRODUCTION

The purpose of this Preliminary Staff Assessment (PSA) is to assess the transmission line design and operational plan for the proposed AEC project to determine whether its related field and non-field impacts would constitute a significant environmental hazard in the area around the proposed route. All related health and safety laws, ordinances, regulations, and standards (LORS) are intended to minimize such hazards. Staff's analysis focuses on the following issues taking into account both the physical presence of the line and the physical interactions of its electric and magnetic fields:

- aviation safety;
- interference with radio-frequency communication;
- audible noise;
- fire hazards;
- hazardous shocks;
- nuisance shocks; and
- electric and magnetic field (EMF) exposure.

The federal, state, and local laws and policies in this section apply to the control of the field and non-field impacts of electric power lines. Staff's analysis examines the project's compliance with these requirements.

METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

The LORS and practices listed in **TLSN Table 1** have been established to maintain impacts below levels of potential environmental significance. Thus, if staff determines that the project would comply with applicable LORS, we would conclude that any transmission line-related safety and nuisance impacts would be less than significant. The nature of these individual impacts is discussed below together with the potential for compliance with the LORS that apply.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

The following table summarizes the LORS applicable to this facility. These LORS are fully evaluated in the remainder of this section.

Transmission Line Safety and Nuisance (TLSN) Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable LORS	Description
Aviation Safety	
Federal	
Title 14, Part 77 of the Code of Federal Regulations (CFR),"Objects Affecting the Navigable Air Space"	Describes the criteria used to determine the need for a Federal Aviation Administration (FAA) "Notice of Proposed Construction or Alteration" in cases of potential obstruction hazards.
FAA Advisory Circular No. 70/7460-1G, "Proposed Construction and/or Alteration of Objects that May Affect the Navigation Space"	Addresses the need to file the "Notice of Proposed Construction or Alteration" (Form 7640) with the FAA in cases of potential for an obstruction hazard.
FAA Advisory Circular 70/460-1G, "Obstruction Marking and Lighting"	Describes the FAA standards for marking and lighting objects that may pose a navigation hazard as established using the criteria in Title 14, Part 77 of the CFR.
Interference with Radio Frequency Communication	
Federal	
Title 47, CFR, section 15.2524, Federal Communications Commission (FCC)	Prohibits operation of devices that can interfere with radio-frequency communication.
State	
California Public Utilities Commission (CPUC) General Order 52 (GO-52)	Governs the construction and operation of power and communications lines to prevent or mitigate interference.
Audible Noise	
Local	
City of Long Beach General Plan.	Identifies and appraises noise problems within the community and assists the city in making land use decisions.
City of Long Beach Municipal Code.	Establishes performance standards that noise sources should achieve at existing or planned residential or other noise-sensitive land uses.
Hazardous and Nuisance Shocks	
State	
CPUC GO-95, "Rules for Overhead Electric Line Construction"	Governs clearance requirements to prevent hazardous shocks, grounding techniques to minimize nuisance shocks, and maintenance and inspection requirements.

Applicable LORS	Description
Title 8, California Code of Regulations (CCR) section 2700 et seq. “High Voltage Safety Orders”	Specifies requirements and minimum standards for safely installing, operating, working around, and maintaining electrical installations and equipment.
National Electrical Safety Code (NESC)	Specifies grounding procedures to limit nuisance shocks. Also specifies minimum conductor ground clearances.
Industry Standards	
Institute of Electrical and Electronics Engineers (IEEE) 1119, “IEEE Guide for Fence Safety Clearances in Electric-Supply Stations”	Specifies the guidelines for grounding-related practices within the right-of-way and substations.
Electric and Magnetic Fields	
State	
GO-131-D, CPUC ”Rules for Planning and Construction of Electric Generation, Line, and Substation Facilities in California”	Specifies application and noticing requirements for new line construction including EMF reduction.
CPUC Decision D.93-11-013	Specifies CPUC requirements for reducing power frequency electric and magnetic fields.
CPUC Decision D.06-01-042	Re-affirms CPUC EMF Policy in D.93-11-013.
Industry Standards	
American National Standards Institute (ANSI/IEEE) 644-1944 Standard Procedures for Measurement of Power Frequency Electric and Magnetic Fields from AC Power Lines	Specifies standard procedures for measuring electric and magnetic fields from an operating electric line.
Fire Hazards	
State	
14 CCR sections 1250-1258, “Fire Prevention Standards for Electric Utilities”	Provides specific exemptions from electric pole and tower firebreak and conductor clearance standards and specifies when and where standards apply.

SETTING AND EXISTING CONDITIONS

The proposed project would be located in Long Beach, Los Angeles County, California. The AEC would connect to the regional electrical grid using the existing SCE/CAISO-controlled, 230-kilovolt (kV) switchyard located on a parcel of land owned by SCE within the existing AGS site. No new offsite transmission lines would be needed for the AEC. AEC combined-cycle gas turbine (CCGT) and simple-cycle gas turbine (SCGT) power blocks would connect into the existing SCE/CASIO-controlled switchyard via two new single-circuit (or double-circuit) 230-kV lines (AEC 2015i, Section 3.1).

No changes are planned for the SCE transmission line circuits connecting the SCE switchyard to the area’s CAISO-controlled transmission system. The new onsite 230-kV generation tie lines from the AEC power blocks to the SCE/CAISO-controlled switchyard would be designed as single-circuit or double-circuit, self-supporting steel or concrete structures, which would be installed on concrete pier foundations (AEC 2015i, Section 3.1.1).

The new generation tie lines that connect the AEC power blocks to the existing SCE 230-kV switchyard would be located within the existing Alamitos Generating Station site and would not affect the public because the site is industrial land that does not extend off the AGC/SCE site. Furthermore, no changes are proposed for the transmission lines connecting the SCE switchyard to the CAISO transmission system (AEC 2015i, Section

3.3.2.1). Since the proposed project's transmission lines would be located within the site of an existing power plant without nearby residents, residential exposure to the generated fields would not occur. Such residential exposure has been responsible for past health concerns.

PROJECT DESCRIPTION

The existing AGS's Units 1 through 6 interconnect to the SCE 230-kV switchyard with six separate 230-kV generation tie lines; these six lines would be replaced with two new 230-kV generation tie lines. No modifications would be necessary on the existing 230-kV transmission lines connecting the SCE switchyard at the AEC to the CAISO transmission system (AEC 2015i, Section 3.3.2.2). The only new lines that would be built are the two 230-kV generation tie lines that would connect AEC generator's power blocks 1 and 2 to the SCE 230-kV Alamitos Switching Station (AEC 2015i, Section 3.1). The 230-kV switchgear would receive the power from each generator unit and set-up transformer, then combine and meter the power for delivery to the SCE substation located onsite (AEC 2015i, Section 3.1.2). Details of the interconnection scheme for these two proposed generator tie-lines were provided by the applicant (AEC 2015i, Section 3.1.3).

- Each of the two new AEC power blocks would interconnect to the SCE transmission system at the existing, onsite SCE switchyard.
- The AEC generation tie lines would use 230-kV isolation switches and gas-insulated circuit breakers for each block and an individual generator step-up transformer for each of the generating units within each power block.
- All generation tie lines from the AEC to the SCE switchyard would be constructed as overhead lines. No underground generation tie lines are proposed (AEC 2015i, Section 3.1.3). These overhead lines are within the controlled AEC site and not accessible by the general public (AEC 2015i, Section 3.3).
- The generation tie lines to the SCE switchyard and all equipment would be designed to ensure compliance with applicable National Electrical Code (NEC) and National Electrical Safety Code (NESC) rules following CAISO requirements.
- Standby power for the AEC when not generating would be back-fed through the generator step-up transformer and auxiliary transformer.

The applicant provided the details of the proposed support structures as related to line safety, maintainability, and field reduction efficiency (AEC 2015i, Figure 3.1-2).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

DIRECT IMPACTS AND MITIGATION

Aviation Safety

For AEC, any potential hazard to area aircraft would relate to the potential for collision in the navigable airspace. The requirements in the LORS listed in **TLSN Table 1** establish the standards for assessing the potential for obstruction hazards within the navigable airspace. The requirements also establish the criteria for determining when to notify the FAA about such hazards. For example, FAA notification is required in cases of structures over 200 feet above ground level, or if the structure were to be less than 200 feet in height but located within the restricted airspace in the approaches to public or military airports and heliports. Moreover, for airports with runways longer than 3,200 feet, the restricted space is defined by the FAA as area space that extends 20,000 feet (3.3 nautical miles) from the runway. For airports with runways of 3,200 feet or less, the restricted airspace is defined as a space that extends 10,000 feet from the runway. For heliports, the restricted space is area space that extends 5,000 feet (0.8 nautical miles) from the landing site.

There are neither public airports with runways within 3.3 miles of the AEC, nor heliports within 0.8 miles of the AEC. The nearest military airport is the Los Alamitos Army Airfield approximately 2.7 miles northeast of the proposed AEC site (AEC 2015i, Section 3.3.3). None of these airports and heliports is close enough for any line-related collision hazards. Therefore, staff does not expect any potential hazard for aviation safety and does not recommend a condition of certification regarding aviation safety.

Interference with Radio-Frequency Communication

Transmission line-related radio-frequency interference is one of the indirect effects of line operation. It is produced by the physical interactions of line electric fields. More specifically, such interference is due to radio noise produced by the action of the electric fields on the surface of the energized conductor. The process involved is known as *corona discharge*, but is referred to as *spark gap electric discharge* when it occurs within gaps between the conductor and insulators or metal fittings. Corona from a transmission line may result in radio and television reception interference, audible noise, light, and production of ozone. When generated, such noise manifests itself as perceivable interference with radio or television signal reception or interference with other forms of radio communication.

Since the level of interference depends on factors such as line voltage, distance from the line to the receiving device, orientation of the antenna, signal level, line configuration and weather conditions, maximum interference levels are not specified as design criteria for modern transmission lines. The level of any such interference usually depends on the magnitude of the electric fields involved and the distance from the line. The potential for such impacts therefore would be minimized by reducing the line electric fields and by locating the line away from inhabited areas.

The AEC transmission lines would be built and maintained according to standard practices that minimize surface irregularities and discontinuities. Moreover, the potential for such corona-related interference is usually of concern for lines of 345 kV and above, and not for 230-kV lines such as the proposed lines. Since the proposed AEC's generation tie lines are rated at less than 345 kV and would be located within an existing power plant with no nearby residents (AEC 2015i, Section 3.3.2.3), staff does not expect any corona-related radio-frequency interference or complaints. Thus staff does not recommend any related condition of certification.

Audible Noise

The noise-reducing designs related to electric field intensity are not specifically mandated by federal or state regulations in terms of specific noise limits. Instead, such audible noise is limited through design, construction, or maintenance practices established from industry research and experience as effective without significant impacts on line safety, efficiency, maintainability, and reliability. Audible noise usually results from the action of the electric field at the surface of the line conductor and could be perceived as a characteristic crackling, frying, or hissing sound or hum, especially in wet weather. Since the noise level depends on the strength of the line's electric field, the potential for perception would be assessed from estimating the field strengths during operation. Such noise is usually generated during rainfall, but mainly from overhead lines of 345 kV or higher. It is, therefore, not generally expected at significant levels from lines of less than 345 kV as proposed for AEC. Research by the Electric Power Research Institute (EPRI 1982) has validated this by showing that the fair-weather audible noise from modern transmission lines is generally indistinguishable from background noise at the edge of a right-of-way of 100 feet or more. The proposed line right-of-way (ROW) would fall entirely within the boundaries of an existing power plant with similar connecting lines. The new generation tie lines will be located within the AEC site and would be designed and constructed to reduce project-related audible noise interference (AEC 2015i, Section 3.3.2.2 and Section 3.3.2.3). Since these designs are also aimed at minimizing field strengths, staff does not expect the proposed line operation to add significantly to current background noise levels in the project area. For an assessment of the noise from the proposed project and related facilities, please refer to staff's analysis in the **Noise and Vibration** section.

Fire Hazards

The fire hazards addressed in **TLSN Table 1** are those that could be caused by sparks from conductors of overhead lines, or that could result from direct contact between a line and nearby trees and other combustible objects.

The requirements of the existing SCE fire prevention and suppression program would be implemented for the proposed project line. The applicant's intention to ensure compliance with the clearance-related aspects of GO-95 would be an important part of this mitigation approach. GO-95 establishes clearances from other manmade and natural structures, and tree-trimming requirements to mitigate fire hazards (AEC 2015i, Section 3.3.4). Although the new lines would be located within the AEC site, Condition of Certification **TLSN-3** is recommended to ensure compliance with these program requirements.

Hazardous Shocks

Hazardous shocks are those that could result from direct or indirect contact between an individual and the energized line, whether overhead or underground. Such shocks are capable of serious physiological harm or death. The hazard shocks remain a driving force in the design and operation of transmission and other high-voltage lines.

No design-specific federal regulations have been established to prevent hazardous shocks from overhead power lines. Safety is assured within the industry by compliance with the requirements specifying the minimum national safe operating clearances applicable in areas where the line might be accessible to the public.

Potentially hazardous shocks could result from electrical faults from the new AEC equipment or the SCE high-voltage transmission system. The existing SCE/CAISO-controlled 230-kV switchyard is located within the secured area of the existing AGS. The SCE switchyard is fenced to keep individuals within the AEC site from entering the switchyard where they could be exposed to associated hazardous shocks. The new AEC 230-kV generation tie lines would be designed in accordance with applicable LORS (AEC 2015i, Section 3.4.3). Implementing the GO-95-related measures against direct contact with the energized line (AEC 2015i, pp.3-2 through 3-6) would serve to minimize the risk of hazardous shocks. Staff's recommended Condition of Certification **TLSN-1** would be adequate to ensure implementation of the necessary mitigation measures.

Nuisance Shocks

Nuisance shocks are caused by current flow at levels generally incapable of causing significant physiological harm. They result mostly from direct contact with metal objects electrically charged by fields from the energized line. Such electric charges are induced in different ways by the line's electric and magnetic fields.

There are no design-specific federal or state regulations to limit nuisance shocks in the transmission line environment. For modern overhead high-voltage lines, such shocks are effectively minimized through grounding procedures specified in the National Electrical Safety Code (NESC) and the joint guidelines of the American National Standards Institute (ANSI) and the Institute of Electrical and Electronics Engineers (IEEE). For the proposed project line, the project owner would be responsible in all cases for ensuring compliance with these grounding-related practices within the right-of-way.

The potential for nuisance shocks around the proposed line would be minimized through standard industry grounding practices (AEC 2015i, Section 3.3.2.4). For the proposed project line, the applicant would be responsible in all cases for ensuring compliance with these ground-related practices within the right-of-way. Staff recommends Condition of Certification **TLSN-4** to ensure such grounding for AEC.

Electric and Magnetic Field (EMF) Exposure

. Both electric and magnetic fields are created whenever electricity flows, and exposure to them together is generally referred to as *EMF exposure*. There is general public concern regarding the possibility of health effects from EMF exposure.

Electric Fields

Electric fields around transmission lines are produced by differences in voltage (i.e., electrical charges on the energized conductor). The electric field strength is measured in volts per meter (V/m). Electric Fields are easily shielded/weakened by conducting objects such as trees and buildings. Increased voltage produces a stronger electric field, but increased distance from the sources decreases its strength.

Magnetic Fields

Magnetic fields around transmission lines are produced when electric current (measured in amperes) flows. Magnetic fields are measured in gauss (G) or tesla (T). Unlike electric fields, magnetic fields are not easily shielded/weakened by most materials. Magnetic field strength is directly proportional to the current; that is, increased amperes produce a stronger magnetic field. Like electric fields, increased distance from the sources decreases its strength.

The strengths of both the electric field and magnetic field are inversely proportional to the distance from the conductors. Thus, the EMF strength declines as the distance from the conductor increases (AEC 2015i, Section 3.3.2.1).

Human Health Risk Assessment Findings

Human health risk assessments for EMF are conducted to determine if there are biological and other hazards from EMF exposure and what the potential health impacts might be.

Although there are several studies on the health effects of EMF, there are no consistent conclusions from human studies (epidemiological and clinical) and animal studies. In 1996, the World Health Organization (WHO) launched a large, multidisciplinary research effort (i.e. the International EMF Project) to bring together current knowledge and available resources including 25,000 articles which had been published over the past 30 years. Based on a recent in-depth review of the scientific literature, the WHO concluded that current evidence does not confirm the existence of any health consequences from exposure to low level electromagnetic fields[1]. The conclusions from WHO and other sources are summarized as follows:

- **Effects on general health:** Scientific evidence does not support a link between the reported symptoms (including headaches, anxiety, suicide and depression, nausea, fatigue and loss of libido) and exposure to electromagnetic fields.

- **Effects on pregnancy outcome:** The overall weight of evidence shows that exposure to fields at typical environmental levels does not increase the risk of any adverse outcome such as spontaneous abortions, malformations, low birth weight, and congenital diseases. There have been occasional reports of associations between health problems and presumed exposure to electromagnetic fields, such as

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[1] EMF can be broadly divided into *static* and *low-frequency* electric and magnetic fields, where the common sources include power lines, household electrical appliances and computers, and *high-frequency* or radiofrequency fields, for which the main sources are radar, radio and television broadcast facilities, mobile telephones and their base stations, induction heaters and anti-theft devices (WHO 2002).

reports of prematurity and low birth weight in children of workers in the electronics industry, but these have not been regarded by the scientific community as being necessarily caused by the field exposures.

- **Cataracts:** General eye irritation and cataracts have sometimes been reported in workers exposed to high levels of radiofrequency and microwave radiation, but animal studies do not support the idea that such forms of eye damage can be produced at levels that are not thermally hazardous[2]. There is no evidence that these effects occur at levels experienced by the general public.

- **Cancers:** Despite many studies, the evidence for any effect remains highly controversial. However, it is clear that if electromagnetic fields do have an effect on cancer, then any increase in risk will be extremely small. The results to date contain many inconsistencies, but no large increases in risk have been found for any cancer in children or adults. The U. S. National Institute of Environmental Health Sciences (NIEHS) also concluded that "a link has not been established between residential EMF exposure and adult cancers, including leukemia, brain cancer, and breast cancer. There have been no proven instances of cancer clusters[3] linked with EMF exposure, either (NIEHS 2002).

- **Childhood leukemia and cancers:** There have been studies showing a weak association between measured fields and childhood leukemia, but it is not clear whether this represents a cause-and-effect relationship. A number of epidemiological studies suggest small increases in risk of childhood leukemia with exposure to low frequency magnetic fields in the home. However, scientists have not generally concluded that these results indicate a cause-and-effect relationship between exposure to the fields and disease. Moreover, animal and laboratory studies have failed to demonstrate any reproducible effects that are consistent with the hypothesis that fields cause or promote cancer. After reviewing all the data, NIEHS also concluded in 1999 that the evidence was weak, but that it was still sufficient to warrant limited concern. Other than leukemia, the present available series of studies indicates no association between EMF exposure and childhood cancers (NIEHS 2002).

- **Electromagnetic hypersensitivity and depression:** Some individuals report hypersensitivity (examples: aches and pains, headaches, depression, lethargy, sleeping disorders, and even convulsions and epileptic seizures) to electric or magnetic fields. There is little scientific evidence to support the association between electromagnetic hypersensitivity and electromagnetic field exposure. Recent Scandinavian studies found that individuals do not show consistent reactions under

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[2] The definition of "thermally hazardous" is "any system above 130°F which exposes persons to potential thermal burns" (Source: http://apps.leg.wa.gov/wac/default.aspx?cite=296-59-080). Therefore, EMF is not at the level that is thermally hazardous.

[3] An unusually large number of cancers, miscarriages, or other adverse health effects that occur in one area or over one period of time is called a "cluster."

properly controlled conditions of electromagnetic field exposure. Nor is there any accepted biological mechanism to explain hypersensitivity.

Based on the available evidence as evaluated by WHO and NIEHS, staff has determined that there is not sufficient evidence that such fields pose a significant health hazard to exposed humans.

EMF Exposure Guidelines and Policies

There are no health-based federal regulations or industry codes specifying environmental limits or maximum acceptable levels of EMF from power lines. Most regulatory agencies believe, as staff does, that health-based limits are inappropriate at this time. They also believe that the present knowledge of the issue does not justify any retrofit of existing lines.

Staff considers it important, as does the California Public Utilities Commission (CPUC), to note that while such a hazard has not been established from the available evidence, the same evidence does not serve as proof of a definite lack of a hazard. Staff therefore considers it appropriate, in light of present uncertainty, to recommend feasible reduction of such fields without affecting safety, efficiency, reliability, and maintainability.

While there is considerable uncertainty about EMF health effects, the following facts have been established from the available information and have been used to establish existing policies:

- Any exposure-related health risk to the exposed individual will likely be small;
- The most biologically significant types of exposures have not been established;
- Most health concerns are about the magnetic field; and
- There are measures that could be employed for field reduction, but they are not recommended because they would affect line safety, reliability, efficiency, and maintainability, depending on the type and extent of such measures.

State's Approach to Regulating EMF Exposures

In the absence of conclusive or evocative evidence, some states, including California, have chosen not to specify maximum acceptable levels of EMF exposure. Instead, these states, including California, mandate a program of prudent avoidance whereby EMF exposure to the public would be minimized by encouraging electric utilities that are regulated by the CPUC to use cost-effective techniques to reduce the levels of EMF (AEC 2015i, Section 3.3.2.1). The municipal and other publicly owned utilities that are not under the direct jurisdiction of the CPUC voluntarily comply with this CPUC policy.

In 1993, the CPUC[4] issued Decision D. 93-11-013, establishing EMF policy for California's investor-owned electric utilities. The Decision acknowledged that scientific research had not demonstrated that exposures to EMF cause health hazards and that it was inappropriate to set numeric standards that would limit exposure. In recognizing the

[4] CPUC regulates the installation and operation of many high-voltage lines owned and operated by investor-owned utilities

scientific uncertainty, the CPUC addressed public concern over EMF by establishing a no-cost and low-cost EMF reduction policy that utilities would follow for proposed electrical facilities.

In 2006, the CPUC revisited the EMF management issue to assess the need for policy changes to reflect the available information on possible health impacts. The findings specified in Decision D.06-01-042 did not point to a need for significant changes to existing field management policies. Instead, D.06-01-042 re-affirmed D.93-11-013 in that health hazards from exposures to EMF have not been established and that state and federal public health regulatory agencies have determined that setting numeric exposure limits is not appropriate at this time. The CPUC also re-affirmed its past conclusions and required the existing no-cost and low-cost precaution-based EMF policy to be continued. The CPUC requirement is that such field reductions are to be made only in connection with new or modified lines in any of the utilities' service areas. Each utility complies by establishing its own EMF-reducing measures and incorporating such measures into the designs for all new or upgraded power lines and related facilities. The CPUC further established specific limits on the resources to be used in each case for field reduction.

Since there are no residences in the immediate vicinity of the proposed project's transmission lines, there would not be the long-term residential EMF exposures mostly responsible for the health concerns noted above. The only project-related EMF exposures of potential significance would be the short-term exposures of plant workers, regulatory inspectors, maintenance personnel, visitors, or individuals in the vicinity of the line. These types of exposures are short term and well understood as not significantly related to the health concern.

In keeping with this CPUC policy, staff requires a showing that each proposed overhead line would be designed according to the safety and EMF-reducing design guidelines applicable to the utility service area involved. These field-reducing measures would impact line operation if applied without appropriate regard for environmental and other local factors bearing on safety, reliability, efficiency, and maintainability. Therefore, it is up to each applicant to ensure that such measures are applied in ways that prevent significant impacts on transmission line operation and safety. The extent of such applications would be reflected by ground-level field strengths as measured during operation. When estimated or measured for lines of similar voltage and current-carrying capacity, such field strength values could be used by staff and other regulatory agencies to assess the effectiveness of the applied reduction measures. These field strengths could be estimated for any given design using established procedures. Estimates are specified for a height of one meter above the ground, in units of kilovolts per meter (kV/m), for the electric field, and milligauss (mG) for the companion magnetic field. Their magnitude depends on line voltage (in the case of electric fields), the geometry of the support structures, degree of cancellation from nearby conductors, distance between conductors, and, in the case of magnetic fields, amount of current in the line.

Since the CPUC currently requires that most new lines in California be designed according to safety and EMF-reducing guidelines of the electric utility in the service area involved, their fields are required under this CPUC policy to be similar to fields from similar lines in that service area. Designing the proposed project line according to existing SCE field strength-reducing guidelines would constitute compliance with the CPUC requirements for line field management.

Industry's and Applicant's Approach to Reducing EMF Exposures

The present focus is on the magnetic field. This is because unlike electric fields, magnetic fields would penetrate the soil, buildings, and other materials to produce the types of human exposures at the root of health concerns. The industry seeks to reduce exposure, not by setting specific exposure limits, but through design guidelines that minimize exposure in each given case.

As one focuses on the strong magnetic fields from the more visible high-voltage power lines, staff considers it important, for perspective, to note that an individual in a home could be exposed to much stronger fields than those produced by high-voltage lines while using some common household appliances (National Institute of Environmental Health Sciences 1998). The difference between these types of field exposures is that the higher-level, appliance-related exposures are short term duration, while the exposures from power lines are lower level, but long term duration. Scientists have not established which of these exposure types would be more biologically meaningful in the individual. Staff notes such exposure differences only to show that high-level magnetic field exposures regularly occur in areas other than around high-voltage power lines.

As with similar SCE lines, specific field strength-reducing measures would be incorporated into the proposed line design to ensure the field strength minimization currently required by the CPUC in light of the concern over EMF exposure and health.

The field reduction measures that could be applied include the following:

1. increasing the distance between the conductors and the ground to an optimal level;
2. reducing the spacing between the conductors to an optimal level;
3. minimizing the current in the line; and
4. arranging current flow to maximize the cancellation effects from interacting of conductor fields.

Since as previously noted, the route of the proposed project's transmission lines would be close to no nearby residences, the long-term residential field exposures at the root of health concerns would not be a significant concern. The field strengths of most significance in this regard would be those encountered within the boundaries of the existing Alamitos Generating Station. These field intensities would depend on the effectiveness of the applied field-reducing measures. The applicant calculated the maximum electric and magnetic field intensities expected when the two proposed line circuits are energized. The maximum electric field strength was calculated as 0.73 kV/m directly underneath the AEC generation tie lines and 0.45 kV/m at the edge of the AEC boundary. The maximum operational magnetic field strength was calculated as 63.44 mG underneath the lines and 38.88 mG at the edge of the AEC site boundary. All the measurements are well below regulatory levels established by states that do have limits (AEC 2015i, Section 3.3.2.1). These field strength values are similar to those of similar SCE lines (as required under current CPUC regulations) but, in the case of the magnetic field, the estimate is much less than the 150- 250 mG currently specified by the few states with regulatory limits. The requirements in Condition of Certification **TLSN-2** for field strength measurements are intended to assess the applicant's assumed field reduction efficiency.

CUMULATIVE IMPACTS

Operating any given project may lead to significant adverse cumulative impacts when its effects are considered cumulatively considerable. "Cumulatively considerable" means in this context that the incremental field and non-field effects of an individual project would be significant when considered together with the effects of past, existing, and future projects (California Code Regulation, Title 14, section 15130). When field intensities are measured or calculated for a specific location, they reflect the interactive, and therefore, cumulative effects of fields from all contributing conductors. This interaction could be additive or subtractive depending on prevailing conditions. For the proposed project's transmission lines, this interaction would occur between the AEC-related fields and the fields from nearby SCE lines. Since the proposed project's transmission lines would be designed, built, and operated according to applicable field-reducing SCE guidelines (as currently required by the CPUC for effective field management), any contribution to cumulative area exposures should be at levels expected for SCE lines of similar voltage and current-carrying capacity and not considered environmentally significant in the present health risk-based regulatory scheme. The actual field strengths and contribution levels for the proposed line design would be assessed from the results of the field strength measurements specified in Condition of Certification **TLSN-2**.

COMPLIANCE WITH LORS

As previously noted, current health risk driven CPUC policy on EMF management requires that any high-voltage line within a given area be designed to incorporate the field strength-reducing guidelines of the main area utility lines to be interconnected. The utility in the case of AEC is SCE. Since the proposed project's 230-kV lines would be designed according to the respective requirements of the LORS listed in **TLSN Table 1**, and operated and maintained according to current SCE guidelines on line safety and field strength management, staff considers the proposed design and operational plan to be in compliance with the health and safety requirements of concern in this analysis. The actual contribution to the area's field exposure levels would be documented for the proposed route from results of the field strength measurements required in Condition of Certification **TLSN-2**.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

To date, staff has received no public or agency comments on the transmission line nuisance and safety aspects of the proposed AEC and would reply to any such comments received in the Final Staff Assessment (FSA) document for the project.

NOTEWORTHY PUBLIC BENEFITS

Since the proposed tie-in lines would pose specific, although insignificant, risks of the field and nonfield effects of concern in this analysis, their building and operation would not yield any public benefits regarding the effort to minimize any human risks from these impacts.

FACILITY CLOSURE

If the proposed AEC were to be closed and decommissioned, and all related structures are removed as described in the **Project Description** section, the minimal electric shocks and fire hazards from the physical presence of this tie-in line would be eliminated. Decommissioning and removal would also eliminate the transmission lines' field and non-field impacts assessed in this analysis in terms of nuisance shocks, radio-frequency impacts, audible noise, electric and magnetic field exposure, and aviation safety. Since the lines would be designed and operated according existing SCE guidelines, these impacts would be as expected for SCE lines of the same voltage and current-carrying capacity and therefore, at levels reflecting compliance with existing health and safety LORS.

CONCLUSIONS

AEC construction and operation, including the two new generation tie lines replacing the existing six tie lines to SCE's existing switchyard and transmission system, is not expected to result in significant changes in EMF levels, corona, audible noise, or radio and television interference.

Since staff does not expect the proposed 230-kV transmission tie-in lines to pose an aviation hazard according to current FAA criteria, staff does not consider it necessary to recommend specific location changes on the basis of a potential hazard to area aviation.

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

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

Since electric or magnetic field health effects have neither been established nor ruled out for the proposed AEC and similar transmission lines, the public health significance of any related field exposures cannot be characterized with certainty. The only conclusion to be reached with certainty is that the proposed line design and operational plan would be adequate to ensure that the generated electric and magnetic fields are managed to an extent the CPUC considers appropriate in light of the available health effects information. The long-term, mostly residential, magnetic exposure would be insignificant for the proposed lines given the absence of residences along the proposed route. On-site worker or public exposure would be short term and at levels expected for SCE lines of similar design and current-carrying capacity. Such exposure is well understood and has not been established as posing a significant human health hazard.

Since the proposed project's lines would be operated to minimize the health, safety, and nuisance impacts of concern to staff and would be routed within an area with no nearby residences, staff considers the proposed design, maintenance, and construction plan as complying with the applicable LORS. With implementation of the four recommended conditions of certification, any such impacts would be less than significant.

PROPOSED CONDITIONS OF CERTIFICATION

TLSN-1 The project owner shall construct the proposed 230-kV transmission lines according to the requirements of California Public Utility Commission's GO-95, GO-52, GO-131-D, Title 8, and Group 2, High Voltage Electrical Safety Orders, sections 2700 through 2974 of the California Code of Regulations, and Southern California Edison's EMF reduction guidelines.

Verification: At least 30 days prior to start of construction of the transmission lines or related structures and facilities, the project owner shall submit to the compliance project manager (CPM) a letter signed by a California registered electrical engineer affirming that the lines will be constructed according to the requirements stated in the condition.

TLSN-2 The project owner shall measure the maximum strengths of the line electric and magnetic fields at the edge of the right-of-way to validate the estimates the applicant has provided for these fields. These measurements shall be made (a) according to the standard procedures of the American National Standard Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE) and (b) before and after energization. The measurements shall be completed no later than six months after the start of operations.

Verification: The project owner shall file copies of the pre-and post-energization measurements with the CPM within 60 days after completion of the measurements.

TLSN-3 The project owner shall ensure that the route of the proposed transmission line is kept free of combustible material, as required under the provisions of GO-95 and section 1250 of Title 14 of the California Code of Regulations.

Verification: During the first five (5) years of plant operation, the project owner shall provide a summary of inspection results and any fire prevention activities carried out along the proposed route and provide such summaries in the Annual Compliance Report on transmission line safety and nuisance-related requirements.

TLSN-4 The project owner shall ensure that all permanent metallic objects within the proposed route are grounded according to industry standards.

<u>Verification:</u> At least 30 days before the lines are energized, the project owner shall transmit to the CPM a letter confirming compliance with this condition.

REFERENCES

EPRI — Electric Power Research Institute 1982. Transmission Line Reference Book: 345 kV and Above.

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VISUAL RESOURCES

John Hope

SUMMARY OF CONCLUSIONS

The proposed Alamitos Energy Center (AEC) project would be constructed at the site of the existing Alamitos Generating Station (AGS). Critical off-site viewpoints, referred to as key observation points (KOPs), were selected to represent primary viewer groups and sensitive viewing locations in a defined area surrounding the project site where visual impacts could occur. California Energy Commission staff did not identify significant visual resources impacts at three of the four KOPs used in the analysis for the AEC and visual impacts at these KOPs are considered less than significant. Impacts at KOP 4 are considered less than significant with mitigation incorporated (Condition of Certification **VIS-2**).

Staff evaluated the potential effects of the long-term schedule for the proposed construction of the AEC. Staff concludes that construction and commissioning activities would not substantially degrade the existing visual character and quality of the site and its surroundings. In addition, staff analyzed the potential for lighting of the project site and structures during construction, commissioning, and operation to create new sources of substantial light or glare. Staff proposes Conditions of Certification **VIS-1, VIS-2**, and **VIS-4** to reduce potential effects of lighting and glare on nighttime and daytime views to less than significant.

The project site is in the state's Coastal Zone. Section 30251 of the California Coastal Act requires that the scenic and visual qualities of coastal areas be considered and protected as resources of public importance. Permitted development must be sited and designed to restore and enhance visual quality in visually degraded areas where feasible. The applicant has indicated that a landscape design plan would be prepared for the AEC prior to commencement of construction. The plan would provide details as to how the project owner intends to enhance visual quality at the project site. Staff proposes Condition of Certification **VIS-3** to require preparation of landscaping plans prior to project implementation to satisfy the requirements of the city of Long Beach's South East Area Development and Improvement Plan (SEADIP) Specific Plan, the certified local coastal program for this area of the state.

INTRODUCTION

Visual resources are the natural and cultural features of the environment that can be viewed. Visual resources also include "sensitive viewing areas," which are areas consisting of uses such as residential, recreational, travel routes, and tourist destinations, and the people within those use areas, or "sensitive viewers." This analysis focuses on whether the AEC would cause significant adverse visual impacts and whether the project would be in compliance with applicable laws, ordinances, regulations and standards (LORS). The California Environmental Quality Act (CEQA) requires the California Energy Commission to determine the potential for significant impacts to visual resources resulting from the proposed project.

Visual Resources Appendix-1 (VR Appendix-1), Visual Resources Terms, Definitions, and Analysis Method, describes the visual resources methodology employed for the CEQA analysis (Energy Commission staff's methodology), and the "Method and Threshold for Determining Significance" subsection below describes the thresholds for determining environmental consequences. In accordance with staff's procedure, conditions of certification are proposed as needed to reduce potentially significant impacts (under CEQA) to less than significant levels or to the extent possible, and to ensure LORS conformance, if feasible.

This section describes existing visual resources conditions in the vicinity of the proposed AEC and assesses changes to those conditions that would occur from construction and operation of the proposed project.

Staff visited the project site in October 2013 and surveyed existing visual resources in the project area. The descriptions of visual resources in this analysis are based on staff's direct observations, proposed project materials and data prepared by the applicant and submitted to the Energy Commission in October 2015, and other information and planning documents addressing visual resource conditions and issues in the project area.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

LORS pertaining to aesthetics and protection of sensitive visual resources are summarized below. Further details on applicable LORS and analyses of the proposed project's consistency with specific policies and ordinances are discussed below under "Compliance with Laws, Ordinances, Regulations, and Standards." No federal LORS pertaining to visual resources are applicable to the proposed AEC.

STATE

California Coastal Act of 1976

The California Coastal Commission (Coastal Commission) was established by voter initiative in 1972 and later made permanent by the California State Legislature through adoption of the California Coastal Act of 1976 (Coastal Act) (Pub. Resources Code § 30000 et seq.). The Coastal Act includes policies addressing many environmental and land use management issues and defines the Coastal Zone boundary where those policies apply. Section 30001.5 of the Coastal Act includes a declaration to "protect, maintain, and where feasible, enhance and restore the overall quality of the coastal zone environment and its natural and artificial resources." Section 30251 of the Coastal Act requires that the scenic and visual qualities of coastal areas be considered and protected as resources of public importance.

Implementation of Coastal Act policies is accomplished primarily through preparation of local coastal programs (LCPs) by local municipalities that are located wholly or partly in the Coastal Zone. The city of Long Beach is a shoreline community, a portion of which is in the state's Coastal Zone. Coastal Act policies are the standards by which the Coastal Commission evaluates the adequacy of an LCP. An LCP includes a land use plan (LUP), which may be the relevant portion of the local general plan, including any maps necessary to administer the plan; and zoning ordinances, zoning district maps, and other legal instruments necessary to implement the LUP (Coastal Commission 2016).

The city of Long Beach's LCP was prepared to implement the Coastal Act, to "supplement and enhance" the Coastal Act, and to protect and enhance the city's Coastal Zone and its resources (City of Long Beach 1980, I-2 – I-3). The LCP was certified by the Coastal Commission in 1980 (City of Long Beach 2016a).

LOCAL

City of Long Beach General Plan

Applicable goals, objectives, and policies in the Long Beach General Plan include those pertaining to visual and aesthetic resources in general, development in areas designated as Mixed Use, and development in the Coastal Zone. The city prepared the Local Coastal Program of its General Plan to guide development for its portion of the Coastal Zone. The General Plan Open Space and Recreation Element, Air Quality Element, Land Use Element, and Conservation Element also contain goals, objectives, and policies that are potentially applicable to the proposed project.

South East Area Development and Improvement Plan (SEADIP)

The SEADIP includes provisions pertaining to visual and character quality of development from public views and surrounding development, along with landscaping requirements.

City of Long Beach Municipal Code Zoning Ordinance

The purpose of the city's zoning ordinance is to regulate land use development within the city of Long Beach in conformance with the general plan. Chapter 21.37 (Planned Development Districts) includes the SEADIP Specific Plan (PD-1), which implements the policies of the city's certified LCP. In addition, Chapter 21.42 contains development and design standards that are applicable to landscaped areas.

SETTING

PROJECT AREA CHARACTERISTICS

The project area is characterized by flat, sea-level topography built with urban mixed uses (e.g., industrial, commercial, residential) and pockets of maritime land uses including the San Gabriel River, Los Cerritos Channel, marina, open spaces, wetlands, and marina-oriented commercial businesses.

The existing AGS is situated on a flat coastal plain with a site elevation of approximately 10 to 20 feet above mean sea level (msl). The project site is located between the San Gabriel River and Los Cerritos Channel. The ridgeline of the hills beyond San Pedro to the northwest and the Santa Ana Mountains to the southeast are visible in background views from the project area. Roughly the southern half of the existing AGS site is located within the coastal zone and the northern half of the site is located outside of the Coastal Zone. A portion of the proposed AEC Power Block 1 and the construction access road would be constructed within the Coastal Zone.

The AEC would be located in an area of existing energy facilities that is surrounded by residential neighborhoods, open spaces, commercial developments, transportation corridors, and a marina and harbor area. The area on the north side of the AEC site includes the Southern California Edison (SCE) 230-kilovolt (kV) switchyard. The Plains West Coast Terminals Tank Farm encompasses the area on the south side of the AEC site.

The San Gabriel River Bike Trail parallels both banks of the San Gabriel River and is adjacent to the AEC site. The Los Angeles Department of Water and Power (LADWP) Haynes Generating Station occupies a large site on the east side of the San Gabriel River and east of the AEC site. Immediately beyond the LADWP generating facility is the senior residential community known as Leisure World.

PROJECT SITE CHARACTERISTICS

The existing AGS site would be used for construction and operation of the proposed AEC. The six AGS exhaust stacks, over 200 feet tall, and the generating units behind the stacks, are approximately 750 feet from the nearest residential neighborhood (University Park Estates located west across the Los Cerritos Channel). Compared to other development in the surrounding area, including the relatively low-profile tank farm, the AGS, SCE switchyard transmission structures, and LADWP generating facility are the most visually prominent, built features in the project area.

The northwest corner of the existing AGS site, adjacent to the main entrance, is landscaped with trees and shrubs. The main entrance to the AGS is from North Studebaker Road. Views toward the AEC site from the north, west, and south are partially limited because of tree and shrub landscaping along adjacent roadways (i.e., Studebaker Road, Westminster Avenue, Highway 22).

The applicant describes existing lighting of the AGS structures as being equipped with red flashing aviation safety lights on the top of the existing exhaust stacks and exposed stairways and scaffolding are illuminated with bright, unshielded bulbs (AES 2015, 5.13-14).

The existing AGS generates steam to produce electricity, and the technology and operational characteristics produce visually prominent water vapor plumes from the exhaust stacks. Based on staff's review of photographs of the power plant, a visible plume emanates from the exhaust stack in varying weather conditions. Water vapor plumes form more frequently and are most visible during daytime hours in the winter when the sky is relatively clear. Highly visible water vapor plumes from the existing power plant slightly increase the industrial character and appearance of the site.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHODS AND THRESHOLDS FOR DETERMINING SIGNIFICANCE

CEQA provides a series of broad policy statements addressing environmental protection, including the requirement to: "Take all action necessary to provide the people of this state with clean air and water, enjoyment of *aesthetic, natural, scenic*, [emphasis added] and historic environmental qualities..." (Pub. Resources Code § 21001 [b]).

Staff uses the environmental checklist in the "Aesthetics" section of Appendix G of the CEQA Guidelines and professional practices for visual resource assessments to evaluate the potential effects of a project on visual resources. From the State CEQA Guidelines, an impact on visual resources is considered significant if the project would:

1. Have a substantial adverse effect on a scenic vista;

2. Substantially damage scenic resources, including but not limited to trees, rock outcroppings, and historic buildings within a state scenic highway;

3. Substantially degrade the existing visual character or quality of the site and its surroundings, or;

4. Create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area.

The CEQA Guidelines define a significant effect on the environment to mean a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project, including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance" (Cal. Code Regs., tit.14, § 15382). The section, "Direct and Indirect Impacts and Mitigation Measures," (below) includes a complete analysis of impacts from the proposed project.

Vista can be defined as a distant view through or along an avenue or opening. For this visual resources analysis, the definition of a scenic vista is expanded to include views that include remarkable or memorable scenery or views of a natural or cultural feature that is indigenous to the area. The proposed AEC would be constructed in a mostly developed area of Southern California. Views in the vicinity of the existing AGS primarily include built elements typical of urban development in similar urbanized areas. No particular view in the project vicinity has a level of scenic appeal that could distinguish it as a scenic vista. Because the AEC would have no impact on a scenic vista, no further analysis of the project relating to this criterion is necessary.

There are no scenic resources on the AEC site that could be damaged by the proposed project. The Pacific Coast Highway (PCH) (State Route 1) extends approximately ½-mile to the southwest of the AEC site and is part of a much longer segment of the highway extending north and south of the site. Segments of the PCH in Ventura, Los Angeles, and Orange counties are on the list of eligible state scenic highways, as shown on the California Scenic Highway Program website (California Department of Transportation 2016); however, the PCH is not an officially designated state scenic highway in the region. No further analysis of the project relating to this criterion is necessary.

The analysis below is focused on Appendix G questions 3 and 4.

Analysis Method

The method for this assessment of impacts on visual resources is primarily adapted from guidelines used by the U.S. Forest Service, U.S. Bureau of Land Management, and U.S. Department of Transportation. These guidelines are useful and meaningful for assessing the potential impacts of projects in various environmental settings, including the setting for the proposed AEC.

The process to evaluate potential impacts on visual resources from construction and operation of the AEC involved these general steps:

- Define the visual environment, or visual sphere of influence (VSOI), within which visual impacts could occur. As stated in the Application for Certification (AFC), the VSOI may be refined based on computer viewshed analysis and mapping.
- Describe sensitive viewpoints and the process to select key observation points, or critical viewpoints, within the VSOI for the project.
- Evaluate the potential effects of the project on visual resources based on the estimated visual sensitivity of the viewing public, the probability that the project site and area would demonstrate a noticeable visual impact with project implementation, and the estimated magnitude of the visual change that would occur with project construction and operation.
- Evaluate whether the proposed project would comply with applicable LORS for protection of visual and aesthetic resources.

Visual Resources Appendix-1 (Appendix VR-1) of this staff assessment, **Visual Resources Terms, Definitions, and Analysis Method**, provides further detail on the approach and process used in this visual resources analysis.

Visual Sphere of Influence

The VSOI for the proposed AEC takes into account the estimated visibility of its most visible structures on the project site, existing development in the area, and other variables potentially affecting visibility of the site. The highest level of visibility exists when the viewer is stationary and has direct and close-up views of the site (e.g., nearby residents). A lower level of visibility exists, for example, when the viewer is farther from the site (e.g., residents that are approximately a mile or more from the site) and/or are traveling on local roadways not immediately adjacent to the site.

The limits of the VSOI for the project generally extend to encompass the furthest distance at which potentially significant visual impacts could occur. For views of the AEC, this distance was determined by staff to be approximately 1½ miles. At greater distances, the mass of project structures in the views would be much less dominant compared to views at closer distances.

Process to Select Key Observation Points

Sensitive Viewing Areas and Identification of Key Observation Points

The visual analysis for the proposed AEC involved identifying key observation points (KOPs), or critical viewpoints that would most clearly show the visual effects of the proposed project. Results of the VSOI analysis and photographic survey for the AEC resulted in selection of four critical viewpoints to represent views from areas with relatively high levels of visual sensitivity. KOPs were selected to represent viewing conditions from nearby residential neighborhoods and recreation areas. **Visual Resources (VR) Figure 1** shows the results of the viewshed analysis and the KOPs for the proposed project. **VR Figure 2** shows further detail for the project area. The four KOPs selected for this analysis are:

KOP 1 – View from Channel View Park / Long Beach Bikeway Route 10

KOP 2 – View from University Park Estates

KOP 3 – View from Marine Stadium Park

KOP 4 – View from Loynes Drive

Major AEC Components

The proposed project components would be located entirely on the existing AGS 63-acre site; no off-site linear elements are proposed. The project would include a new, single-circuit, on-site 230-kV transmission line to interconnect the proposed power blocks to the existing SCE 230-kV switchyard adjacent to the north. **VR Table 1** summarizes the dimensions and quantities of the project components on the AEC site that would likely be visible to the public from offsite locations.

Visual Resources Table 1
Visually Prominent Proposed AEC Structures

Project Feature	Length (feet)	Width (feet)	Height (feet)	Diameter (feet)	Color	Materials	Finish
Combined-Cycle Power Block 1							
Administration Building	100	50	25	---	Tan		Flat / Untextured
Water Treatment Building	75	70	20	---	Tan	Ribbed Sheet Steel	Flat / Untextured
Warehouse Building	100	60	25	---	Tan	Ribbed Sheet Steel	Flat / Untextured
Gas Compressor Building	100	62	25	---	Tan	Ribbed Sheet Steel	Flat / Untextured
Air Cooled Condenser	299	211	104	---	Gray	A-36 Steel Shapes	Flat / Untextured
Demin Water Storage Tank	---	---	25	28	Gray	A-36 Steel	Flat / Untextured
Steam Turbine and Generator (STG)	90	33	62	---	Gray	A-36 Steel Plate	Flat / Untextured
STG Step-Up Transformer	28	16	25	---	Gray	Mid Steel Plate	Flat / Untextured
Combustion Turbine	56	25	29	---	Gray	Steel	Flat / Untextured
Combustion Turbine Generator (CTG)	37	18	28	---	Gray	Steel	Flat / Untextured
Air Inlet Filter	45	25	40	---	Gray	Custom Steel Shape	Flat / Untextured
Fuel Gas Filter/Separator	11	11	22	18	Gray	Custom Steel Shape	Flat / Untextured
Generator Breaker	19	15	28	---	Gray	Mid Steel Plate	Flat / Untextured
CTG Step-Up Transformer	30	23	25	---	Gray	Custom Steel Shape	Flat / Untextured
Heat recovery steam generator (HRSG)	139	57	95	38	Gray	A-36 Steel Plate	Flat / Untextured
Stack	---	---	140	20	Gray	A-36 Steel Plate	Flat / Untextured
Blowdown Tank	---	---	20	9	Gray	A-36 Steel	Flat / Untextured
Auxiliary Boiler and Associated Equipment	40	41	38	---	Gray	Ribbed Sheet Steel	Flat / Untextured

Project Feature	Length (feet)	Width (feet)	Height (feet)	Diameter (feet)	Color	Materials	Finish
Air Cooled Heat Exchanger	81	56	35	---	Gray	Mild Steel Plate	Flat / Untextured
Waste Water Tank	---	---	25	28	Gray	A-36 Steel	Flat / Untextured
Condensate Tank	---	---	25	28	Gray	A-36 Steel	Flat / Untextured
Transformer Wall	50	40	28	---	Untinted	Concrete	Flat / Untextured
Acoustical Barrier	262	182	35	---	Untinted	Concrete	Flat / Untextured
Single-Cycle Power Block 2							
Fin Fan Cooler	151	130	32	---	Gray	A-36 Steel Shapes	Flat / Untextured
Site Fence	---	---	7	---	Gray	Steel	Flat / Untextured
Combustion Turbine	60	20	15	---	Gray	Steel	Flat / Untextured
Combustion Turbine Generator	28	22	28	---	Gray	Steel	Flat / Untextured
Air Inlet Filter	48	35	14	---	Gray	Custom Steel Shape	Flat / Untextured
Fuel Gas Compressors	42	27	18	---	Gray	Ribbed Sheet Steel	Flat / Untextured
Intercooler Skid	50	31	14	---	Gray	Structural Steel Shape	Flat / Untextured
Stack	---	---	80	13.5	Gray	A-36 Steel Plate	Flat / Untextured
Selective Catalytic Reduction (SCR) Unit	37	23	38	---	Gray	Mid Steel Plate	Flat / Untextured
Combustion Turbine VBV Silencer Stack	---	---	48	11	Gray	A-36 Steel Plate	Flat / Untextured

Source: AES 2015, pp. 5.13-10 - 5.13-11

Steps in the KOP Analysis

The evaluation of the visual sensitivity for each representative KOP includes consideration of five factors: visual quality, viewer concern, visibility, number of viewers, and duration of view (see Diagram 1 in **Appendix VR-1**). Overall viewer exposure for each KOP is generally based on an average of the values for site visibility, number of viewers, and duration of view. Overall visual sensitivity is generally based on an average of the values for visual quality, viewer concern, and overall viewer exposure. **Appendix VR-1** includes definitions for the key terms used in this analysis.

The assessment of visual impacts by staff is based on the change that would occur from the introduction of new built elements in the VSOI. The *overall visual change* is typically based on an average of the values for *contrast, dominance,* and *view blockage* for each KOP. The rating scale to assess visual sensitivity and visual change ranges from low to high for each factor. **Visual Resources Appendix-2 (VR Appendix-2), Key Observation Point Evaluation Matrix and Visual Impact Determination Conclusions,** describes the rating scale and summarizes the evaluations for each KOP's existing and proposed condition and the visual impact determination conclusion of the proposed project at each KOP. The ratings for *overall visual sensitivity* and *overall visual change* are combined to determine the visual impact significance for each KOP using **VR Appendix-1, Table 5 – KOP Visual Impact Significance Determination**).

Visual Sensitivity for the KOPs

The discussion above under, "Steps in the KOP Analysis," summarizes the process to determine impact significance. **Appendix VR-1** describes key terms and the method used by staff to evaluate effects of a project on visual resources.

KOP 1 – View from Channel View Park / Long Beach Bikeway Route 10 (Existing Condition)

Channel View Park extends along the Los Cerritos Channel adjacent to the University Estates residential neighborhood. The park encompasses 5.28 acres of land and incorporates a portion of the Long Beach bikeway between Loynes Drive and 7th Street. Kettering Elementary School is located adjacent to the northern extent of the park. KOP 1 is located within the park at the end of 5th Street across the Los Cerritos Channel.

Visual Resources Figure 3a shows the existing view from KOP 1 looking southeast toward the project site. Channelized water in the Los Cerritos Channel along with its rock bed and scrub brush along the top of the banks are visible in the foreground. Trees adjacent to Studebaker Road and on the western edge of the AGS site, along with utility lines, create the middle ground and screen the lower levels of the AGS structures and screen distant views beyond the site. The six existing AGS stacks and scaffolding-covered boiler are skylined above the treetops. Traffic traveling along Studebaker Road is also in the view.

The existing AGS power plant is composed of immense, complex, mechanical structures in an area where the built environment is generally characterized by low buildings (e.g., residences, commercial businesses) and relatively open views of the nearby residential and recreational uses. There is little or no visual coherence or harmony in the southeastward view from KOP 1 and from other nearby viewpoints from Channel View Park. The AGS power plant is a visually discordant built element in the view and visual quality for KOP 1 is characterized as low.

Viewers at KOP 1 include recreationists engaged in passive and active recreational activities in Channel View Park and/or Long Beach Bikeway. Viewers near KOP 1 include persons walking, bicycling, and jogging on the bikeway that parallels the Los

Cerritos Channel along with people picnicking in the park. Other viewer groups near KOP 1 include students at Kettering Elementary School located at the northern extent of Channel View Park. Viewer concern for visitors to Channel View Park and Long Beach Bikeway and other viewpoints near KOP 1 is considered high.

Under existing conditions, the lower portions of the AGS power plant structures are screened, but given their height and bulk, views of the AGS from KOP 1 are mostly unimpeded. As a result, the AGS power plant structures block the views of the proposed AEC site. Therefore, visibility of the AEC project site at this location is low.

The city of Long Beach classifies Channel View Park as a greenway park which is a largely undeveloped green space, often a remnant or odd shaped piece of land left over from development, which can be used for casual recreation uses. The city does not provide an estimate as to the number of users of a greenway park; therefore, staff presumes that the number of recreational users per day averages over 200 and that the number of viewers for KOP 1 is high (see Table 2 in **Appendix VR-1**). The duration of view for KOP 1 varies depending on the visitor’s type of activity and whether a recreational activity is active (e.g., bicycling, jogging) or passive (e.g., walking, picnicking). Duration of view for KOP 1 is considered high or moderate to high.

Based on the ratings for visibility, number of viewers, and duration of view, overall viewer exposure for KOP 1 is considered moderate.

Due to the dominance of the AGS in views from KOP 1, visual quality is characterized as low. Viewer concern is characterized as high. Based on the ratings for visual quality, viewer concern, and overall viewer exposure, overall visual sensitivity for KOP 1 is considered *moderate*.

KOP 2 – View from University Park Estates (Existing Condition)

University Park Estates, located to the west across the Los Cerritos Channel, is the closest residential neighborhood to the AEC site. The neighborhood is located between 7th Street and Loynes Drive and is adjacent to Channel View Park and Long Beach Bikeway Route 10. KOP 2 is located within the neighborhood at the intersection of Silvera Street and Eliot Street.

Visual Resources Figure 4a shows the existing view from KOP 2 looking east toward the AEC site. Hardscape of the street and front yard landscaping dominate the foreground view. Trees and utility lines located at the end of Eliot Street and in Channel View Park create the middle ground and screen the lower levels of the AGS and screen distant views beyond the AEC site. Six existing AGS stacks and a scaffolding-covered boiler are skylined above the treetops. Multiple vapor plumes may occasionally be seen by residents from the multiple stacks during weather conditions conducive to plume formation, further emphasizing the industrial character of development within close proximity to the residential subdivision.

The existing AGS encompasses immense, complex, mechanical structures in an area where the built environment is generally characterized by low buildings (e.g., residences, commercial businesses) and relatively open views of the nearby residential and recreational uses. There is little or no visual coherence or harmony in the eastward view from KOP 2 and from other nearby viewpoints from University Park Estates. The AGS is a visually discordant built element in the view and visual quality for KOP 2 is characterized as low.

Viewers at KOP 2 include motorists and residents engaged in active and passive recreational activities. Viewers near KOP 2 include people driving a vehicle or bicycling on the street and people walking or jogging on sidewalks. Other viewer groups near KOP 2 include people relaxing in their front or backyard. Viewer concern for residents in University Park Estates and other viewpoints near KOP 2 is considered high.

Under existing conditions, the lower portions of the AGS structures are screened by trees in Channel View Park, but given the height and bulk of the power plant structures, views of the AGS from KOP 2 are mostly unimpeded. As a result, the AGS power plant structures block the views of the proposed AEC site. Therefore, visibility of the project site at this location is low.

Staff presumes that the number of users per day averages over 200 and that the number of viewers for KOP 2 is high (see Table 2 in **Appendix VR-1**). The duration of view for KOP 2 varies depending on the visitor's type of activity and whether a recreational activity is active (e.g., driving, jogging) or passive (e.g., walking, sitting). Duration of view for KOP 2 is considered high or moderate to high.

Based on the ratings for visibility, number of viewers, and duration of view, overall viewer exposure for KOP 2 is considered moderate to high.

Due to the dominance of the AGS in views from KOP 2, visual quality is characterized as low. Viewer concern is characterized as high. Based on the ratings for visual quality, viewer concern, and overall viewer exposure, overall visual sensitivity for KOP 2 is considered *moderate*.

KOP 3 – View from Marine Stadium Park (Existing Condition)

Marine Stadium Park is located at the confluence of the Los Cerritos Channel and Alamitos Bay (Marine Stadium portion). Marine Stadium is popular location for rowing, water skiing, and speedboats. KOP 3 is located within the park at the intersection of Appian Way and Bay Shore Avenue adjacent to Marine Stadium (**VR Figure 5a**, existing view).

Visual Resources Figure 5a shows the existing view from KOP 3 looking northeast toward the AEC site. Channelized water in the Alamitos Bay, along with buoys, dominates the foreground. Docked boats, trees, and various developments (e.g., residential, recreation, commercial) adjacent to the waterline create the middle ground. The AGS is viewable in distant background down the Los Cerritos Channel. Six stacks of the existing AGS are skylined above the waterline.

The existing AGS power plant is composed of immense, complex, mechanical structures in an area where the built environment is generally characterized by low buildings (e.g., residences, commercial businesses) and relatively open views of the nearby residential and recreational uses. The physical boundaries of the Los Cerritos Channel create a visual coherence and harmony in the northeastward view from KOP 3 and from other nearby viewpoints from Marine Stadium. The AGS power plant is not a visually discordant built element in the view because of the distance between the observation point and the site. Visual quality for KOP 3 is characterized as moderate.

Viewers at KOP 3 include recreationists engaged in passive and active recreational activities in Alamitos Bay and/or Stadium Park. Viewers near KOP 3 include people recreating on the water in Alamitos Bay and Los Cerritos Channel. Other viewer groups near KOP 3 include residents along the waterfront. Viewer concern for visitors to Marine Stadium and other viewpoints near KOP 3 is considered high.

Under existing conditions, the AGS power plant structures are not screened from KOP 3. Although the height and bulk of the power plant structures are substantial and views of the AGS from KOP 3 are mostly unimpeded, the viewing distance to the power plant reduces the scale of the power plant structures to blend with development in the middle ground along the waterfront. Therefore, visibility of the project site at this location is considered low.

The city of Long Beach classifies Marine Stadium Park as a special use park which provides unique cultural heritage and/or educational features which attract a broad audience from near and far. The city does not provide an estimate as to the number of users of a special use park; however, Marine Stadium Park is public boat launch and the city identifies it as one of the world's premier water skiing facilities. Staff presumes that the number of recreational users per day averages over 200 and that the number of viewers for KOP 3 is high (see Table 2 in **Appendix VR-1**). The duration of view for KOP 3 varies depending on the visitor's type of water activity (e.g., paddling, water skiing). Duration of view for KOP 3 is considered moderate.

Based on the ratings for visibility, number of viewers, and duration of view, overall viewer exposure for KOP 3 is considered moderate.

Due to the AGS not being a dominant visual element from KOP 3, visual quality is characterized as moderate. Viewer concern is characterized as high. Based on the ratings for visual quality, viewer concern, and overall viewer exposure, overall visual sensitivity for KOP 3 is considered *moderate to high*.

KOP 4 – View from Loynes Drive (Existing Condition)

Loynes Drive traverses in an east-west direction to the west of the project site. Loynes Drive deadends at Studebaker Road, which extends adjacent to the western boundary of the project site. Motorists traveling east along Loynes Drive have a direct, unobstructed view of the project site. KOP 4 is located on the bridge crossing over the Los Cerritos Channel within ¼ mile of the western edge of the project site.

Visual Resources Figure 6a shows the existing view from KOP 4 looking east toward the AEC site. The roadway surface and bridge components are visible in the foreground. Structures of the existing AGS and a storage tank dominate the middle ground view. Structures at the LADWP Haynes Generating Station can be seen in the background and blend in with the existing industrial structures at the AGS. Overall, the middle ground and background views are dominated by the prominence of the existing AGS and LADWP power plant structures.

The existing AGS power plant is composed of immense, complex, mechanical structures including whitewashed stacks and boilers with exposed scaffolding which add distinct elements to the viewpoint. The combination of vertical and horizontal forms creates little or no visual coherence or harmony in the eastward view from KOP 4. The human-made electrical generation facilities are visually discordant built elements in the view and visual quality for KOP 4 is characterized as low.

Viewers at KOP 4 primarily include motorists with the occasional pedestrian and bicyclist. Viewers near KOP 4 include primarily persons driving but also include those walking and bicycling. Viewer concern for viewers at KOP 4 is considered low.

Under existing conditions, the AGS power plant structures are not screened and fully portray their height and bulk. Overall, views of the AGS power plant from KOP 4 are unimpeded. Visibility of the project site at this location is very high.

Staff presumes that the number of recreational users per day averages less than 200 and that the number of viewers for KOP 4 is low (see Table 2 in **Appendix VR-1**). The duration of view for KOP 4 varies depending on the visitor's type of activity and whether a recreational activity is active (e.g., bicycling, jogging) or passive (e.g., walking, picnicking). Visitors to KOP 4 would primarily involve an active activity because there are no passive recreational facilities available at KOP 4. Duration of view for KOP 4 is considered low.

Based on the ratings for visibility, number of viewers, and duration of view, overall viewer exposure for KOP 4 is considered low to moderate.

Due to the dominance of the AGS in views from KOP 4, visual quality is characterized as low. Viewer concern is characterized as low. Based on the ratings for visual quality, viewer concern, and overall viewer exposure, overall visual sensitivity for KOP 1 is considered *low*.

DIRECT AND INDIRECT IMPACTS AND MITIGATION MEASURES

This assessment of impacts on visual resources addresses impacts that would occur from construction and operation of the power plant components at the AEC site. Due to the multi-year construction periods for the proposed project, impacts on visual resources from construction activities are considered to be long term rather than temporary.

Section 5.13.4 of the AFC, "Mitigation Measures," states that the proposed project "…would result in an overall visual quality which would remain the same. Because there will be no significant adverse visual impacts, given the existing conditions and the design features discussed [in the AFC], no additional mitigation measures are required" (AES 2015, pp. 5.13-17). Section 5.13.2.5 of the AFC, "Impact Significance," states that with implementation of the proposed project"… there will be no change in the views from KOPs 1 and 3, there will be a very minor and clearly less than significant change to the view from KOP 2, and there will be a slight positive change to the visual quality of the view from KOP 4" (AES 2015, pp. 5.13-16).

Staff's analysis under, "Visual Change for the KOPs," evaluates the visual resources impacts on sensitive viewer groups. The proposed project's potential to comply with applicable LORS is discussed below under, "Compliance with Laws, Ordinances, Regulations, and Standards."

Visual Change for the KOPs

The discussion above under, "Steps in the KOP Analysis," summarizes the process to determine impact significance. **Appendix VR-2** shows the KOP evaluation matrix summarizing the process to determine the visual impact conclusions described below.

KOP 1 – View from Channel View Park / Long Beach Bikeway Route 10 (Proposed Condition)

The visual simulation for KOP 1 shows the AEC as it would appear at the end of construction activities for a viewer at Channel View Park across the Los Cerritos Channel from the project site (**VR Figure 3b**, simulated view).

As shown in the simulated view, the collection of AGS structures, tanks, and stacks viewable beyond the tree line would remain. The new stacks as part of the AEC would be lower than the existing AGS stacks and the new heat recovery steam generator (HRSG) units would be smaller, sleeker units that would be hidden behind the tree line extending along the western perimeter of the project site. The scale and height of existing power plant structures would not change in the view. The proposed facility would be obstructed by the existing, intervening trees and infrastructure. The AEC would not be a dominant feature and would not disrupt any portion of the skyline at the tree line because the AEC stacks and HRSG units would not be visible features in the view from this location. With the implementation of the proposed AEC, the skyline would remain the same from this viewpoint.

The overall visual change is typically based on an average of the values for contrast, dominance, and view blockage. Although overall visual sensitivity for KOP 1 is considered moderate, the overall visual change as a result of the proposed AEC compared to existing conditions would be low (none). From this viewpoint, constructing new angular, metallic power plant structures would not change visual resource conditions to a notable or significant degree. Compared to existing conditions, implementation of the AEC would not change the existing visual character and quality of the site and its surroundings for views at or near KOP 1, and the impact is considered ***less than significant***.

KOP 2 – View from University Park Estates (Proposed Condition)

The visual simulation for KOP 2 shows the AEC as it would appear at the end of construction activities for a viewer at the intersection of Silvera Street and Eliot Street within the University Park Estates residential neighborhood (**VR Figure 4b**, simulated view).

As shown in the simulated view, the tall AGS stacks and boiler viewable beyond the neighborhood would remain. The new air-cooled condensers, HRSG units, and stacks would be shorter than existing structures, and would be mostly hidden behind the houses and vegetation in the foreground of the view. The overall scale and height of power plant structures in the view would not change. The proposed facility would be obstructed by the existing, intervening trees and residences and thereby would not change the contrast in the view nor change the overall dominance of power plant structures in the view. To the extent that they are visible, the air-cooled condensers, HRSG units, and stacks would create a solid line of developed features that would appear through breaks in trees located in Channel View Park. However, views of these structures would not extend above the highest portion of the tree line.

The existing tall stacks and scaffold-covered structures, which are currently the most visually discordant elements in the backdrop of the view, would not be removed as part of the proposed project. However, it should be noted that the project owner intends to remove the existing AGS power plant structures under terms of a memorandum of understanding (MOU) with the city of Long Beach at a future date. The new AEC stacks and HRSG units would appear lower than the trees and in line with residential rooftops, creating the appearance of an intact skyline.

Although overall visual sensitivity for KOP 2 is considered moderate, the overall visual change as a result of the proposed AEC compared to existing conditions would be low. From this viewpoint, constructing new angular, metallic power plant structures would not change visual resource conditions to a notable or significant degree. Compared to existing conditions, implementation of the AEC would slightly change the existing visual character and quality of the site and its surroundings for views at or near KOP 2, and the impact is considered ***less than significant***.

KOP 3 – View from Marine Stadium Park (Proposed Condition)

The visual simulation for KOP 3 shows the AEC as it would appear at the end of construction activities for a viewer at Marine Stadium Park across Alamitos Bay and down the Los Cerritos Channel from the project site (**VR Figure 5b**, simulated view).

As shown in the simulated view, the existing assemblage of structures and stacks would not be removed as part of the proposed project. However, the project owner intends to remove the existing AGS power plant structures under terms of an MOU with the city of Long Beach at a future date. The new elements as part of the AEC would appear similar in scale to the existing AGS features.

Features of the AEC would appear equal in dominance with the existing AGS power plant structures in the open view across Alamitos Bay and up the Los Cerritos Channel. Similarly, the AEC structures would not change the contrast in the view because features of the AEC structures would not appear strikingly different from the existing AGS. The combination of the human-made features creates a visual mosaic with various types, scales, colors, and forms. The AEC structures and stacks would increase the visual intactness of manmade structures across the horizontal plane. Structures of the AGS would continue to be silhouetted against the sky and viewable in the distance from Marine Stadium Park and nearby residences fronting the water. Construction of the proposed project would intensify the view of manmade structures in a continual horizontal pattern across the center view.

From this viewpoint, constructing new power blocks with angular, metallic power plant structures would change visual resource conditions to a noticeable degree. The overall visual change as a result of the proposed AEC compared to existing conditions would be moderate. Within the context of moderate to high visual sensitivity at KOP 3, this level of visual change compared to existing conditions would be considered a potentially significant impact. Implementation of staff's Condition of Certification **VIS-2** would minimize the potential for visual intrusion and reduce contrast by blending with the existing visual environment in the project area. ***Less than significant with mitigation incorporated***.

KOP 4 – View from Loynes Drive (Proposed Condition)

The visual simulation for KOP 4 shows the AEC as it would appear at the end of construction activities for a viewer on Loynes Drive at the bridge crossing over the Los Cerritos Channel (**VR Figure 6b**, simulated view).

As shown in the simulated view, the two stacks HRSG units, and the ACC associated with AEC Power Block 1, along with an assemblage of structures and stacks of the existing AGS, would be visible across the view. Two of the stacks in Power Block 2 are barely visible immediately to the left of the simulated Power Block 1 structures. The existing stacks and scaffolding at the LADWP Haynes Generating Station will remain partially visible in the view's background.

Features of the AEC would appear equal in dominance with the existing AGS power plant structures in the direct, unobstructed view from Loynes Drive. Similarly, the AEC structures would not change the contrast in the view because features of the AEC structures would not appear strikingly different from the existing AGS and Haynes power plants and the overall industrial nature of structures in the view. The combination of the human-made features creates a visual mosaic with various types, scales, colors, and forms. The AEC structures and stacks would increase the visual intactness of manmade structures across the horizontal plane. Structures of the AEC would be silhouetted against the sky similarly as the existing AGS structures. Construction of the AEC would intensify the view of manmade structures in the center view.

From this viewpoint, the new structures associated with the AEC would change visual resource conditions to a notable or considerable degree. Although the overall visual change would be moderate to high, within the context of the low visual sensitivity at KOP 4, the visual impacts of the AEC would be considered ***less than significant***.

Project Construction Visual Impacts

Construction Overview

The construction activities at the project site would occur on a single shift composed of a 10-hour workday, Monday through Friday, and a single 8-hour shift on Saturday. Construction would typically take place between the hours of 7:00 a.m. and 7:00 p.m., Monday through Friday, and 9:00 a.m. and 6:00 p.m. on Saturday. Overtime and additional shift work may be used to maintain the construction schedule or to complete critical construction activities (e.g., continuous pour and/or pouring concrete at night during hot weather, working around time-critical shutdowns and constraints).

The proposed project would require several areas for construction worker parking, storage, and laydown during site construction activities. Parking for workers would include an 8-acre area on the eastern and southern portions of the project site and a 10-acre area adjacent to the south of the project site. The adjacent 10-acre area is located along the west side of a rip rapped and channelized segment of the San Gabriel River that is flanked by industrial uses including the Los Angeles Department of Water and Power's Haynes Generating Station, decommissioned fuel oil tanks, high-voltage transmission lines, and the AGS. A segment of the San Gabriel River Bike Trail borders the east side of the river through this industrial area.

Existing vegetation and fencing would create a visual buffer and screening for views toward these open lots, which would presumably be full of vehicles during daylight hours and sometimes at night while construction progressed on the AEC.

Construction-Related Effects

The intensity of the long-term construction impact on visual resources would be greatest for sensitive viewer groups, primarily residents and recreationists, at the closest viewing distances to the project site. Construction activities would increase the presence and movement of heavy construction equipment and vehicles, large-scale construction work, and generation of dust over an approximately 5-year construction time frame at the project site. The long-term construction time frame could impact the ground surface on or adjacent to the project site from movement of heavy equipment and temporary storage of construction materials. Existing landscaped areas and the ground surface of areas at or near the AEC site would not be permanently impacted by the AEC. The construction parking and laydown areas are located in an existing disturbed area for utility uses. These areas are not located adjacent to public use areas. In addition, the AEC is located at or below the elevation of adjacent neighborhoods that surround the site which limits direct, unobstructed views of the construction areas. Neighborhoods located at an elevation above the AEC are located at a distance that substantially limits the ability of viewers to distinguish between construction equipment parked onsite and existing utility facilities.

The AEC is in an area with existing and former utility uses, and use of the 10-acre open lot at the AEC site for construction laydown would be a relatively minor change in visual resources conditions at this location. Long-term construction impacts at the AECP site would not substantially alter the visual character or quality of the site or surrounding area, and no impact on visual resources would occur.

Lighting and Glare Effects

Project Construction Lighting

Section 5.13.2.3.5 of the AFC, "Lighting," summarizes lighting requirements for night construction and commissioning activities. Although most construction activities would occur during daytime hours, additional hours could be necessary to make up schedule deficiencies or to complete critical construction activities (AES 2015, page 5.13-12). During some construction periods and the project commissioning/startup phase, work would continue 24 hours per day, 7 days per week. The frequency of nighttime work over the 5-year construction schedule is not known, and the applicant states that the project site could appear as a brightly lit area for limited times during project construction and commissioning. Although lighting of construction worker parking areas is not discussed in the AFC, staff assumes that security lighting of the construction parking areas would be necessary. The AFC states that nighttime construction and commissioning lighting would be shielded and directed toward the center of the construction activity. Task-specific lighting would be used to the extent practicable and in compliance with worker safety regulations. The AFC provides no further details (e.g., a process requiring the project owner to respond to a construction-related lighting complaint). In response to staff's data requests on construction lighting, the applicant states there is no expectation for placing lighting on tall structures (e.g., cranes) during construction activities unless required for safety (AES 2014).

Staff has incorporated the applicant's proposed measures into staff's recommended Condition of Certification **VIS-1**, which includes measures to minimize the potential impacts of long-term lighting for construction and commissioning work. Implementation of **VIS-1** would reduce lighting impacts during construction to ***less than significant***.

Project Operation Lighting

The AEC site is located in an urbanized area with existing street and industrial lighting. The amount of lighting in the area would increase marginally with the AEC. The AFC states that exterior lights for project operation would be hooded and directed onsite to minimize glare and light spillage beyond the project site (AES 2015, page 5.13-14). Low-pressure sodium lamps and/or efficient LED lighting with non-glare fixtures would be used for the project, and "switched lighting circuits" would be provided for areas not requiring continuous illumination. In addition, the AFC states the HRSG and air-cooled condenser structures would be lower than the existing boiler structures and their sides would be completely enclosed, without external scaffolding and stairways, thereby, requiring little to no need for external lighting. External lighting would be primarily restricted to the platforms on the tops of the HRSG structures. The applicant states that lighting fixtures would conform to standards (Dark Skies) for minimizing offsite lighting effects. Staff has incorporated the applicant's proposed measures into staff-recommended Condition of Certification **VIS-4** to ensure that operational lighting results in ***less than significant effects***. After the existing AGS generating units are retired (expected by the end of 2020), the AGS lighting needed for worker safety would no longer be required and would be turned off. At that time, the amount of lighting on the site, even with the lighting required by the AEC, would be less than at present.

Structure Surface Glare

The applicant has proposed no measures requiring surface treatments to minimize glare from project structure surfaces. The potential for glare from project structures to adversely affect daytime views in the project area is considered a potentially significant impact of the AEC. Condition of Certification **VIS-2** is proposed to require preparation and implementation of a Surface Treatment Plan to reduce the effects of glare from project surfaces to ***less than significant***.

Visible Plumes

When a thermal power generation facility is operated at times when the ambient temperature is low and relative humidity is high, the warm moisture (water vapor) in the exhaust plume condenses as it mixes with the cooler ambient air, resulting in formation of a visible plume[1]. This is similar to when the moisture-laden air in a person's breath on a cold day is chilled to the point where the water vapor condenses into lots of tiny droplets of liquid water, forming a visible cloudy fog. Formation of visible plumes typically occurs on cool, humid days when the outdoor air is at or near saturation[2].

Power plants like the proposed AEC produce high velocity, high temperature exhausts that disperse quickly, thereby, minimizing the probability that visible plumes would form above the stacks. Using data provided by the applicant, Energy Commission Air Quality staff conducted a preliminary assessment of the proposed project's exhaust gas plumes. Based on the AEC's exhaust gas characteristics and ambient air conditions, staff concluded that conditions would be unlikely to cause formation of visible plumes above the project's exhaust stacks. The AEC would not include wet cooling towers with evaporative cooling. Instead, the AEC would use dry cooling (i.e., ACCs) for heat rejection with no possibility of forming water vapor plumes. ***No impact*** on visual resources would occur pertaining to visible plumes.

Cumulative Impacts

Section 15130 of the State CEQA Guidelines requires a discussion of cumulative impacts of a project when the project's incremental effect is cumulatively considerable. According to State CEQA Guidelines Section 15065(a)(3), "[c]umulatively considerable means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects." Sections 15130 and 15355 of the State CEQA Guidelines both stress cumulative impacts in the context of closely related projects and from projects causing related impacts. The goal of such an analysis is twofold: first, to determine whether the overall long-term impacts of all such projects would be cumulatively significant; and second, to determine whether the AEC itself would cause a

[1] Relative humidity is the percentage of the amount of water vapor in the air. The colder the air, the less water vapor it can carry.
[2] Saturated air is air containing the maximum amount of water vapor possible at a given temperature.

“cumulatively considerable”, and thus significant, incremental contribution to any such cumulatively significant impacts.

For this analysis, the impacts of cumulative projects (i.e., related projects) on visual resources are limited to those that could combine with the proposed project’s visual resources impacts. The geographic scope of the area that could be subject to a cumulative visual effect is limited to the area very near the proposed AEC. Staff reviewed current and probable future projects occurring in the AEC area. Upon review of projects, staff determined that the distance between the AEC site and other current and probable future projects is of such distance to prevent a cumulative visual effect. In other words, an observer at any given location would be unable to see the AEC in combination with any current or probable future project. For this reason, the AEC would not contribute considerably to a cumulatively significant effect for visual resources.

Summary of Project Effects

As described above, criteria for determining the significance of impacts on visual resources are based on the environmental checklist form in Appendix G of the State CEQA Guidelines. This discussion summarizes the effects of the AEC on visual resources and the corresponding significance criteria for evaluating impacts on visual resources.

Substantial Adverse Effect on a Scenic Vista

Views in the vicinity of the AEC site include built elements typical of development in urbanized areas near the coast. No particular view in the project vicinity has a level of scenic appeal that could distinguish it as a scenic vista; therefore, the proposed project would have ***no impact*** relative to this criterion.

Substantially Damage Scenic Resources, Including But Not Limited to Trees, Rock Outcroppings, and Historic Buildings within a State Scenic Highway

Because the PCH is not an officially designated state scenic highway in the region, no impact would occur relative to this criterion. Furthermore, the project site does not contain scenic resources, including trees, rock outcroppings, and historic buildings; therefore, the proposed project would have ***no impact*** relative to this criterion.

Substantially Degrade the Existing Visual Character or Quality of the Site and its Surroundings

The visual character of the existing AGS site and adjacent areas are dominated by large-scale electric generation and transmission facilities that include the AGS, a large SCE substation and associated transmission lines, and the LADWP Haynes Generating Station and associated transmission lines. The visual character of views in the project vicinity would not substantially change overall because the AEC structures would add to an existing industrial visual environment which includes the AGS and LADWP power plant structures. From most KOPs, the proposed project would not substantially degrade the existing visual character of the project site and its surroundings and the proposed project would have a ***less than significant impact*** relative to this criterion. At

KOP 4, visual impacts are considered ***less than significant with mitigation incorporated***.

Create a New Source of Substantial Light or Glare That Would Adversely Affect Daytime or Nighttime Views in the Area

The applicant has proposed measures to ensure that project lighting during construction, commissioning, and operation does not create significant visual impacts. Staff has incorporated these measures into Conditions of Certification **VIS-1** and **VIS-4** and concludes that the AEC would not create a new source of substantial light or glare that could adversely affect nighttime views in the area. ***Less than significant with mitigation incorporated.***

Implementation of staff's Condition of Certification **VIS-2** would minimize the potential for glint or glare from project structures to adversely affect daytime views in the project area. ***Less than significant with mitigation incorporated***.

COMPLIANCE WITH LORS

VR Table 2 summarizes LORS pertaining to protection of visual and aesthetic resources. The summary of applicable LORS in **VR Table 2** includes several that address minimizing the visual impacts of utilities by requiring landscape and architectural buffers and screens. The city's SEADIP Specific Plan includes Provision A2 which requires a minimum of thirty percent of the site shall be developed and maintained as usable open space. See applicable goals, objectives, and policies under, "South East Area Development and Improvement Plan (SEADIP) Specific Plan," in the table below.

Visual Resources Table 2
Proposed Project Consistency with Applicable Visual Resources LORS

Applicable Law	*Consistency Determination*	*Basis for Consistency*
California Coastal Act of 1976		
Section 30251 Scenic and visual qualities. The scenic and visual qualities of coastal areas shall be considered and protected. Permitted development shall be visually compatible with the character of the area and, where feasible, to restore and enhance visual quality in visually degraded areas.	Refer to the analyses (below) under Provision A2 for the SEADIP Specific Plan.	
City of Long Beach General Plan		
Open Space and Recreation Element		
Policy 1.2 Protect and improve the community's natural resources, amenities and scenic values including nature centers, beaches, bluffs, wetlands and water bodies.	Consistency with Policy 1.2 to protect community natural resources, amenities, and scenic values is achieved with the project's proposed design.	The proposed arrangement of the AEC would locate components further away from surrounding areas (e.g., Los Cerritos Channel). The proposed lighting design (e.g., hooded lighting, lighting directed onsite) would minimize the potential for glare and light spillage into nearby recreation and open space areas.
Land Use Element		
Urban Design Analysis - Conclusions and Policy Directions Certain city entrances at arterial and freeways should be beautified to enhance the city's image. Of particular importance are the entrances at Seventh Street and Studebaker Road, and all the entrances from the Long Beach Freeway.	Consistency with Urban Design Analysis to beautify entrances along Studebaker Road is achieved with the project's proposed design.	The existing AEC has landscaping in place that complies with the requirements for setbacks, screening, and vegetation. The AEC site boundary does not reach to Studebaker Road and implementation of the AEC would not affect landscaping that is already in place along Studebaker Road. It should be noted that the city submitted a comment letter requesting all perimeter and public-facing landscape areas of the AGS be cleared and replanted with a comprehensively-designed landscape plan for the entire site (Long Beach 2016b).

Applicable Law	*Consistency Determination*	*Basis for Consistency*
		In addition, the applicant identified a commitment to work cooperatively with the city in submitting landscape plans for review and approval (AECP 2015, pg. 5.13-21). Implementation of Condition of Certification **VIS-3** would ensure conformance.
Conservation Element		
Goals for the City No. 2 To create and maintain a productive harmony between man and his environment through conservation of natural resources and protection of significant areas having environment and aesthetic value.	Consistency with Goals for the city to protect significant areas with aesthetic value is achieved with the project's proposed design.	The proposed design for AEC would comply with all setback and buffer requirements. The applicant identified a commitment to work cooperatively with the city in submitting landscape plans for review and approval (AECP 2015, pg. 5.13-21). Implementation of Condition of Certification **VIS-3** would ensure conformance.
Local Coastal Program		
The LCP adopted the SEADIP Specific Plan by reference. Specific development and land use standards are provided within the SEADIP Specific Plan.	Refer to the analyses (below) under Provision A2 for the SEADIP Specific Plan.	
South East Area Development and Improvement Plan (SEADIP) Specific Plan		
Provision A2 A minimum of thirty percent of the site shall be developed and maintained as usable open space (building footprint, streets, parking areas and sidewalks adjacent to streets shall not be considered usable open space. Bicycle and pedestrian trails not included within the public right-of-way may be considered usable open space). All buildings shall be set back a minimum of twenty feet from all public streets and a wider setback may be required by individual subarea. Within this minimum twenty-foot setback area, a strip having a minimum width of ten feet and abutting the street shall be attractively landscaped.	Consistency with Provision A2 to identify open space areas on the AECP site would be achieved with implementation of **VIS-3**.	Condition of Certification **VIS-3** requires the project owner to provide landscaping that reduces the visibility of the power plant structures in accordance with local policies. In addition, the applicant identified a commitment to work cooperatively with the city in submitting landscape plans for review and approval (AECP 2015, pg. 5.13-21). Implementation of Condition of Certification **VIS-3** would ensure conformance.
Provision A9 All development	Consistency with Provision A9 to	AEC would be designed to be in

Applicable Law	*Consistency Determination*	*Basis for Consistency*
shall be designed and constructed to be in harmony with the character and quality of surrounding development so as to create community unity within the entire area.	construct and design in harmony with the character and quality of surrounding development is achieved with the project's proposed design.	harmony with the industrial zone in which it is located. Condition of Certification **VIS-3** would ensure the AEC would comply with applicable development policies set forth in the General Plan and SEADIP.
Provision A12 Public views to water areas and public open spaces shall be maintained and enhanced to the maximum extent possible, consistent with the wetlands restoration plan.	Consistency with Provision A12 to maintain and enhance public views to water areas and public open spaces is achieved with the project's proposed design.	The AEC would not block views of water areas and public open spaces.
City of Long Beach Municipal Code Zoning Ordinance		
21.42.010 Landscaping Standards ***Landscaping Purpose*** - Landscapes are intended to improve the physical appearance of the city by providing visual, ecological, and psychological relief in the urban environment. Successfully designed and maintained landscape areas provide an attractive living, working, and recreating environment in addition to their role in reducing water and energy consumption. ***General Requirement C*** - Plans Required. When applicable, a Landscape Document Package shall be approved prior to the issuance of any planning or building permit. For projects proposing landscape area coverage with a minimum of ninety percent (90%) very low to low water use plantings, ETWU and MAWA calculations are not required in the Landscape Document Package submittal. Applicable landscaping, irrigation, planter drainage, water reuse, retention and filtration improvements shall be implemented before any final building and planning inspection is approved.	Consistency with Municipal Code Section 21.42.010 to provide a Landscape Document Package would be achieved with implementation of **VIS-3**.	Condition of Certification **VIS-3** requires the project owner to provide a landscaping plan whose proper implementation would satisfy the Municipal Code requirements.
21.42.040 Landscaping	Consistency with Municipal Code	The AEC site boundary does not

Applicable Law	*Consistency Determination*	*Basis for Consistency*
standards for R-3, R-4 and Nonresidential Districts. ***Landscape Area Requirements.*** A. Applicability. All portions of a lot not paved or occupied by a structure shall be attractively landscaped. All required set back areas shall be landscaped unless used for a permitted use. B. Landscape Area Requirements On-Site Street Frontage - Within the required setback area along all street frontages, except at driveways, a minimum five-foot (5') wide landscaping strip (inside dimension to planter) shall be provided. This area shall be landscaped with one (1) tree for each fifteen (15) linear feet of street frontage and three (3) shrubs for each tree. Fences and retaining walls. All required fences and retaining walls shall be landscaped with vines planted no more than ten feet (10') on center on all accessible sides of a wall or alternative plant materials approved by the Director of Development Services.	Section 21.42.040 to provide landscaped area along street frontages is achieved with the project's proposed design.	reach to Studebaker Road and implementation of the AEC would not affect landscaping that is already in place along Studebaker Road. It should be noted that the city submitted a comment letter requesting all perimeter and public-facing landscape areas of the AGS be cleared and replanted with a comprehensively-designed landscape plan for the entire site (Long Beach 2016b). In addition, the applicant identified a commitment to work cooperatively with the city in submitting landscape plans for review and approval (AECP 2015, pg. 5.13-21). Implementation of Condition of Certification **VIS-3** would ensure conformance.

CONCLUSIONS AND RECOMMENDATIONS

Impacts on visual resources were assessed based on the magnitude of the anticipated incremental changes to the visual environment, considering the appropriate baseline conditions (i.e., existing conditions), and the estimated effects of those changes on sensitive viewer groups.

Lighting of the project site and structures during construction, commissioning, and operation could create new sources of substantial light or glare that could adversely affect daytime and nighttime views in the area. Staff proposes implementation of Conditions of Certification **VIS-1** and **VIS-4** to reduce the effects of lighting on visual resources. Condition of Certification **VIS-2** is proposed to require preparation and implementation of a Surface Treatment Plan to reduce the effects of daytime glare from project surfaces to less than significant. Lastly, staff proposes implementation of Condition of Certification **VIS-3** to require preparation of landscaping plans to satisfy the requirements of local policies.

With implementation of staff's proposed conditions of certification, the proposed project would not cause significant visual impacts and would comply with all applicable visual resources-related laws, ordinances, regulations, and standards.

PROPOSED CONDITIONS OF CERTIFICATION

VIS-1 **Lighting – Project Construction.** Consistent with applicable worker safety regulations, the project owner shall ensure that lighting of on-site construction areas and construction worker parking lots minimizes potential night lighting impacts by implementing the following measures:

- All fixed-position lighting shall be hooded and shielded to direct light downward and toward the construction area to be illuminated to prevent illumination of the night sky and minimize light trespass (i.e., direct light extending beyond the boundaries of the parking lots and construction sites, including any security-related boundaries).
- Lighting of any tall construction equipment (e.g., scaffolding, derrick cranes) shall be directed toward areas requiring illumination and shielded to the maximum extent practicable.
- Task-specific lighting shall be used to the maximum extent practicable.
- Wherever and whenever feasible, lighting shall be kept off when not in use and motion sensors shall be used to the maximum extent practicable.
- The Compliance Project Manager (CPM) shall be notified of any construction-related lighting complaints. Complaints shall be documented using a form in the format shown in Attachment 1, and completed forms shall record resolution of each complaint. A copy of each completed complaint form shall be provided to the CPM. Records of lighting complaints shall also be kept in the compliance file at the project site.

Verification: Within 7 calendar days after the first use of fixed-position parking area and construction lighting for major construction milestones, the project owner shall notify the CPM that the lighting is ready for inspection. Verification is to be repeated for these construction milestones:

- construction of Power Block 1
- construction of Power Block 2

If the CPM determines that modifications to the lighting are needed for any construction milestone, within 14 calendar days of receiving that notification, the project owner shall correct the lighting and notify the CPM that modifications have been completed.

Within 48 hours of receiving a lighting complaint for any construction activity, the project owner shall provide to the CPM a copy of the complaint report and resolution form, including a schedule for implementing corrective measures to resolve the complaint.

The project owner shall report any lighting complaints and document their resolution in the Monthly Compliance Report for the project, accompanied by copies of completed complaint report and resolution forms for that month.

VIS-2 **Surface Treatment of Project Structures and Buildings.** Prior to commercial operation of the Power Block 1, the project owner shall prepare and implement a Surface Treatment Plan addressing treatment of the surfaces of all project structures and buildings visible to the public such that proposed colors and finishes (1) minimize visual intrusion and reduce contrast by blending with the existing visual environment, (2) avoid creating new sources of substantial glint and glare, and (3) are consistent with all applicable laws, ordinances, regulations, and standards.

The Surface Treatment Plan shall include, at a minimum, the following elements:

- Description of the overall rationale for the proposed surface treatments, including selection of the proposed colors and finishes;
- Discussion of proposed opportunities and options for using color to enhance design quality;
- Schedule for completing the surface treatments;
- Procedure to ensure proper surface treatment maintenance for the life of the project;
- Three printed sets (11” x 17”), and a digital copy in PDF format of elevation drawings depicting at life-size scale the major project structures and buildings, and specifying for each structure and building: (1) the proposed color and finish; and (2) the height, length, and width or diameter;
- Two sets of color brochures, color chips, and or physical samples showing each proposed color and finish. Digital files showing proposed colors may not be submitted in place of original samples. Colors must be identified by vendor, name, and number, or according to a universal designation system; and
- Three printed sets (11’ x 17”) and a digital copy in PDF format of color visual simulations at life-size scale showing the surface treatment proposed for the project structures. The visual simulations for key observation point (KOP) X and KOP X shall be used to prepare images showing the proposed surface treatment plan.

The Surface Treatment Plan shall be submitted to the Compliance Project Manager (CPM) for review and approval. The project owner shall not submit instructions for colors and finishes to manufacturers or vendors of project structures, or perform final field treatment on any structures, until written approval of the final plan is received from the CPM. Modifications to the Surface Treatment Plan are prohibited without the CPM's approval.

<u>Verification:</u> At least 90 calendar days before submitting instructions for colors and other surface treatments to manufacturers or vendors of project structures, and/or ordering prefabricated project structures, the project owner shall submit the Surface Treatment Plan to the CPM for review and comment.

If the CPM determines that the plan requires revision, the project owner shall provide a plan with the specified revision(s) for review and approval by the CPM. No work to implement the Surface Treatment Plan shall begin until final plan approval is received from the CPM.

Prior to the start of commercial operation of Power Block 1, the project owner shall notify the CPM that surface treatments of all publicly visible structures and buildings identified in the Surface Treatment Plan have been completed and that the facilities are ready for inspection. The project owner shall obtain written confirmation from the CPM that the project complies with the Surface Treatment Plan.

VIS-3 **Perimeter Landscape Screening.** The project owner shall provide landscaping that provides minimum open space areas on the project site in accordance with local policies. The objective shall be to create landscape of a semi-permanent manner with California-native, drought-tolerant groundcover and tree species of colorful, interesting, and distinctive character.

The project owner shall submit to the Compliance Project Manager (CPM) for review and approval and simultaneously to the city of Long Beach for review and comment a landscaping plan whose proper implementation will satisfy these requirements. The plan shall include:

a) A detailed landscape, grading, and irrigation plan, at a reasonable scale. The plan shall demonstrate how the requirements stated above shall be met. The plan shall provide a detailed installation schedule.

b) A list (prepared by a qualified professional arborist familiar with local growing conditions) of proposed species, specifying installation sizes, growth rates, expected time to maturity, expected size at five years and at maturity, spacing, number, availability, and a discussion of the suitability of the plants for the site conditions and mitigation objectives, with the objective of providing the widest possible range of species from which to choose;

c) Maintenance procedures, including any needed irrigation and a plan for routine annual or semi-annual debris removal for the life of the project; and

d) A procedure for monitoring for and replacement of unsuccessful plantings for the life of the project.

The plan shall not be implemented until the project owner receives final approval from the CPM.

Verification: The landscaping plan shall be submitted to the CPM for review and approval and simultaneously to the city of Long Beach for review and comment at least 90 days prior to installation.

If the CPM determines that the plan requires revision, the project owner shall provide to the CPM and simultaneously to the city of Long Beach a revised plan for review and approval by the CPM.

The planting must occur during the first optimal planting season following site mobilization. The project owner shall simultaneously notify the CPM and the city of Long Beach within seven days after completing installation of the landscaping that the landscaping is ready for inspection.

The project owner shall report landscape maintenance activities, including replacement of dead or dying vegetation, for the previous year of operation in each Annual Compliance Report.

Lighting Management Plan – Project Operation

VIS-4 The project owner shall prepare and implement a comprehensive Lighting Management Plan for project operations. The project owner shall not purchase or order any permanent lighting fixtures or apparatus until written approval of the final plan is received from the CPM. Modifications to the Lighting Management Plan are prohibited without the CPM's approval. Consistent with applicable worker safety regulations, the project owner shall design, install, and maintain all permanent exterior lighting such that light sources are not directly visible from areas beyond the project site, glare is avoided, and night lighting impacts are minimized or avoided to the maximum extent feasible. All lighting fixtures shall be selected to achieve high energy efficiency for the facility. The project owner shall meet these requirements for permanent project lighting:

1. The Lighting Management Plan shall include three printed sets of full-size plans (24” x 36”, minimum), three sets of 11” x 17” reductions, a digital copy in PDF format, and contain the following information.

2. The Lighting Management Plan shall be prepared with the direct involvement of a certified lighting professional trained to integrate efficient technologies and designs into lighting systems.

3. Exterior lights shall be hooded and shielded and directed downward or toward the area to be illuminated to prevent obtrusive spill light (i.e., light trespass) beyond the project site.

4. Exterior lighting shall be designed to minimize backscatter to the night sky to the maximum extent feasible.

5. Energy efficient lighting products and systems shall be used for all permanent new lighting installations. Smart bi-level exterior lighting using high efficiency directional LED fixtures shall be used as appropriate for exterior installations. The lighting system shall work in conjunction with occupancy sensors, photo sensors, wireless controls, and/or other scheduling or controls technologies to provide adequate light for security and maximize energy savings.

6. Lighting fixtures shall be kept in good working order and continuously maintained according to the original design standards.

7. The Lighting Management Plan shall be consistent with all applicable laws, ordinances, regulations, and standards.

The Compliance Project Manager (CPM) shall be notified of any complaints about permanent lighting at the project site. Complaints shall be documented using a form in the format shown in Attachment 1, and completed forms shall record resolution of each complaint. A copy of each completed complaint form shall be provided to the CPM. Records of lighting complaints shall also be kept in the compliance file at the project site.

Verification: At least 90 calendar days before ordering any permanent lighting equipment for the project, the project owner shall submit the comprehensive Lighting Management Plan to the CPM for review and approval.

If the CPM determines that the plan requires revision, the project owner shall provide a plan with the specified revision(s) for review and approval by the CPM. No work to implement the plan (e.g., purchasing of fixtures) shall begin until final plan approval is received from the CPM.

Prior to the start of commercial operation of the project, the project owner shall notify the CPM that installation of permanent lighting for the project has been completed and that the lighting is ready for inspection. If the CPM notifies the project owner that modifications to the lighting system are required, within 30 days of receiving that notification, the project owner shall implement all specified changes and notify the CPM that the modified lighting system(s) is ready for inspection.

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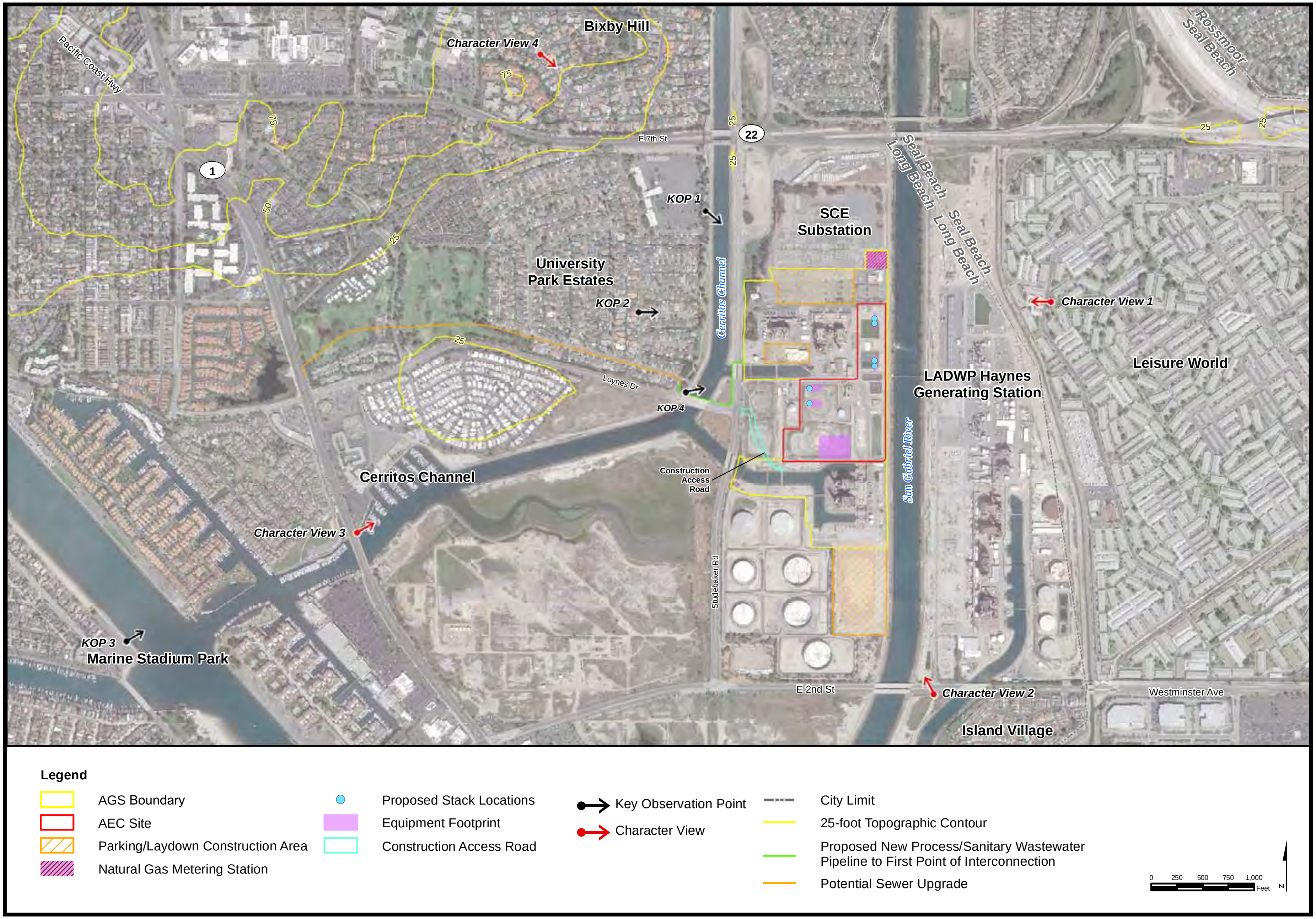
VISUAL RESOURCES - FIGURE 1

Alamitos Energy Center - Project Components, Key Observation Points and Character Views



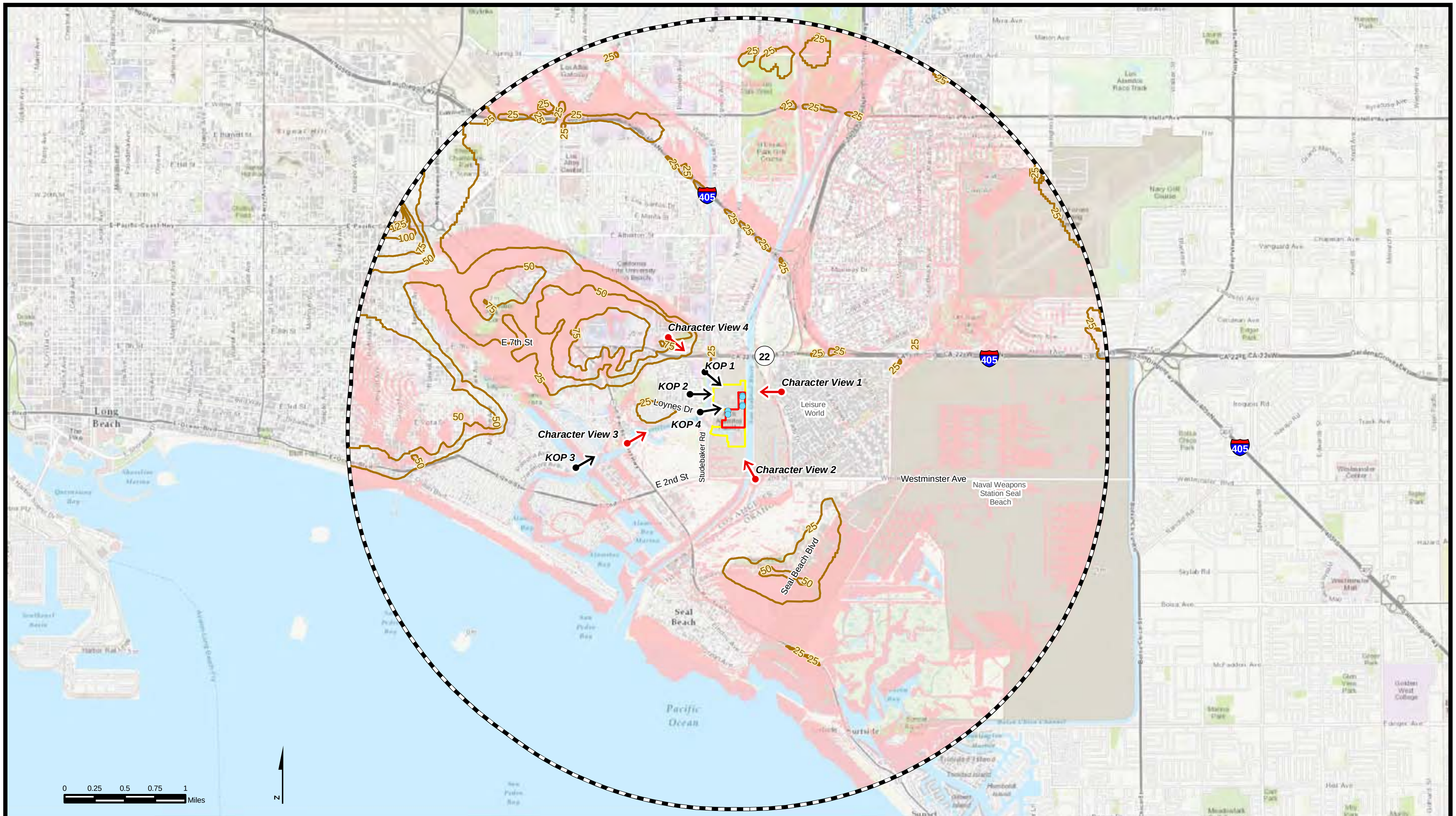
VISUAL RESOURCES

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Supplemental AFC

VISUAL RESOURCES - FIGURE 2

Alamitos Energy Center - Project Viewshed, Key Observation Points and Character View Locations within 3 Miles of Project Site



Legend

- AGS Boundary
- AEC Site
- 25-foot Topographic Contour
- Potential Stack Locations
- Key Observation Point
- Character View
- 3- Mile Radius from Project Boundary

Potential Stack Visibility

- Areas within 3-mile radius from which the project will have the potential to be visible
- Areas within 3-mile radius from which the project will not be visible because the line of sight will be blocked by terrain

Notes:
Viewshed based on stack heights of 140 feet.
Elevation data from USGS 10 Meter DEM.

Service Layer Credits:
Esri World Topo Map

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Supplemental AFC

VISUAL RESOURCES - FIGURE 3a and b

Alamitos Energy Center - KOP-1 View from Channel View Park/Long Beach Bikeway Route 10

3a

KOP-1. Existing view toward the project site from Channel View Park and Long Beach Bikeway Route 10.

3b

KOP-1. Simulated view toward the project site after the addition of new AEC structures. New facilities will not be visible in this view.

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SOURCE: Supplemental AFC

VISUAL RESOURCES - FIGURE 4a and b

Alamitos Energy Center - KOP-2 View from University Park Estates

4a

KOP-2. Existing view toward the project site from a street in University Park Estates, the residential area closest to the project site. A boiler and stacks that are part of the ALamitos Generating Station that surround the project are visible extending above the trees in the background of the view.

4b

KOP-2. Simulated view toward the project site after the addition of new AEC structures. After the addition of AEC structures, two stacks will be partially visible in the right portion of the view.

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SOURCE: Supplemental AFC

Alamitos Energy Center - KOP-3 View from Marine Stadium Park

5a

KOP-3. Existing view toward the project site from Marine Stadium Park. The Alamitos Generating Station that surrounds the project site is visible in the left half of the view as the two power units with the large, scaffold-covered boilers as well as the tops of two white appearing stacks in the center-right of the view which are partially obscured behind commercial development. The stacks and generating units that extend along the horizon in the right half of the view are all part of the LADWP Haynes Generating Station.

5b

KOP-3. Simulated view toward the project site after the addition of new AEC structures. The AEC structures will be visible in the distance at the far end of the channel in the center of the view.

VISUAL RESOURCES - FIGURE 6a and b

Alamitos Energy Center - KOP-4 View from Loynes Drive

6a

KOP-4. Existing view toward the project site from Loynes Drive

6b

KOP-4. Simulated view toward the project site after the addition of new AEC structures.

FACILITY DESIGN

Shahab Khoshmashrab

SUMMARY OF CONCLUSIONS

The California Energy Commission staff (staff) concludes that the design, construction, and eventual closure of the project and its linear facilities would comply with applicable engineering laws, ordinances, regulations and standards (LORS). The proposed conditions of certification, below, would ensure compliance with these LORS.

INTRODUCTION

Facility design encompasses the civil, structural, mechanical, and electrical engineering design of the Alamitos Energy Center (AEC). The purpose of this analysis is to:

- Verify that the LORS that apply to the engineering design and construction of the project have been identified;
- Verify that the project's proposed design criteria and analysis methods have been identified and to provide assurance that the project will be designed and constructed in accordance with all applicable engineering LORS;
- Determine whether special design features should be considered during final design to address conditions unique to the site which could influence public health and safety; and
- Describe the design review and construction inspection process and establish the conditions of certification used to monitor and ensure compliance with the engineering LORS, in addition to any special design requirements.

Subjects discussed in this analysis include:

- Identification of the engineering LORS that apply to facility design;
- Evaluation of the applicant's proposed design criteria, including identification of criteria essential to public health and safety; and
- Conditions of certification proposed by staff to ensure that the project will be designed and constructed to ensure public health and safety and comply with all applicable engineering LORS.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS

Lists of LORS applicable to each engineering discipline (civil, structural, mechanical, and electrical) are described in **Facility Design Appendix A** below. Key LORS are listed in **Facility Design Table 1** below:

Facility Design Table 1
Key Engineering Laws, Ordinances, Regulations and Standards (LORS)

Applicable LORS	Description
Federal	Title 29 Code of Federal Regulations (CFR), Part 1910, Occupational Safety and Health standards
State	2013 (or the latest edition in effect) California Building Standards Code (CBSC) (also known as Title 24, California Code of Regulations)
Local	City of Long Beach building and engineering regulations and ordinances
General	American National Standards Institute (ANSI) American Society of Mechanical Engineers (ASME) American Welding Society (AWS) American Society for Testing and Materials (ASTM)

The Facility **Design** conditions of certification require the project to comply with the California Building Standards Code and city of Long Beach building and engineering regulations and ordinances to ensure that the project would be built to applicable engineering codes and ensure public health and safety.

For the project to be built in a manner that would ensure public health and safety and operational integrity of project equipment, the LORS listed above in **Facility Design Table 1** under the "**General**" heading, must also be met by the project. The LORS listed under this heading are only some of the key engineering LORS applicable to the project; for a complete list of engineering LORS, please see **Facility Design Appendix A** below. These LORS are consistent with those that are applicable to power plants.

SETTING

AEC would be built on the existing site of the Alamitos Generating Station, an existing power plant in Long Beach. For more information on the site and its related project description, please see the **Project Description** section of this document.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The purpose of this analysis is to ensure that the project would be built to applicable engineering codes, ensure public health and safety, and verify that applicable engineering LORS have been identified. This analysis also evaluates the applicant's proposed design criteria, describes the design review and construction inspection process, and establishes conditions of certification that would monitor and ensure compliance with engineering LORS and any other special design requirements. These conditions allow both the California Energy Commission (Energy Commission) compliance project manager (CPM) and the applicant to adopt a compliance monitoring program that will verify compliance with these LORS.

SITE PREPARATION AND DEVELOPMENT

The applicant proposes the use of accepted industry standards, design practices, and construction methods in preparing and developing the site. Staff concludes that this project would comply with all applicable site preparation LORS. To ensure compliance, staff proposes the conditions of certification listed below and in the **Geology and Paleontology** section of this document.

MAJOR STRUCTURES, SYSTEMS, AND EQUIPMENT

Major structures, systems, and equipment are structures and their associated components or equipment that are necessary for power production, costly or time consuming to repair or replace, are used for the storage, containment, or handling of hazardous or toxic materials, or could become potential health and safety hazards if not constructed according to applicable engineering LORS.

AEC will be designed and constructed to the 2013 California Building Standards Code (CBSC), also known as Title 24, California Code of Regulations, which encompasses the California Building Code (CBC), California Building Standards Administrative Code, California Electrical Code, California Mechanical Code, California Plumbing Code, California Energy Code, California Fire Code, California Code for Building Conservation, California Reference Standards Code, and other applicable codes and standards in effect when the design and construction of the project actually begin. If the initial designs are submitted to the chief building official (CBO) for review and approval after the update to the 2013 CBSC takes effect, the 2013 CBSC provisions shall be replaced with the updated provisions.

Certain structures in a power plant may be required, under the CBC, to undergo dynamic lateral force (structural) analysis; others may be designed using the simpler static analysis procedure. In order to ensure that structures are analyzed according to their appropriate lateral force procedure, staff has included Condition of Certification **STRUC-1**, below, which, in part, requires the project CBO's review and approval of the owner's proposed lateral force procedures before construction begins.

Note that analysis and proposed conditions of certification for all transmission facilities (lines, switchyards, switching stations, and substations) are addressed in the **Transmission System Engineering** section of this document.

PROJECT QUALITY PROCEDURES

The applicant describes a quality program intended to ensure that the project's systems and components will be designed, fabricated, stored, transported, installed, and tested in accordance with all appropriate power plant technical codes and standards, as described in the Supplemental Application for Certification, or SAFC (SAFC 2015a, §§ 2.1, 2.2, 2.3, 2.4, 2.5, 2.5.7.2, 2.6, Appendix 2C). Compliance with project design requirements will be verified through specific inspections and audits. Implementation of this quality assurance/quality control (QA/QC) program will ensure that AEC is actually designed, procured, fabricated, and installed as described in this analysis.

COMPLIANCE MONITORING

Under CBC, Division II, Section 104, the CBO is authorized and directed to enforce all provisions of the CBC. The Energy Commission serves as the building official, and has the responsibility to enforce the code, for all of the energy facilities it certifies. In addition, the Energy Commission has the power to interpret the CBC and adopt and enforce both rules and supplemental regulations that clarify application of the CBC's provisions.

The Energy Commission's design review and construction inspection process conforms to CBC requirements and ensures that all facility design conditions of certification are met. As provided by Section 103 of the CBC, the Energy Commission appoints experts to perform design review and construction inspections and act as delegate CBOs on behalf of the Energy Commission. These delegates may include the local building official and/or independent consultants hired to provide technical expertise that is not provided by the local official alone. The applicant, through permit fees provided by the CBC or a fee schedule agreed upon by the applicant and the CBO, pays the cost of these reviews and inspections.

Engineering and compliance staff will invite a third-party engineering consultant to act as CBO for this project. When an entity has been assigned CBO duties, staff will complete a memorandum of understanding (MOU) with that entity to outline both its roles and responsibilities and those of its subcontractors and delegates.

Staff has developed proposed conditions of certification to ensure protection of public health and safety and compliance with engineering design LORS. Some of these conditions address the roles, responsibilities, and qualifications of the engineers who will design and build the proposed project (Conditions of Certification **GEN-1** through **GEN-8**). These engineers must be registered in California and sign and stamp every submittal of design plans, calculations, and specifications submitted to the CBO. These conditions require that every element of the project's construction subject to CBO review and approval be approved by the CBO before it is performed. They also require that qualified special inspectors perform or oversee special inspections required by all applicable LORS.

While the Energy Commission and delegate CBO have the authority to allow some flexibility in scheduling construction activities, these conditions are written so that no element of construction (of permanent facilities subject to CBO review and approval) which could be difficult to reverse or correct can proceed without prior CBO approval. Elements of construction that are not difficult to reverse may proceed without approval of the plans. The applicant bears the responsibility to fully modify construction elements in order to comply with all design changes resulting from the CBO's subsequent plan review and approval process.

FACILITY CLOSURE

Facility closure is defined in the **Compliance Conditions and Compliance Monitoring Plan** section of this document as a facility shutdown with no intent to restart operation.

In order to ensure that facility closure would be completed in a manner that is environmentally sound, safe, and protects the public health and safety, the project owner must submit a closure plan to the Energy Commission for review and approval prior to the commencement of closing the facility, as required in Condition of Certification **COM-15** (Facility Closure Planning) in **Compliance Conditions and Compliance Monitoring Plan**.

Though future conditions that could affect facility closure are largely unknown at this time, the requirements in **Compliance Conditions and Compliance Monitoring Plan** are adequate protection, even in the unlikely event that the project is abandoned.

CONCLUSIONS AND RECOMMENDATIONS

1. The engineering LORS identified in **Facility Design Appendix A** apply to the project.

2. Staff has evaluated the proposed engineering LORS, design criteria, and design methods in the SAFC, and concludes that the design, construction, and eventual closure of the project will comply with applicable engineering LORS.

3. The proposed conditions of certification will ensure that AEC is designed and constructed in accordance with applicable engineering LORS. This will be accomplished through design review, plan checking, and field inspections that will be performed by the CBO. Staff will audit the CBO to ensure satisfactory performance.

4. Though future conditions that could affect facility closure are largely unknown at this time, it can reasonably be concluded that if the project owner submits a facility closure plan in accordance with **COM-15** as provided in the **Compliance Conditions and Compliance Monitoring Plan** portion of this document prior to facility closure, facility closure procedures will comply with all applicable engineering LORS.

Staff recommends that:

1. The proposed conditions of certification be adopted to ensure that the project is designed and constructed in a manner that protects the public health and safety and complies with all applicable engineering LORS.

2. The project be designed and built to the 2013 CBSC (or successor standards, if in effect when initial project engineering designs are submitted for the CBO review).

3. The CBO review the final designs, checks plans, and performs field inspections during construction. Staff audit and monitor the CBO to ensure satisfactory performance.

CONDITIONS OF CERTIFICATION

GEN-1 The project owner shall design, construct, and inspect the project in accordance with the applicable edition of the California Building Standards Code (CBSC)[1], also known as Title 24, California Code of Regulations, which encompasses the California Building Code (CBC), California Building Standards Administrative Code, California Electrical Code, California Mechanical Code, California Plumbing Code, California Energy Code, California Fire Code, California Code for Building Conservation, California Reference Standards Code, and all other applicable engineering LORS in effect at the time initial design plans are submitted to the CBO for review and approval (the CBSC in effect is the edition that has been adopted by the California Building Standards Commission and published at least 180 days previously). The project owner shall ensure that all the provisions of the above applicable codes are enforced during the construction, addition, alteration, moving (onsite), demolition, repair, or maintenance of the completed facility.

In the event that the initial engineering designs are submitted to the CBO when the successor to the 2013 CBSC is in effect, the 2013 CBSC provisions shall be replaced with the applicable successor provisions. Where, in any specific case, different sections of the code specify different materials, methods of construction or other requirements, the most restrictive shall govern. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern.

The project owner shall ensure that all contracts with contractors, subcontractors, and suppliers clearly specify that all work performed and materials supplied comply with the codes listed above.

Verification: Within 30 days following receipt of the certificate of occupancy, the project owner shall submit to the CPM a statement of verification, signed by the responsible design engineer, attesting that all designs, construction, installation, and inspection requirements of the applicable LORS and the Energy Commission's decision have been met in the area of facility design. The project owner shall provide the CPM a copy of the certificate of occupancy within 30 days of receipt from the CBO.

Once the certificate of occupancy has been issued, the project owner shall inform the CPM at least 30 days prior to any construction, addition, alteration, moving, demolition, repair, or maintenance to be performed on any portion(s) of the completed facility that requires CBO approval for compliance with the above codes. The CPM will then determine if the CBO needs to approve the work.

[1] The applicable edition of the CBCS is currently the 2013 edition, but if the successor edition of this code (i.e., the 2016) is in effect when initial project engineering designs are submitted for the CBO's review, the successor edition becomes the applicable edition.

GEN-2 Before submitting the initial engineering designs for CBO review, the project owner shall furnish the CPM and the CBO with a schedule of facility design submittals, and master drawings and master specifications list. The master drawings and master specifications list shall contain a list of proposed submittal packages of designs, calculations, and specifications for major structures, systems, and equipment. Major structures, systems, and equipment are structures and their associated components or equipment that are necessary for power production, costly or time consuming to repair or replace, are used for the storage, containment, or handling of hazardous or toxic materials, or could become potential health and safety hazards if not constructed according to applicable engineering LORS. The schedule shall contain the date of each submittal to the CBO. To facilitate audits by Energy Commission staff, the project owner shall provide specific packages to the CPM upon request.

Verification: At least 60 days (or a project owner- and CBO-approved alternative time frame) prior to the start of rough grading, the project owner shall submit to the CBO and to the CPM the schedule, and the master drawings and master specifications list of documents to be submitted to the CBO for review and approval. These documents shall be the pertinent design documents for the major structures, systems, and equipment defined above in Condition of Certification **GEN-2**. Major structures and equipment shall be added to or deleted from the list only with CPM approval. The project owner shall provide schedule updates in the monthly compliance report.

GEN-3 The project owner shall make payments to the CBO for design review, plan checks, and construction inspections, based upon a reasonable fee schedule to be negotiated between the project owner and the CBO. These fees may be consistent with the fees listed in the applicable edition of the CBC, adjusted for inflation and other appropriate adjustments; may be based on the value of the facilities reviewed; may be based on hourly rates; or may be otherwise agreed upon by the project owner and the CBO.

Verification: The project owner shall make the required payments to the CBO in accordance with the agreement between the project owner and the CBO. The project owner shall send a copy of the CBO's receipt of payment to the CPM in the next monthly compliance report indicating that applicable fees have been paid.

GEN-4 Prior to the start of rough grading, the project owner shall assign a California-registered architect, or a structural or civil engineer, as the resident engineer (RE) in charge of the project.

The RE may delegate responsibility for portions of the project to other registered engineers. Registered mechanical and electrical engineers may be delegated responsibility for mechanical and electrical portions of the project, respectively. A project may be divided into parts, provided that each part is clearly defined as a distinct unit. Separate assignments of general responsibility may be made for each designated part.

The RE shall:

1. Monitor progress of construction work requiring CBO design review and inspection to ensure compliance with LORS;

2. Ensure that construction of all facilities subject to CBO design review and inspection conforms in every material respect to applicable LORS, these conditions of certification, approved plans, and specifications;

3. Prepare documents to initiate changes in approved drawings and specifications when either directed by the project owner or as required by the conditions of the project;

4. Be responsible for providing project inspectors and testing agencies with complete and up-to-date sets of stamped drawings, plans, specifications, and any other required documents;

5. Be responsible for the timely submittal of construction progress reports to the CBO from the project inspectors, the contractor, and other engineers who have been delegated responsibility for portions of the project; and

6. Be responsible for notifying the CBO of corrective action or the disposition of items noted on laboratory reports or other tests when they do not conform to approved plans and specifications.

The resident engineer (or his delegate) must be located at the project site, or be available at the project site within a reasonable period of time, during any hours in which construction takes place.

The RE shall have the authority to halt construction and to require changes or remedial work if the work does not meet requirements.

If the RE or the delegated engineers are reassigned or replaced, the project owner shall submit the name, qualifications and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of rough grading, the project owner shall submit to the CBO for review and approval, the resume and registration number of the RE and any other delegated engineers assigned to the project. The project owner shall notify the CPM of the CBO's approvals of the RE and other delegated engineer(s) within five days of the approval.

If the RE or the delegated engineer(s) is subsequently reassigned or replaced, the project owner has five days to submit the resume and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer within five days of the approval.

GEN-5 Prior to the start of rough grading, the project owner shall assign at least one of each of the following California registered engineers to the project: a civil engineer; a soils, geotechnical, or civil engineer experienced and knowledgeable in the practice of soils engineering; and an engineering geologist. Prior to the start of construction, the project owner shall assign at least one of each of the following California registered engineers to the project: a design engineer who is either a structural engineer or a civil engineer fully competent and proficient in the design of power plant structures and equipment supports; a mechanical engineer; and an electrical engineer. (California Business and Professions Code section 6704 et seq., and sections 6730, 6731 and 6736 require state registration to practice as a civil engineer or structural engineer in California).

The tasks performed by the civil, mechanical, electrical, or design engineers may be divided between two or more engineers, as long as each engineer is responsible for a particular segment of the project (for example, proposed earthwork, civil structures, power plant structures, equipment support). No segment of the project shall have more than one responsible engineer. The transmission line may be the responsibility of a separate California registered electrical engineer.

The project owner shall submit, to the CBO for review and approval, the names, qualifications, and registration numbers of all responsible engineers assigned to the project.

If any one of the designated responsible engineers is subsequently reassigned or replaced, the project owner shall submit the name, qualifications and registration number of the newly assigned responsible engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer.

A. The civil engineer shall:

1. Review the foundation investigations, geotechnical, or soils reports prepared by the soils engineer, the geotechnical engineer, or by a civil engineer experienced and knowledgeable in the practice of soils engineering;

2. Design (or be responsible for the design of), stamp, and sign all plans, calculations, and specifications for proposed site work, civil works, and related facilities requiring design review and inspection by the CBO. At a minimum, these include: grading, site preparation, excavation, compaction, construction of secondary containment, foundations, erosion and sedimentation control structures, drainage facilities, underground utilities, culverts, site access roads and sanitary sewer systems; and

3. Provide consultation to the RE during the construction phase of the project and recommend changes in the design of the civil works facilities and changes to the construction procedures.

B. The soils engineer, geotechnical engineer, or civil engineer experienced and knowledgeable in the practice of soils engineering, shall:

1. Review all the engineering geology reports;

2. Prepare the foundation investigations, geotechnical, or soils reports containing field exploration reports, laboratory tests, and engineering analysis detailing the nature and extent of the soils that could be susceptible to liquefaction, rapid settlement or collapse when saturated under load;

3. Be present, as required, during site grading and earthwork to provide consultation and monitor compliance with requirements set forth in the applicable edition of the CBC (depending on the site conditions, this may be the responsibility of either the soils engineer, the engineering geologist, or both); and

4. Recommend field changes to the civil engineer and RE.

This engineer shall be authorized to halt earthwork and to require changes if site conditions are unsafe or do not conform to the predicted conditions used as the basis for design of earthwork or foundations.

C. The engineering geologist shall:

1. Review all the engineering geology reports and prepare a final soils grading report; and

2. Be present, as required, during site grading and earthwork to provide consultation and monitor compliance with the requirements set forth in the applicable edition of the CBC (depending on the site conditions, this may be the responsibility of either the soils engineer, the engineering geologist, or both).

D. The design engineer shall:

1. Be directly responsible for the design of the proposed structures and equipment supports;

2. Provide consultation to the RE during design and construction of the project;

3. Monitor construction progress to ensure compliance with engineering LORS;

4. Evaluate and recommend necessary changes in design; and

5. Prepare and sign all major building plans, specifications, and calculations.

E. The mechanical engineer shall be responsible for, and sign and stamp a statement with, each mechanical submittal to the CBO, stating that the proposed final design plans, specifications, and calculations conform to all of the mechanical engineering design requirements set forth in the Energy Commission's decision.

F. The electrical engineer shall:

   1. Be responsible for the electrical design of the project; and

   2. Sign and stamp electrical design drawings, plans, specifications, and calculations.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of rough grading, the project owner shall submit to the CBO for review and approval, resumes and registration numbers of the responsible civil engineer, soils (geotechnical) engineer and engineering geologist assigned to the project.

At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of construction, the project owner shall submit to the CBO for review and approval, resumes and registration numbers of the responsible design engineer, mechanical engineer, and electrical engineer assigned to the project.

The project owner shall notify the CPM of the CBO's approvals of the responsible engineers within five days of the approval.

If the designated responsible engineer is subsequently reassigned or replaced, the project owner has five days in which to submit the resume and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer within five days of the approval.

GEN-6 Prior to the start of an activity requiring special inspection, including prefabricated assemblies, the project owner shall assign to the project, qualified and certified special inspector(s) who shall be responsible for the special inspections required by the applicable edition of the CBC.

A certified weld inspector, certified by the American Welding Society (AWS), and/or American Society of Mechanical Engineers (ASME) as applicable, shall inspect welding performed on-site requiring special inspection (including structural, piping, tanks and pressure vessels).

The special inspector shall:

1. Be a qualified person who shall demonstrate competence, to the satisfaction of the CBO, for inspection of the particular type of construction requiring special or continuous inspection;

2. Inspect the work assigned for conformance with the approved design drawings and specifications;

3. Furnish inspection reports to the CBO and RE. All discrepancies shall be brought to the immediate attention of the RE for correction, then, if uncorrected, to the CBO and the CPM for corrective action; and

4. Submit a final signed report to the RE, CBO, and CPM, stating whether the work requiring special inspection was, to the best of the inspector's knowledge, in conformance with the approved plans, specifications, and other provisions of the applicable edition of the CBC.

Verification: At least 15 days (or project owner- and CBO-approved alternative time frame) prior to the start of an activity requiring special inspection, the project owner shall submit to the CBO for review and approval, with a copy to the CPM, the name(s) and qualifications of the certified weld inspector(s), or other certified special inspector(s) assigned to the project to perform one or more of the duties set forth above. The project owner shall also submit to the CPM a copy of the CBO's approval of the qualifications of all special inspectors in the next monthly compliance report.

If the special inspector is subsequently reassigned or replaced, the project owner has five days in which to submit the name and qualifications of the newly assigned special inspector to the CBO for approval. The project owner shall notify the CPM of the CBO's approval of the newly assigned inspector within five days of the approval.

GEN-7 If any discrepancy in design and/or construction is discovered in any engineering work that has undergone CBO design review and approval, the project owner shall document the discrepancy and recommend required corrective actions. The discrepancy documentation shall be submitted to the CBO for review and approval. The discrepancy documentation shall reference this condition of certification and, if appropriate, applicable sections of the CBC and/or other LORS.

Verification: The project owner shall transmit a copy of the CBO's approval of any corrective action taken to resolve a discrepancy to the CPM in the next monthly compliance report. If any corrective action is disapproved, the project owner shall advise the CPM, within five days, of the reason for disapproval and the revised corrective action to obtain CBO's approval.

GEN-8 The project owner shall obtain the CBO's final approval of all completed work that has undergone CBO design review and approval. The project owner shall request the CBO to inspect the completed structure and review the submitted documents. The project owner shall notify the CPM after obtaining the CBO's final approval. The project owner shall retain one set of approved engineering plans, specifications, and calculations (including all approved changes) at the project site or at another accessible location during the operating life of the project. Electronic copies of the approved plans, specifications, calculations, and marked-up as-builts shall be provided to the CBO for retention by the CPM.

Verification: Within 15 days of the completion of any work, the project owner shall submit to the CBO, with a copy to the CPM, in the next monthly compliance report, (a) a written notice that the completed work is ready for final inspection, and (b) a signed statement that the work conforms to the final approved plans. After storing the final approved engineering plans, specifications, and calculations described above, the project owner shall submit to the CPM a letter stating both that the above documents have been stored and the storage location of those documents.

Within 90 days of the completion of construction, the project owner shall provide to the CBO three sets of electronic copies of the above documents at the project owner's expense. These are to be provided in the form of "read only" (Adobe .pdf 6.0 or newer version) files, with restricted (password-protected) printing privileges, on archive quality compact discs.

CIVIL-1 The project owner shall submit to the CBO for review and approval the following:

1. Design of the proposed drainage structures and the grading plan;
2. An erosion and sedimentation control plan;
3. A construction storm water pollution prevention plan (SWPPP);
4. Related calculations and specifications, signed and stamped by the responsible civil engineer; and
5. Soils, geotechnical, or foundation investigations reports required by the applicable edition of the CBC.

<u>Verification:</u> At least 15 days (or project owner- and CBO-approved alternative time frame) prior to the start of site grading the project owner shall submit the documents described above to the CBO for design review and approval. In the next monthly compliance report following the CBO's approval, the project owner shall submit a written statement certifying that the documents have been approved by the CBO.

CIVIL-2 The resident engineer shall, if appropriate, stop all earthwork and construction in the affected areas when the responsible soils engineer, geotechnical engineer, or the civil engineer experienced and knowledgeable in the practice of soils engineering identifies unforeseen adverse soil or geologic conditions. The project owner shall submit modified plans, specifications, and calculations to the CBO based on these new conditions. The project owner shall obtain approval from the CBO before resuming earthwork and construction in the affected area.

<u>Verification:</u> The project owner shall notify the CPM within 24 hours when earthwork and construction is stopped as a result of unforeseen adverse geologic/soil conditions. Within 24 hours of the CBO's approval to resume earthwork and construction in the affected areas, the project owner shall provide to the CPM a copy of the CBO's approval.

CIVIL-3 The project owner shall perform inspections in accordance with the applicable edition of the CBC. All plant site-grading operations, for which a grading permit is required, shall be subject to inspection by the CBO.

If, in the course of inspection, it is discovered that the work is not being performed in accordance with the approved plans, the discrepancies shall be reported immediately to the resident engineer, the CBO, and the CPM. The project owner shall prepare a written report, with copies to the CBO and the CPM, detailing all discrepancies, non-compliance items, and the proposed corrective action.

Verification: Within five days of the discovery of any discrepancies, the resident engineer shall transmit to the CBO and the CPM a non-conformance report (NCR), and the proposed corrective action for review and approval. Within five days of resolution of the NCR, the project owner shall submit the details of the corrective action to the CBO and the CPM. A list of NCRs, for the reporting month, shall also be included in the following monthly compliance report.

CIVIL-4 After completion of finished grading and erosion and sedimentation control and drainage work, the project owner shall obtain the CBO's approval of the final grading plans (including final changes) for the erosion and sedimentation control work. The civil engineer shall state that the work within his/her area of responsibility was done in accordance with the final approved plans.

Verification: Within 30 days (or project owner- and CBO-approved alternative time frame) of the completion of the erosion and sediment control mitigation and drainage work, the project owner shall submit to the CBO, for review and approval, the final grading plans (including final changes) and the responsible civil engineer's signed statement that the installation of the facilities and all erosion control measures were completed in accordance with the final approved combined grading plans, and that the facilities are adequate for their intended purposes. The project owner shall submit a copy of the CBO's approval to the CPM in the next monthly compliance report.

STRUC-1 Prior to the start of any increment of construction, the project owner shall submit plans, calculations and other supporting documentation to the CBO for design review and acceptance for all project structures and equipment identified in the CBO-approved master drawing and master specifications list. The design plans and calculations shall include the lateral force procedures and details as well as vertical calculations.

Construction of any structure or component shall not begin until the CBO has approved the lateral force procedures to be employed in designing that structure or component. The project owner shall:

1. Obtain approval from the CBO of lateral force procedures proposed for project structures;

2. Obtain approval from the CBO for the final design plans, specifications, calculations, soils reports, and applicable quality control procedures. If there are conflicting requirements, the more stringent shall govern (for example, highest loads, or lowest allowable stresses shall govern). All

plans, calculations, and specifications for foundations that support structures shall be filed concurrently with the structure plans, calculations, and specifications;

3. Submit to the CBO the required number of copies of the structural plans, specifications, calculations, and other required documents of the designated major structures prior to the start of on-site fabrication and installation of each structure, equipment support, or foundation;

4. Ensure that the final plans, calculations, and specifications clearly reflect the inclusion of approved criteria, assumptions, and methods used to develop the design. The final designs, plans, calculations, and specifications shall be signed and stamped by the responsible design engineer; and

5. Submit to the CBO the responsible design engineer's signed statement that the final design plans conform to applicable LORS.

Verification: At least 60 days (or project owner- and CBO-approved alternative time frame) prior to the start of any increment of construction of any structure or component listed in the CBO-approved master drawing and master specifications list, the project owner shall submit to the CBO the above final design plans, specifications and calculations, with a copy of the transmittal letter to the CPM.

The project owner shall submit to the CPM, in the next monthly compliance report, a copy of a statement from the CBO that the proposed structural plans, specifications, and calculations have been approved and comply with the requirements set forth in applicable engineering LORS.

STRUC-2 The project owner shall submit to the CBO the required number of sets of the following documents related to work that has undergone CBO design review and approval:

1. Concrete cylinder strength test reports (including date of testing, date sample taken, design concrete strength, tested cylinder strength, age of test, type and size of sample, location and quantity of concrete placement from which sample was taken, and mix design designation and parameters);

2. Concrete pour sign-off sheets;

3. Bolt torque inspection reports (including location of test, date, bolt size, and recorded torques);

4. Field weld inspection reports (including type of weld, location of weld, inspection of non-destructive testing (NDT) procedure and results, welder qualifications, certifications, qualified procedure description or number (ref: AWS); and

5. Reports covering other structural activities requiring special inspections shall be in accordance with the applicable edition of the CBC.

Verification: If a discrepancy is discovered in any of the above data, the project owner shall, within five days, prepare and submit an NCR describing the nature of the discrepancies and the proposed corrective action to the CBO, with a copy of the transmittal letter to the CPM. The NCR shall reference the condition(s) of certification and the applicable CBC chapter and section. Within five days of resolution of the NCR, the project owner shall submit a copy of the corrective action to the CBO and the CPM.

The project owner shall transmit a copy of the CBO's approval or disapproval of the corrective action to the CPM within 15 days. If disapproved, the project owner shall advise the CPM, within five days, the reason for disapproval, and the revised corrective action to obtain CBO's approval.

STRUC-3 The project owner shall submit to the CBO design changes to the final plans required by the applicable edition of the CBC, including the revised drawings, specifications, calculations, and a complete description of, and supporting rationale for, the proposed changes, and shall give to the CBO prior notice of the intended filing.

Verification: On a schedule suitable to the CBO, the project owner shall notify the CBO of the intended filing of design changes, and shall submit the required number of sets of revised drawings and the required number of copies of the other above-mentioned documents to the CBO, with a copy of the transmittal letter to the CPM. The project owner shall notify the CPM, via the monthly compliance report, when the CBO has approved the revised plans.

STRUC-4 Tanks and vessels containing quantities of toxic or hazardous materials exceeding amounts specified in the applicable edition of the CBC shall, at a minimum, be designed to comply with the requirements of that chapter.

Verification: At least 30 days (or project owner- and CBO-approved alternate time frame) prior to the start of installation of the tanks or vessels containing the above specified quantities of toxic or hazardous materials, the project owner shall submit to the CBO for design review and approval final design plans, specifications, and calculations, including a copy of the signed and stamped engineer's certification.

The project owner shall send copies of the CBO approvals of plan checks to the CPM in the following monthly compliance report. The project owner shall also transmit a copy of the CBO's inspection approvals to the CPM in the monthly compliance report following completion of any inspection.

MECH-1 The project owner shall submit, for CBO design review and approval, the proposed final design, specifications and calculations for each plant major piping and plumbing system listed in the CBO-approved master drawing and master specifications list. The submittal shall also include the applicable QA/QC procedures. Upon completion of construction of any such major piping or plumbing system, the project owner shall request the CBO's inspection approval of that construction.

The responsible mechanical engineer shall stamp and sign all plans, drawings, and calculations for the major piping and plumbing systems, subject to CBO design review and approval, and submit a signed statement to the CBO when the proposed piping and plumbing systems have been designed, fabricated, and installed in accordance with all of the applicable laws, ordinances, regulations and industry standards, which may include, but are not limited to:

- American National Standards Institute (ANSI) B31.1 (Power Piping Code);
- ANSI B31.2 (Fuel Gas Piping Code);
- ANSI B31.3 (Chemical Plant and Petroleum Refinery Piping Code);
- ANSI B31.8 (Gas Transmission and Distribution Piping Code);
- NACE R.P. 0169-83;
- NACE R.P. 0187-87;
- NFPA 56;
- Title 24, California Code of Regulations, Part 5 (California Plumbing Code);
- Title 24, California Code of Regulations, Part 6 (California Energy Code, for building energy conservation systems and temperature control and ventilation systems);
- Title 24, California Code of Regulations, Part 2 (California Building Code); and
- City of Long Beach codes.

The CBO may deputize inspectors to carry out the functions of the code enforcement agency.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of any increment of major piping or plumbing construction listed in the CBO-approved master drawing and master specifications list, the project owner shall submit to the CBO for design review and approval the final plans, specifications, and calculations, including a copy of the signed and stamped statement from the responsible mechanical engineer certifying compliance with applicable LORS, and shall send the CPM a copy of the transmittal letter in the next monthly compliance report.

The project owner shall transmit to the CPM, in the monthly compliance report following completion of any inspection, a copy of the transmittal letter conveying the CBO's inspection approvals.

MECH-2 For all pressure vessels installed in the plant, the project owner shall submit to the CBO and California Occupational Safety and Health Administration (Cal-OSHA), prior to operation, the code certification papers and other documents required by applicable LORS. Upon completion of the installation of any pressure vessel, the project owner shall request the appropriate CBO and/or Cal-OSHA inspection of that installation.

The project owner shall:

1. Ensure that all boilers and fired and unfired pressure vessels are designed, fabricated, and installed in accordance with the appropriate section of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, or other applicable code. Vendor certification, with identification of applicable code, shall be submitted for prefabricated vessels and tanks; and

2. Have the responsible design engineer submit a statement to the CBO that the proposed final design plans, specifications, and calculations conform to all of the requirements set forth in the appropriate ASME Boiler and Pressure Vessel Code or other applicable codes.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of on-site fabrication or installation of any pressure vessel, the project owner shall submit to the CBO for design review and approval, the above listed documents, including a copy of the signed and stamped engineer's certification, with a copy of the transmittal letter to the CPM.

The project owner shall transmit to the CPM, in the monthly compliance report following completion of any inspection, a copy of the transmittal letter conveying the CBO's and/or Cal-OSHA inspection approvals.

MECH-3 The project owner shall submit to the CBO for design review and approval the design plans, specifications, calculations, and quality control procedures for any heating, ventilating, air conditioning (HVAC) or refrigeration system. Packaged HVAC systems, where used, shall be identified with the appropriate manufacturer's data sheets.

The project owner shall design and install all HVAC and refrigeration systems within buildings and related structures in accordance with the CBC and other applicable codes. Upon completion of any increment of construction, the project owner shall request the CBO's inspection and approval of that construction. The final plans, specifications and calculations shall include approved criteria, assumptions, and methods used to develop the design. In addition, the responsible mechanical engineer shall sign and stamp all plans, drawings and calculations and submit a signed statement to the CBO that the proposed final design plans, specifications and calculations conform with the applicable LORS.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of construction of any HVAC or refrigeration system, the project owner shall submit to the CBO the required HVAC and refrigeration calculations, plans, and specifications, including a copy of the signed and stamped statement from the responsible mechanical engineer certifying compliance with the CBC and other applicable codes, with a copy of the transmittal letter to the CPM.

ELEC-1 Prior to the start of any increment of electrical construction for all electrical equipment and systems 110 Volts or higher (see a representative list, below) the project owner shall submit, for CBO design review and approval, the proposed final design, specifications, and calculations. Upon approval, the above listed plans, together with design changes and design change notices, shall remain on the site or at another accessible location for the operating life of the project. The project owner shall request that the CBO inspect the installation to ensure compliance with the requirements of applicable LORS.

A. Final plant design plans shall include:
   1. one-line diagram for the 13.8 kV, 4.16 kV and 110/480 V systems;
   2. system grounding drawings;
   3. lightning protection system; and
   4. hazard area classification plan.

B. Final plant calculations must establish:
   1. short-circuit ratings of plant equipment;
   2. ampacity of feeder cables;
   3. voltage drop in feeder cables;
   4. system grounding requirements;
   5. coordination study calculations for fuses, circuit breakers and protective relay settings for the 13.8 kV, 4.16 kV and 110/480 V systems;
   6. system grounding requirements;
   7. lighting energy calculations; and
   8. 110 volt system design calculations and submittals showing feeder sizing, transformer and panel load confirmation, fixture schedules and layout plans.

C. The following activities shall be reported to the CPM in the monthly compliance report:
   1. Receipt or delay of major electrical equipment;
   2. Testing or energizing of major electrical equipment; and
   3. A signed statement by the registered electrical engineer certifying that the proposed final design plans and specifications conform to requirements set forth in the Energy Commission decision.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of each increment of electrical construction, the project owner shall submit to the CBO for design review and approval the above listed documents.

The project owner shall include in this submittal a copy of the signed and stamped statement from the responsible electrical engineer attesting compliance with the applicable LORS, and shall send the CPM a copy of the transmittal letter in the next monthly compliance report.

REFERENCES

AEC 2015f - Alamitos Energy Center Supplemental AFC (TN 206427-1). Submitted on October 26, 2015. CEC/Docket on October 26, 2015.

Facility Design Appendix A

ENGINEERING LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

This appendix lists the LORS that would be used in the engineering design and construction of the Redondo Beach Energy Project (RBEP).

1. **Civil Engineering LORS:**

American Association of State Highway and Transportation Officials (AASHTO) — Standards and Specifications

American Concrete Institute (ACI) − Standards and Recommended Practices

American Institute of Steel Construction (AISC) − Standards and Specifications

American National Standards Institute (ANSI) − Standards

American Society of Testing and Materials (ASTM) − Standards, Specifications, and Recommended Practices

American Water Works Association (AWWA) − Standards and Specifications

American Welding Society (AWS) − Codes and Standards

Asphalt Institute (AI) − Asphalt Handbook

State of California Department of Transportation (CALTRANS) Standard Specification

California Energy Commission (CEC) − Recommended Seismic Design Criteria for Non-Nuclear Generating Facilities in California, 1989

Concrete Reinforcing Steel Institute (CRSI) − Standards

Factory Mutual (FM) − Standards

National Fire Protection Association (NFPA) − Standards

California Building Code (CBC)

Steel Structures Painting Council (SSPC) − Standards and Specifications

American Society of Civil Engineers (ASCE) – Standards and Recommended Practices

United States Geological Survey (USGS)

2. **Structural Engineering LORS:**

American Concrete Institute (ACI)

American Society of Civil Engineers (ASCE)

American Society of Mechanical Engineers (ASME)

American Welding Society (AWS)

Code of Federal Regulations, Title 29—Labor, Chapter XVII, Occupational Safety and Health Administration (OSHA)

National Association of Architectural Metal Manufacturers (NAAMM)—Metal Bar Grating Manual

Hoist Manufacturers Institute (HMI), Standard Specifications for Electric Wire Rope Hoists (HMI 100)

IEEE 980 – Guide for Containment and Control of Oil Spills in Substations

National Electric Safety Code (NESC), C2-2007

National Fire Protection Association (NFPA Standards)

OSHA Williams-Steiger Occupational Safety and Health Act of 1970

Steel Deck Institute (SDI)—Design Manual for Floor Decks and Roof Decks

3. Mechanical Engineering LORS:

American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code

ASME/ANSI B31.1 Power Piping Code

ASME Performance Test Codes

ASME Standard TDP-1

American National Standards Institute (ANSI) B16.5, B16.34, and B133.8

American Boiler Manufacturers Association (ABMA)

American Gear Manufacturers Association (AGMA)

Air Moving and Conditioning Association (AMCA)

American Society for Testing and Materials (ASTM)

American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE)

American Welding Society (AWS)

Cooling Tower Institute (CTI)

Heat Exchange Institute (HEI)

Manufacturing Standardization Society (MSS) of the Valve and Fitting Industry

National Fire Protection Association (NFPA)

Hydraulic Institute Standards (HIS)

Tubular Exchanger Manufacturer's Association (TEMA)

4. Electrical Engineering LORS:

American National Standards Institute (ANSI)

American Society for Testing and Materials (ASTM)

Anti-Friction Bearing Manufacturers Association (AFBMA)

California Building Standards Code

California Electrical Code

Insulated Cable Engineers Association (ICEA)

Institute of Electrical and Electronics Engineers (IEEE)

Illuminating Engineering Society (IES)

National Association of Corrosion Engineers (NACE)

National Electrical Code (NEC)

National Electrical Manufacturers Association (NEMA)

National Electrical Safety Code (NESC)

National Fire Protection Association (NFPA)

Underwriters Laboratories, Inc. (UL)

5. Long Beach LORS:

City of Long Beach building and engineering regulations and ordinances

GEOLOGY AND PALEONTOLOGY

Garry Maurath, PhD, PG, CHg

SUMMARY OF CONCLUSIONS

The proposed Alamitos Energy Center (AEC) site is located in a geologically active area along the right bank of the San Gabriel River in coastal Southern California. The site could be subject to very strong levels of earthquake-related ground shaking and the affects of this shaking on structures must be mitigated. In addition to strong seismic shaking, the project may be subject to soil failure caused by liquefaction and/or dynamic compaction. A design-level geotechnical investigation required for the project by the California Building Code 2013 (CBC 2013), and proposed Conditions of Certification **GEO-1** and **FACILITY DESIGN** Conditions of Certification **GEN-1**, **GEN-5** and **CIVIL-1**, would present standard engineering design requirements for mitigation of strong seismic shaking, liquefaction and potential excessive settlement due to dynamic compaction.

While not likely to occur during the project design life, the site is subject to inundation by tsunami. Sea level rise could exacerbate the potential for inundation. Staff recommends **GEO-1,** which would require the applicant to consider potential impacts from tsunami inundation on facility design. **GEO-2** would require the applicant to develop a tsunami hazard mitigation plan for preparedness and evacuation methods that would ensure public health and safety.

Petroleum is the only economic geologic resource in the project vicinity. The project site lies within the Seal Beach oil field (DOGGR 1990). It is likely that oil reserves exist below the project site. With depths to main production zones in adjacent areas between 4600 feet and 5000 feet below ground surface (DOGGR 1990) these resources could be accessed by off-site directional drilling, and would not be impacted by the AEC.

Fossils have not been found in close proximity to the project site. Potential impacts to paleontological resources due to construction activities are not likely, but if discovered during construction, they would be mitigated through worker training and monitoring by qualified paleontologists, as required by proposed Conditions of Certification **PAL-1** through **PAL-8**.

Based on this information, Energy Commission staff concludes that the potential adverse cumulative impacts to project facilities from geologic hazards during its design life are less than significant. Similarly, staff concludes the potential adverse cumulative impacts to potential geologic, mineralogic, and paleontologic resources from the construction, operation, and closure of the proposed project, if any, are less than significant. It is staff's opinion that the proposed AEC can be designed and constructed in accordance with all applicable laws, ordinances, regulations, and standards (LORS), and in a manner that both protects environmental quality and assures public safety.

INTRODUCTION

This section presents the discussion by California Energy Commission (Energy Commission) staff about potential impacts of geologic hazards on the proposed AEC facility as well as the AEC's potential impact on geologic, mineralogic, and paleontologic resources. Staff's objective is to identify resources that could be significantly adversely affected, evaluate the potential of the project construction and operation to significantly impact the resources and provide mitigation measures, as necessary, to ensure there would be no significant adverse impacts to geological and paleontological resources during project construction, operation, and closure and to ensure that operation of the plant would not expose occupants to high-probability geologic hazards. A brief geological and paleontological overview is provided. The section concludes with staff's proposed Conditions of Certification - *i.e.*, monitoring and mitigation measures that, if implemented, would reduce any project impacts from geologic hazards and to geologic, mineralogic, and paleontologic resources, to insignificant levels.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

Applicable laws, ordinances, regulations and standards (LORS) are listed in the Application for Certification (AFC) (AEC 2013). The following table briefly describes the current LORS for both geologic hazards and resources and mineralogic and paleontologic resources.

Geology and Paleontology Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	The site is not located on Federal Land and there are no federal regulations directly applicable to the geological or paleontological conditions at the project site
State	
California Building Code (2013)	The California Building Code (CBC 2013) includes a series of standards that are used in project investigation, design, and construction (including seismicity, grading and erosion control). The CBC has adopted provisions in the International Building Code (IBC, 2012).
Alquist-Priolo Earthquake Fault Zoning Act, Public Resources Code (PRC), section 2621–2630	Mitigates against surface fault rupture of known active faults beneath occupied structures. Requires disclosure to potential buyers of existing real estate and a 50-foot setback for new occupied buildings.
Seismic Hazards Mapping Act, PRC section 2690–2699	Maps identify areas (zones) that are subject to the effects of strong ground shaking, such as liquefaction, landslides, tsunamis, and seiches. Requires a geotechnical report be prepared that defines and delineates any seismic hazard prior to approval of a project located in a seismic hazard zone.

Applicable Law	Description
Local	
City of Long Beach Public Safety Element, 1975	The City of Long Beach addresses public safety and welfare in the City through implementation of its General Plan. General Plan policies specific to geologic, soil, and seismic hazards are listed in the Public Safety Element.
City of Long Beach Public Seismic Safety Element, 1988	Provides an in-depth analysis of seismic factors to assist with the reduction of loss of life, injuries, damage to property, and social and economic impacts resulting from future earthquakes.
Long Beach Building Standards Code as a part of the Long Beach Municipal Code, ORD – 13 – 0024, 2013	Establishes the minimum requirements to safeguard the public health, safety and general welfare, provides minimum provisions considered necessary for safety, efficiency, adequacy and the practical safeguarding of persons and of buildings, structures and their contents from hazards.
Standards	
Society for Vertebrate Paleontology (SVP), 2010	The "Measures for Assessment and Mitigation of Adverse Impacts to Non-Renewable Paleontological Resources: Standard Procedures" is a set of procedures and standards for assessing and mitigating impacts to vertebrate paleontological resources developed by the SVP, a national organization of professional scientists. The measures were adopted in October 1995, and revised in 2010 following adoption of the Paleontological Resources Preservation Act (PRPA) of 2009.
Bureau of Land Management (BLM) Instructional Memorandum 2008-009	Provides up-to-date methodologies for assessing paleontological sensitivity and management guidelines for paleontological resources on lands managed by the Bureau of Land Management. While not required on non-BLM lands, the methodologies are useful for all paleontological studies, regardless of land ownership.

SETTING

REGIONAL SETTING

Formation of the western coast of North America began in late Triassic time during inception of the Mid-Atlantic rise (DeCourten 2008). This motion caused the continental North American crustal plate to migrate westward. As the North American plate migrated westward, the eastern edge of the Farallon plate was overridden and subducted beneath the advancing North American plate (Atwater 1998). This crustal subduction continued into the Miocene (Yerkes, 1965). As the Farallon plate disappeared into the subduction zone, the East Pacific Rise reached the western edge of the continent and the northern end of the Peninsular Ranges became deformed (Yerkes, 1965). The project site is located in the northwestern portion of the Peninsular

Ranges geomorphic province. (**GEOLOGY AND PALEONTOLOGY - FIGURE 1**) This deformation caused the Channel Islands-San Nicolas Island crustal block and the Santa Monica Mountains crustal block to move west from the Peninsular Ranges, leaving behind a rift that became the Los Angeles basin (Yerkes, 1965). Subsequently, late Cenozoic age marine sediments filled the Los Angeles Basin. These sediments overlie diversely oriented Mesozoic basement rocks.

In early Miocene, plate motion slowly shifted from subduction along the western margin of the North American continent to translation along transform faults. As the area was subjected to right-lateral shear in late Miocene and early Pliocene time pre-existing faults in Mesozoic age basement rocks, which were formed during the earlier subduction period, propagated upward into Cenozoic age marine sediments creating the current transform fault systems. The orientation of these “new” transform fault systems was controlled by the orientation of the older faults. (Yerkes, 1965). Structurally, the Los Angeles Basin is a northwest-trending syncline composed of Cretaceous to Recent marine and non-marine deposits underlain by a basement complex of Jurassic through Cretaceous meta-sediments and granitic rocks (Yerkes 1965). The structural deformation of the Los Angeles Basin has allowed the accumulation of over 15,000 feet of stratified Miocene marine sediments (WCC 1988). During the late stages of sediment deposition in the LA Basin, the basin additional deformation creating four uplifted zones and synclinal depressions that are bound by faults. These regional faults break the LA Basin into four structural zones identified as the Northwestern, Northeastern, Central and Southern Blocks (Norris 1990). The project site lies near the boundary of the Southwest Block and Central Block which is defined by the Newport-Inglewood fault zone.

Tectonic uplifting activities within the NIFZ during the past 300,000 years have created a raised linear dome structure within the marine sediments in the Long Beach area (Orange 2013a). Dissection of these uplifted marine sediments occurred during the lower sea level stand of the last glacial period when the ancestral Los Angeles and San Gabriel Rivers created deeply incised channels through the sedimentary sequence. The water gaps formed by the Los Angeles and San Gabriel rivers are respectively known as the Dominguez and the Alamitos Gaps (Orange 2013b).

The project site is located within the Alamitos Gap. The Alamitos Gap is an erosional feature located between the mesas of Bixby Ranch Hill and Landing Hill in the cities of Long Beach and Seal Beach, respectively (**GEOLOGY and PALEONTOLOGY - FIGURE 2**). The erosion that created the Alamitos Gap began in the Late Pleistocene (approximately 60,000 years ago) and continued until the end of the last glacial period approximately 11,000 years ago. The combination of a lowered sea level and accelerated stream erosion produced a river valley that grew hundreds of feet deep and thousands of feet wide. At the end of the glacial period, the sea level began to rise and the ancestral river began backfilling the valley eventually forming the existing coastal plain where the site is located.

The coastal plain contains alluvial deposits (gravels, sands, and silts), aeolian deposits (well sorted fine grain windblown sand), estuarian deposits (organic silts and clays), and near shore marine deposits (predominantly well sorted medium grain sand) (Ninyo 2011).

According to State of California Division of Oil and Gas, and Geothermal Resources Publication TR 39, the project site and surrounding area are situated within the Seal Beach oil field (**GEOLOGY AND PALEONTOLOGY - FIGURE 3**). The Seal Beach oil field is between the Long Beach and the Huntington Beach oil fields, about one-half mile inland from the Pacific Ocean. The oil field lies within a series of oil fields associated with what is referred to as the Newport-Inglewood Structural Trend (Magorien 2002). A number of other significant oil fields are located along the Newport-Inglewood Structural Trend, all of which owe their existence to the Newport-Inglewood Fault.

PROJECT SITE DESCRIPTION

The AEC site is located on a gently sloping coastal plain in the southeast part of the city of Long Beach. Topography of the site is relatively flat and elevation ranges from approximately 8 to 15 feet above mean sea level (Ninyo 2011). The site is bordered by the San Gabriel River channel to the east, North Studebaker Road and the Los Cerritos Channel to the west, Westminster Avenue to the south and East 7th Street to the north (**GEOLOGY AND PALEONTOLOGY - FIGURE 4**).

The project would be built on the site of the existing Alamitos Generating Station, an operating electrical generation facility. The site currently consists of six active power generating units and one retired unit occupying approximately 21 acres of the 71-acre site. Each unit is comprised of a control room, boiler, turbine and other support facilities. The entire site is covered with asphalt or concrete pavement.

As part of the preliminary on-site geotechnical investigation, four small diameter exploratory borings were drilled and four Cone Penetration Tests (CPT) were driven in the northern and eastern portions of the site (Ninyo 2011). The borings were drilled to maximum depths of 51.5 feet below ground surface (bgs) and the CPTs were driven to final depths of approximately 63.5 feet bgs.

Groundwater was observed in exploratory borings at depths between 8 and 14 feet bgs. However, these observations were not considered to be representative of stabilized ground water conditions (Ninyo 2011). As presented in the Preliminary Geotechnical Report, groundwater has historically been as high as 10 feet bgs in the site vicinity.

Based on the preliminary geotechnical investigation, Ninyo and Moore concluded that the upper 6 to 9 feet of the subsurface consists of artificial fill composed of loose to medium dense sandy silt, sandy clay, and clayey sand and firm clayey silt. Native alluvial deposits beneath the fill consist of interbedded layers of loose to very dense sand, silty sand, sandy silt and clayey sand and very soft to stiff clayey silt, silty clay, and silt to a depth of approximately 63.5 feet bgs (Ninyo 2011).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

This section assesses two types of impacts. The first is the potential impacts the proposed facility could have on existing geologic, mineralogic, and paleontologic resources in the area. The second is the potential geologic hazards, which could adversely affect the proper functioning of the proposed facility and create life/safety concerns.

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

The California Environmental Quality Act (CEQA) guidelines, Appendix G, provide a checklist of questions that lead agencies typically address when assessing impacts related to geologic and mineralogic resources, and effects of geologic hazards.

- Section (V) (c) includes guidelines that determine if a project will either directly or indirectly destroy a unique paleontological resource or site, or a unique geological feature.
- Sections (VI) (a), (b), (c), (d), and (e) focus on whether or not the project would expose persons or structures to geologic hazards.
- Sections (XI) (a) and (b) concern the project's effects on mineral resources.

To assess potential impacts on unique geologic features and effects on mineral resources, staff has reviewed geologic and mineral resource maps for the surrounding area, as well as site-specific information provided by the applicant, to determine if geologic and mineralogic resources exist in the area.

To assess potential impacts on paleontological resources, staff reviewed existing paleontologic information and reviewed the information obtained from the applicant's requested records searches from the Los Angeles County Natural History Museum for the surrounding area. The University of California (at Berkeley) Museum of Paleontology's (UCMP) website, which gives generalized information for locality records of their collection, and site-specific information generated by the applicant for the proposed AEC was also reviewed (UCMP 2008). All research was conducted in accordance with accepted assessment protocol (BLM 2008 and SVP 2010) to determine whether known paleontologic resources exist in the general area. If present or likely to be present, Conditions of Certification that outline required procedures to mitigate adverse effects to potential resources are proposed as part of the project's approval.

The current California Building Code (CBC 2013) provides geotechnical and geological investigation and design guidelines that engineers must follow when designing a facility. As a result, the criterion used to assess the significance of a geologic hazard includes evaluating each hazard's potential impact on the design, construction, and operation of the proposed facility. Geologic hazards include faulting and seismicity, liquefaction, dynamic compaction, hydrocompaction, subsidence, expansive soils, landslides, tsunamis, seiches, and others as may be dictated by site-specific conditions.

DIRECT/INDIRECT IMPACTS AND MITIGATION

An assessment of the potential impacts to geologic, mineralogic, and paleontologic resources, and from geologic hazards is provided below. The assessment of impacts is followed by a summary of potential impacts that may occur during construction and operation of the project and provides recommended conditions of certification that would ensure potential impacts are mitigated to a level that is less than significant. The recommended Conditions of Certification would allow the Energy Commission's compliance project manager (CPM) and the applicant to adopt a compliance monitoring scheme ensuring ongoing compliance with LORS applicable to geologic hazards and the protection of geologic, mineralogic, and paleontologic resources.

GEOLOGIC AND MINERALOGIC RESOURCES

At the AEC site, the geologic units are buried with a layer of fill approximately 6 to 9 feet thick. The geologic units in the subsurface are widespread alluvial deposits that occur throughout the Long Beach/Seal Beach area (**GEOLOGY AND PALEONTOLOGY - FIGURE 5).** These geologic units are not unique in terms of recreational, commercial, or scientific value.

According to online maps of the California Division of Oil, Gas and Geothermal Resources (DOGGR 2012), oil and natural gas deposits are present in the wider project area. The city of Long Beach lies over several oil producing areas, comprising the Seal Beach, Long Beach and Wilmington oil fields. The Long Beach area has been the site of the extraction of oil and gas over many years. Large-scale oil and gas production has occurred since the late 1920s and continues today.

The project site overlies the Seal Beach oil field, which is situated between the Long Beach and Huntington Beach oil fields. The Seal Beach oil field lies on the northwesterly–southeasterly oriented Newport-Inglewood structural trend, and includes five separate structural areas: North Block, North Block-East Extension, South Block, Alamitos, and Marine (DOGGR 1990). The project site lies within the Alamitos structural area.

The Seal Beach oil field was first discovered in September 1924 by Shell Oil Company. Subsequent oil field development continued in the area through the mid-1950s. Production history for the area shows a rapid initial decline, followed by 35 years of gradual decline. Over 31 million barrels of oil have been produced from the area, with almost half of the production in the first 3 years of development. Today, the Alamitos area is in a mature production stage. Of the 140 known wells completed, only 19 are still producing.

California is the largest consumer of sand and gravel in the country, and the Los Angeles metropolitan area produces and consumes more construction aggregate than any other metropolitan area in the country (Los Angeles County 2014). Both Los Angeles and Orange counties depend on the California Geological Survey to identify regionally-significant aggregate source material. Within Los Angeles County there are four areas designated as Mineral Resource Zones (MRZ), with cumulative reserves of over 680 M tons. However, the AEC site is located more than 16 miles from the closest MRZ (LA County 2016). In 1982, the California Division of Mines and Geology published a comprehensive mineral land classification for aggregate materials in the Orange County area. Based on this investigation, the AEC site is mapped as an area with no aggregate significance. The Mineral and Energy Resources Element of the Orange County General Plan indicates that significant mineral deposits are not present in the project area (Orange 2011). Based on these data there are no known active areas of mining for mineral resources occur near the AEC site.

Based on the information above, it is staff's opinion that the project would have no effect on oil and gas production or on other geologic resources of commercial value or on the availability of such resources and would not have any significant adverse direct, or indirect, impacts to potential geologic and mineralogic resources.

PALEONTOLOGIC RESOURCES

The project site is mantled with approximately 6 to 9 feet of artificial fill material. Beneath the fill are native soils consisting of alluvial, estuarine and marine sediments. The upper 50 feet of the native soils consist of Holocene coastal marine sediments (AEC 2013). Underlying the Holocene deposits are older Quaternary sediments of the Pleistocene age Palos Verdes Formation. The Palos Verdes Formation consists of greenish-gray, fine- to medium-grained sand with traces of silt and clay. Within the Palos Verdes Formation is a unit referred to as the Palos Verdes Sand. The Palos Verdes Sand is a fossiliferous layer of marine gray sands and gravels and has produced a large number of fish fossils, as well as the remains of terrestrial and aquatic birds and mammals (BonTerra 2010).

Beneath the Palos Verdes Formation lies the San Pedro Sand (BonTerra 2010). The San Pedro Sand consists of gray to dark gray to reddish-yellow (rust)-stained siltstone and clayey siltstone with friable, interbedded fine to gravelly coarse grained sandstones. In the San Pedro area, the San Pedro Sand has yielded late Pleistocene crustaceans, marine mollusks, bony fish and sharks, amphibians, birds, rodents, and mammals, including *Bison*, *Mammuthus* (mammoth), *Paramylodon* (sloth), *Equus* (horse), and *Capromeryx* (very small antelope). During the course of the field reconnaissance conducted for the nearby Banning Ranch project (BonTerra 2010), three shell bearing fossiliferous sites were found in deposits mapped as San Pedro Sand. The fossil sites represent the first recognized fossils from the San Pedro Sand in Orange County (BonTerra 2010).

Because the entire project area is highly developed, no paleontological resources survey was conducted by the applicant. As noted previously, a reconnaissance-level field review conducted by the applicant confirmed that no native sediment is present at the surface, and that the majority of the project site is covered by concrete or blacktop.

Even though the site is developed and paved and mantled with artificial fill, excavations are proposed for project construction. If the excavations extend through the fill, native soils will be encountered. There is a low potential for significant fossils to be encountered in the excavations. However, the possibility of encountering fossils remains. Therefore, staff considers monitoring of construction activities in accordance with the proposed Conditions of Certification is necessary. Proposed Conditions of Certification **PAL-1** to **PAL-8** are designed to mitigate any potential paleontological resource impacts, as discussed above, to a less than significant level. Essentially, these conditions would require a worker education program in conjunction with monitoring of proposed earthwork activities by qualified professional paleontologists (paleontologic resource specialist; PRS).

Earthwork would be halted in the immediate area of the find at any time potential fossils are recognized by either the paleontological monitor or the worker. A PRS would be retained for the proposed project by the applicant to produce a monitoring and mitigation plan, conduct the worker training, and provide on-site monitoring. During monitoring, the PRS can petition the CPM for a change in the monitoring protocol. Most commonly, this would be a request for lesser monitoring after sufficient monitoring has been performed to ascertain that there is little chance of finding significant fossils. In other cases, the PRS can propose increased monitoring due to unexpected fossil discoveries or in response to repeated out-of-compliance incidents by the earthwork contractor.

GEOLOGICAL HAZARDS

The AFC provides documentation of potential geologic hazards at the proposed AEC plant site. Staff reviewed information presented in the AFC and conducted independent research regarding the site's susceptibility to geologic hazards. Staff believes that the possibility of geologic hazards affecting plant operations, during its practical design life (40 years), would be low. However, the potential and probability for the site to be affected by geologic hazards such as strong seismic shaking, liquefaction and dynamic compaction, would need to be addressed in a project geotechnical report per requirements of CBC 2013, or the most current version succeeding that code. All recommendations from the geotechnical report must be addressed in project design.

Staff's independent research included the review of available geologic maps, reports, and related data of the proposed AEC plant site. Geological information from the California Geological Survey (CGS) and other governmental organizations was reviewed. Staff's analysis of this information is provided below.

Faulting and Seismicity

In southern California, tectonic deformation between the Pacific and North American plates is accommodated primarily by a zone of northwest trending strike-slip faults. However, within this complex zone of shear, areas of compression also occur. Major active and potentially active faults in the region are shown on **GEOLOGY AND PALEONTOLOGY - FIGURE 6**.

Most tectonic deformation in southern California occurs along strike slip faults associated with the on-land portion of the San Andreas Fault system. In addition to the on-land faults, the tectonic shear is shared with faults in the offshore inner Continental Borderland region (Grant 2004).

In 2002, Grant and Rockwell postulated that an active 300-km-long Coastal Fault zone extends between the Los Angeles basin and coastal Baja California (Grant 2002). This Coastal Fault zone includes those faults contained within the inner Continental Borderland which become contiguous with the Agua Blanca fault in Baja California (Grant 2004). The Agua Blanca fault is considered to have a slip rate between 5 and 7 millimeters/year (Rockwell 2012). That slip is believed to be transferred to the offshore faults within the inner Continental Borderland (Rockwell 2012). The geometry and slip rate of faults in the inner Continental Borderland are poorly constrained relative to onshore faults, yet they may pose significant seismic risk because they are close to populated areas, and several offshore faults appear to displace seafloor sediments (Legg, 1991).

Active faults in southern California associated with shear between the north American and Pacific plates include (from east to west), the San Andreas fault zone, the San Jacinto fault zone, the Elsinore fault zone, the Whittier fault zone, the Newport-Inglewood fault zone, the Palos Verdes fault zone, the San Diego Trough fault zone and the San Clemente fault zone. Faults specific to the inner Continental Borderland include the Newport-Inglewood fault zone, the Palos Verdes fault zone, the San Diego Trough fault zone and the San Clemente fault zone (Legg 2002).

In addition to transform strike slip faulting, tectonic compression in the southern California area has formed folds (anticlines and synclines), reverse faults and blind thrust faults (Blind thrusts). Blind thrusts underlie regions undergoing contraction in the Los Angeles Basin and if there is an associated surface expression it would typically be an active fold. The Compton-Los Alamitos fault and the San Joaquin Blind thrust are examples of this style of deformation. Seismic hazards posed by active thrusts are assessed in the Los Angeles Basin by a number of means, all of which are aimed at placing constraints on fault slip rates, earthquake recurrence and fault geometry and segmentation (Mueller 2005). Research into the relationship between fault slip, fault geometry and fold growth thus provides insight into the occurrence of earthquakes produced on these structures. Large earthquakes originating on blind thrusts within Southern California have occurred in the past century, illuminating their geometry and potential for seismic hazard and include the Mw5.9 1987 Whittier Narrows earthquake and the Mw6.8 1994 Northridge earthquake. It is likely that in 1769, a M7+ earthquake occurred on the San Joaquin Blind thrust which uplifted coastal Orange County approximately 10 feet (Grant 2004).

Early phases of active fault evaluation were conducted by CGS under the Alquist-Priolo Special Studies Zone Act of 1972 and under the subsequent Alquist-Priolo Earthquake Fault Zoning Act of 1994. These evaluations resulted in the delineation of Earthquake Fault Zones throughout California. Active faults with a potential to affect the AEC site are listed and described below and their locations presented on **GEOLOGY AND PALEONTOLOGY - FIGURE 6)**:

San Andreas Fault Zone

The San Andreas is the "master" fault of an intricate fault system that defines the boundary between the Pacific and North American crustal plates in California (Schulz 1992). The entire San Andreas fault system is more than 800 miles long and extends to depths of at least 10 miles within the Earth. In detail, the fault is a complex zone of crushed and broken rock from a few hundred feet to a mile wide. Many smaller faults branch from and join the San Andreas fault zone.

Over much of its length, a linear trough reveals the presence of the San Andreas fault; from the air, the linear arrangement of lakes, bays, and valleys in this trough is striking. Viewed from the ground, however, the features are more subtle. For example, many people driving near Crystal Springs Reservoir, near San Francisco, or along Tomales Bay, or through Cajon or Tejon Passes may not realize that they are within the San Andreas fault zone. On the ground, the fault can be recognized by carefully inspecting the landscape. The fault zone is marked by distinctive landforms that include long straight escarpments, narrow ridges, and small undrained ponds formed by the settling of small blocks within the zone. Many stream channels characteristically jog sharply to the right where they cross the fault.

At least 350 miles of offset has occurred along the San Andreas fault since it came into being about 15-20 million years ago (Schulz 1992). Surveying demonstrates the strain (displacement) occurs along the fault at the rate of approximately 2 inches per year.

San Jacinto Fault Zone

The San Jacinto fault zone is one of the major branches of the San Andreas fault system in southern California (Sharp 1965).

The San Jacinto fault zone is a complex zone of splaying and overlapping strike-slip fault segments, steps and bends, and associated zones of contractional and extensional deformation (Dorsey 2002). Offsets on basement piercing points and Pleistocene strata indicate that about 25 km of slip has accumulated on the San Jacinto fault during the past 1.5 to 2.0 million years. Based on GPS studies and offsets of dated Quaternary deposits, the rate of slip on the San Jacinto system is generally agreed to be about10-12 millimeters per year (mm/yr). This represents 20 to 25 percent of the present-day Pacific-North American relative plate motion (Dorsey 2002).

The straightness, continuity, and high seismicity of the San Jacinto fault zone suggest that it may be currently the most important member of the San Andreas fault system in southern California (Sharp 1965).

Elsinore Fault Zone

The Elsinore fault zone parallels the San Jacinto and is part of the same right-lateral crustal plate strain system as the San Andreas and the San Jacinto (ECI 2000).The Elsinore branches into the Whittier fault near Santa Ana Canyon, where it borders the Puente Hills to the southwest and the Chino fault to the northeast. The most apparent displacements on the Whittier-Elsinore have been vertical, as evidenced by the steep scarp (an earthquake-built cliff) along the Santa Ana Mountains.

Whittier Fault Zone

The Whittier fault zone is exposed for a distance of about 25 miles along the south slopes of the Puente Hills from the Whittier Narrows on the northwest to the Santa Ana River near its southwest end (Yerkes 1965). In the vicinity of the Santa Ana River, it joins with the northern end of the Elsinore Fault Zone. Recent deformation along the Whittier Fault Zone is indicated by steeply tilted and locally overturned strata of late Pleistocene age (Yerkes 1965). Trenching along the fault has uncovered evidence of recent offsets, including faulted Holocene alluvium dated at 1400 to 2200 years before present (Gath 1988).

Compton-Los Alamitos Fault Zone

The Compton blind thrust fault is active and has generated at least six large-magnitude earthquakes (Mw 7.0–7.4) during the past 14,000 years (Leon 2009). Deformed Holocene strata record recent activity on the Compton thrust and are marked by discrete sequences that thicken repeatedly across a series of buried fold scarps. Minimum uplift in each of the scarp-forming events, which occurred at 0.7–1.75

thousand years ago (ka) (event 1), 0.7–3.4 ka or 1.9–3.4 ka (event 2), 5.6–7.2 ka (event 3), 5.4–8.4 ka (event 4), 10.3–12.5 ka (event 5), and 10.3–13.7 ka (event 6), ranged from approximately 2 to 6.2 feet,, indicating minimum thrust displacements of ≥4.2 to 13.8 feet. Such large displacements are consistent with the occurrence of large-magnitude earthquakes (Mw ≥ 7). This large, concealed fault underlies the Los Angeles metropolitan area and thus poses one of the largest deterministic seismic risks in the United States (Leon 2009).

Newport-Inglewood Fault Zone

The Newport-Inglewood fault zone (NIFZ) is approximately 0.9 to 1.6 miles wide, trends N45-60W, is mainly a right-lateral tectonic structure that extends from the Santa Monica Mountains on the north to offshore connection with the Rose Canyon fault at San Diego on the south (Shlemon 2008). Known active fault traces in the NIFZ zone of deformation have been mapped in Alquist-Priolo Special Studies Zones (CDMG 1994 and 2003).

The NIFZ was first identified as a significant threat to southern California residents in 1933 when it generated the M6.3 Long Beach earthquake, killing 115 people and providing motivation for passage of the first seismic safety legislation in the United States (Grant 2004).

Ongoing studies indicate the NIFZ is capable of generating earthquakes with magnitudes up to 7.4 Mw (Toppozada 1989) or 7.5Mw (Petersen 2008). The higher magnitude indicated by Petersen uses a fault length of 208 km as described by Shlemon (2008).

A mapped trace of an inferred concealed fault is located approximately 500 feet southwest of the southwestern property corner. The surface expression of the fault, indicating its Holocene age, has been mapped approximately 3,500 feet west of the project site. (**GEOLOGY AND PALEONTOLOGY - FIGURE 7)**.

San Joaquin Hills Blind Thrust

The uplift rate of the San Joaquin Hills during the late Quaternary period was approximately twice as high as uplift rates parallel to the Newport-Inglewood Fault Zone (NIFZ) along the coast to the south (Grant 2002). Several observations suggest that the San Joaquin Hills are underlain by a fault that is distinct from the NIFZ, although they may be linked kinematically. There are several Quaternary anticlines along the NIFZ north of the San Joaquin Hills (Grant 2002). However, the San Joaquin Hills anticline is longer and has the greatest topographic expression. Other topographically prominent anticlines, such as Signal Hill, are located within the structurally complex NIFZ and are associated with step-overs (Barrows, 1974).

Geomorphic studies along the coastline in the vicinity of the San Joaquin Hills have discovered emergent shorelines along the open coast and an elevated marsh bench in Newport Back Bay. The surface of the marsh bench is approximately 5 feet above the current marsh elevation (Grant 2002). Radiocarbon dating and interpretation of the introduction of exotic pollens contained within the elevated marsh bench indicates that the marsh bench was uplifted between the years 1635 and 1797 (Grant 2002).

On July 28, 1769 a strong temblor was described by explorer Gaspar de Portola while he was in the central Los Angeles basin area (Townley 1939). The main shock was described as violent, and at least two dozen earthquakes followed it over the course of several days. It is likely that the 1769 San Joaquin Hills earthquake occurred on the San Joaquin Blind Thrust and was responsible for the uplift of the elevated marsh bench in Newport Bay and the emergent shorelines along the open coastline (Grant 2002). The San Joaquin earthquake may be the largest known earthquake that has originated within the greater Los Angeles region in the last few centuries (Grant 2002).

Palos Verdes Fault Zone

The Palos Verdes Fault Zone extends southwestward from the northern part of Santa Monica Bay to the area southwest of Lasuen Knoll, offshore from Dana Point (Fisher 2004).The structure of the Palos Verdes Fault Zone changes markedly southeastward across the San Pedro Shelf and slope. Under the northern part of the shelf, this fault zone includes several strands, but the main strand dips west and is probably an oblique-slip fault (Fisher 2004). Under the slope, this fault zone consists of several fault strands having normal separation, most of which dip moderately east. To the southeast near Lasuen Knoll, the Palos Verdes Fault Zone locally is a low angle fault that dips east, but elsewhere near this knoll the fault appears to dip steeply. Fresh sea-floor scarps near Lasuen Knoll indicate recent fault movement (Fisher 2004).

Analysis of wave-cut terraces and offset stream courses indicates total fault-slip rate to be around 3 mm/yr. (Fisher 2004). The main style of movement along the Palos Verdes Fault Zone has been strike slip and multibeam bathymetric data show recent scarps along this fault near Lasuen Knoll indicating the fault's recent activity.

San Diego Trough Fault Zone

The San Diego Trough Fault Zone runs roughly from the Mexican border northward toward Catalina Island. The San Diego trough fault zone (SDTFZ) is part of a 56 mile-wide zone of faults within the inner Continental Borderland that accommodates motion between the Pacific and North American plates (Ryan 2012). New seismic reflection data shows that the fault zone steps across a 3.1-mile-wide stepover and continues for an additional 37 miles north of its previously mapped extent. At the latitude of Santa Catalina Island, the SDTFZ bends 20 degrees to the west and may be linked via a complex zone of folds with the Palos Verdes fault zone (PVFZ). If this is the case, this fault zone would be one of the longest in the California Borderland, and could produce some of the largest earthquakes in the region (Poppick 2013). The 1986 epicenter of the Oceanside earthquake (a magnitude 5.4 quake that caused nearly one million dollars in damage, 29 injuries, and one death) and the associated 1986 earthquake swarm is located within the SDTFZ (Poppick 2013). In a cooperative program between the U.S. Geological Survey (USGS) and the Monterey Bay Aquarium Research Institute (MBARI), the coseismic offset of a submarine channel that intersects the fault zone near the SDTFZ– PVFZ junction was measured and dated. This research indicated an estimated horizontal slip rate of about 1.5±0.3 mm/yr over the past 12,270 yr (Ryan 2012).

San Clemente Fault Zone

The San Clemente fault zone is the westernmost of the group of right lateral faults traversing the California Inner Continental Borderland (Legg 1989). The main trace of the San Clemente fault cuts a straight path directly across the rugged topography of the region, displaying evidence of a steeply dipping (near vertical) fault surface. Modern tectonic activity along the San Clemente fault zone is demonstrated by numerous earthquakes with epicenters located along the fault's trend. The average strike of the San Clemente fault is parallel to the Pacific-North American relative plate motion vector at this location and is a part of the broad Pacific-North American transform plate boundary (Legg 1989).

Fault Rupture

All of the faults discussed above have the potential to generate strong seismic shaking at the project site. However, none have the potential to cause fault offset of the ground surface at the project site.

The Alquist-Priolo Earthquake Fault Zoning Act of 1994 (formerly known as the Alquist-Priolo Special Studies Zone Act of 1972) stipulates that no structure for human occupancy may be built within an Earthquake Fault Zone until geologic investigations demonstrate that the site is free of fault traces that are likely to rupture with surface displacement. Earthquake Fault Zones include faults considered to have been active during Holocene time and to have a relatively high potential for surface rupture (CGS 2008). An Earthquake Fault Zone has not been mapped on the project site.

Fault rupture almost always follows pre-existing faults, which are zones of weakness (CGS 2007). No active faults are shown on published maps as crossing the boundary of new construction on the proposed AEC power plant site or associated linear facilities. Therefore, it is highly unlikely that the site would experience surface fault rupture during the project's design life.

Seismic Shaking

Preliminary estimates of ground motion based on probabilistic seismic hazard analyses have been calculated for the project site using the USGS Earthquake Hazards application called the U.S. Seismic "DesignMaps" Web Application (**Geology and Paleontology Table 2**). This application produces seismic hazard curves, uniform hazard response spectra, and seismic design values. The values provided by this application are based upon data from the 2008 USGS National Seismic Hazard Mapping Project. These design parameters are for use with the 2012 International Building Code, the 2010 ASCE-7 Standard, the 2009 NEHRP Provisions, and their respective predecessors.

Geology and Paleontology Table 2
Planning Level 2013 CBC Seismic Design Parameters Maximum Considered Earthquake, ASCE 7 Standard

Parameter	Value
Assumed Site Class	E
Structure Risk Category	III - Substantial
SS – Mapped Spectral Acceleration, Short (0.2 Second) Period	1.561 g
S1 – Mapped Spectral Acceleration, Long (1.0 Second) Period	0.582 g
Fa – Site Coefficient, Short (0.2 Second) Period	0.900
Fv – Site Coefficient, Long (1.0 Second) Period	2.400
SDS – Design Spectral Response Acceleration, Short (0.2 Second) Period	0.937 g
SD1 – Design Spectral Response Acceleration, Long (1.0 Second) Period	0.931 g
SMS – Spectral Response Acceleration, Short (0.2 Second) Period	1.405 g
SM1 – Spectral Response Acceleration, Long (1.0 Second) Period	1.396 g

ASCE = American Society of Civil Engineers
Values from USGS 2010

These parameters are project-specific and, based on AEC's location, were calculated using latitude and longitude inputs of 33.767 degrees north and 118.100 degrees west, respectively. Other inputs for this application are the site "type" which is based on the underlying geologic materials and the "Structure Risk Category". The assumed site class for AEC is "E", which is applicable to soft clay soil. These parameters can be updated as appropriate following the results presented in a project-specific geotechnical investigation report performed for the site. The assumed "Structure Risk Category" is "III", which is based on its inherent risk to people and the need for the structure to function following a damaging event. Risk categories range from I (non-essential) to IV (critical). Examples of risk category I include agriculture facilities, minor storage facilities, etc., while examples of category IV include fire stations, hospitals, nuclear power facilities, etc.

The ground acceleration values presented are typical for the area. Other developments in the adjacent area would also be designed to accommodate strong seismic shaking. The potential for and mitigation of the effects of strong seismic shaking during an earthquake must be addressed in a project-specific geotechnical report, per requirements of CBC 2013, or the most current version succeeding that code, and proposed Condition of Certification **GEO-1** and Conditions of Certification **FACILITY DESIGN GEN-1**, **GEN-5** and **CIVIL-1**. Compliance with these conditions of certification would ensure the project is built to current seismic standards and potential impacts would be mitigated to insignificant levels in accordance with current standards of engineering practice.

Liquefaction

Liquefaction is the phenomenon in which uniformly sized, loosely deposited, saturated, granular soils with low clay contents undergo rapid loss of shear strength through the development of excess pore pressure during strong earthquake induced ground shaking of sufficient duration to cause the soil to behave as a fluid for a short period of time. Liquefaction generally occurs in saturated or near-saturated cohesionless soils at depths shallower than 50 feet below the ground surface. If the liquefying layer is near the surface, the effect for any structure supported on it is much like that of quicksand, resulting in sinking or tilting. If the layer is deeper in the subsurface, it can provide a sliding surface for materials above it, resulting in lateral motion (spreading or lurching) toward any nearby 'free face' (shore bluff, river embankment, excavation wall) (PBS&J 2009).

The proposed project site is mapped in a Liquefaction Investigation Zone on the State of California Seismic Hazard Zone Map for the Los Alamitos Quadrangle (CGS 1998). A Liquefaction Investigation Zone is an area "where historic occurrence of liquefaction, or local geological, geotechnical and groundwater conditions indicate a potential for permanent ground displacement such that mitigation as defined in Public Resources Codes Section 2693(c) [Seismic Hazards Mapping Act] would be required" (CGS 1998).

Groundwater was measured in geotechnical borings at depths between approximately 8 and 14 feet below ground surface (Ninyo 2011). Ninyo and Moore stated that the measured groundwater depth is likely not representative of stabilized conditions. The Seismic Hazard Zone Report for this area indicates that the historic shallowest depth to groundwater at the site occurs at a depth of approximately 10 feet below ground surface (CDMG 1998). These determinations indicate that groundwater is shallow at the site and surrounding vicinity. The presence of shallow groundwater raises concerns about liquefaction potential, settlement rates, and the possible need for construction dewatering.

Based on site observations and review of information presented in the preliminary geotechnical report (Ninyo 2011), subsurface conditions at the site are likely to be conducive to liquefaction. Groundwater levels must be confirmed and the liquefaction potential on the proposed AEC site must be addressed in a project-specific geotechnical report, per requirements of CBC 2013, or the most current version succeeding that code, and proposed Condition of Certification **GEO-1**, and **FACILITY DESIGN** Conditions of Certification **GEN-1**, **GEN-5** and **CIVIL-1**.

Lateral Spreading

Lateral spreading of the ground surface during an earthquake usually takes place along weak shear zones that have formed within a liquefiable soil layer. Lateral spreading generally takes place in the direction of a free-face (i.e., retaining wall, slope, or channel).

An empirical model is typically used to predict the amount of horizontal ground displacement within a site (Ninyo 2011). For sites located in proximity to a free-face, the amount of lateral ground displacement is strongly correlated with the distance of the site from the free-face. Other factors such as earthquake magnitude, distance from the earthquake epicenter, thickness of the liquefiable layers, and the fines content and particle sizes of the liquefiable layers also affect the amount of lateral ground displacement.

The project site includes free-face slopes along the San Gabriel River on the east side of the site. However, based on analysis of the sampler blow counts and generally discontinuous nature of the underlying soil layers encountered during the preliminary geotechnical evaluation, the project site is not considered susceptible to significant seismically induced lateral spread (Ninyo 2011). However, the susceptibility of the underlying beds to lateral spread beneath the proposed AEC site must be addressed in a project-specific geotechnical report, per requirements of CBC 2013, or the most current version succeeding that code, and proposed Condition of Certification **GEO-1** and **FACILITY DESIGN** Conditions of Certification **GEN-1, GEN-5** and **CIVIL-1**.

Dynamic Compaction

Dynamic compaction of soils results when relatively unconsolidated granular materials experience vibration associated with seismic events. The vibration causes a decrease in soil volume, as the soil grains tend to rearrange into a more dense state (an increase in soil density). The decrease in volume can result in settlement of overlying structural improvements.

In order to estimate the amount of post-earthquake settlement of site soils, Ninyo & Moore used seismically induced cyclic stress ratios and corrected blow counts (N-values) to calculate the potential volumetric strain of the soil (Ninyo 2011). Their analysis indicated that seismically induced settlement at the project site would be approximately 1.25 inches, or less.

The potential for and mitigation of the effects of dynamic compaction of proposed site soils during an earthquake must be addressed in a project-specific geotechnical report, per requirements of CBC 2013, or the most current version succeeding that code, and proposed Conditions of Certification **GEO-1**, and **FACILITY DESIGN** Conditions of Certification **GEN-1**, **GEN-5** and **CIVIL-1**. Common mitigation methods would include deep foundations (driven piles; drilled shafts) for severe conditions, geogrid reinforced fill pads for moderate severity and over-excavation and replacement for areas of minimal hazard.

Hydrocompaction

Hydrocompaction (also known as hydro-collapse) is generally limited to young soils that were deposited rapidly in a saturated state, most commonly by a flash flood. The soils dry quickly, leaving an unconsolidated, low density deposit with a high percentage of voids. Foundations built on these types of compressible materials can settle excessively, particularly when landscaping irrigation dissolves the weak cementation that is preventing the immediate collapse of the soil structure. As stated in the preliminary geotechnical report, “Due to the high groundwater levels encountered at the site and the reported historically high groundwater, it is our opinion that the site soils are not susceptible to hydro-collapse” (Ninyo 20011). The potential for and mitigation of the effects of hydrocompaction of site soils must be addressed in a project-specific geotechnical report, per requirements of CBC 2013, or the most current version succeeding that code, and proposed Conditions of Certification **GEO-1**, and **FACILITY DESIGN** Conditions of Certification **GEN-1**, **GEN-5** and **CIVIL-1**. Typical mitigation measures would include over-excavation/replacement, mat foundations or deep foundations, depending on severity and foundation loads.

Compressible Soils

Compressible soils are generally those soils that undergo consolidation when exposed to new loading, such as fill placement or building construction. Buildings, structures and other improvements may be subject to excessive settlement-related distress when built above compressible soils. Settlement of sufficient magnitude to cause significant structural damage is normally associated with rapidly deposited alluvial soils.

Based on the results of the preliminary geotechnical evaluation, the project site was determined to be underlain by fill soils and young native alluvial sediments. The fill soils were considered potentially compressible (Ninyo 2011). In addition, native soils encountered in the borings contained interbeds of very soft silty clay alluvial/estuarine soil layers which were considered potentially compressible (Ninyo 2011). Due to the presence of potentially compressible soils at the site, the potential impacts of settlement could be significant without appropriate mitigation during detailed project design and construction.

The potential for and mitigation of the effects of consolidation of site soils must be addressed in a project-specific geotechnical report, per requirements of CBC 2013, or the most current version succeeding that code, and proposed Condition of Certification **GEO-1**, and **FACILITY DESIGN** Conditions of Certification **GEN-1**, **GEN-5** and **CIVIL-1**. Typical mitigation measures would include over-excavation/replacement, mat foundations or deep foundations, depending on severity and foundation loads.

Expansive Soils

Soil expansion occurs when clay-rich soils with an affinity for water exist in-place with moisture content below their plastic limit. The addition of moisture from irrigation, precipitation, capillary tension, water line breaks, etc. causes the clay soils to absorb water molecules into their structure, which in turn causes an increase in the overall volume of the soil. This increase in volume can correspond to excessive movement (heave) of overlying structural improvements. The potential for and mitigation of the effects of expansive soils on the proposed site must be addressed in a project-specific geotechnical report, per requirements of CBC 2013, or the most current version succeeding that code, and proposed Conditions of Certification **GEO-1**, and **FACILITY DESIGN** Conditions of Certification **GEN-1**, **GEN-5** and **CIVIL-1**. Mitigation would normally be accomplished by over-excavation and replacement of the expansive soils. For deep-seated conditions, deep foundations are commonly used. Lime-treatment (chemical modification) is often used to mitigate expansive clays in pavement areas.

Corrosive Soils

The project site is located in a geologic environment that could potentially contain soils that are corrosive to concrete and metals. Corrosive soils are defined as having earth materials with more than 500 ppm chlorides, a sulfate concentration of 0.20 percent (i.e., 2,000 ppm) or more, a pH of less than 5.5, or an electrical resistivity of less than 1,000 ohm-centimeters (Ninyo 2011).

As part of the preliminary geotechnical evaluation, the corrosion potential of on-site soil was evaluated for its effect on steel and concrete structural members (Ninyo 2011). Laboratory testing was performed on a representative soil sample to evaluate pH, minimum electrical resistivity, and chloride and soluble sulfate content. Based on the laboratory test results, Ninyo & Moore classified site soils as corrosive (Ninyo 2011).

Corrosive soil conditions may exacerbate the corrosion hazard to buried conduits, foundations, and other buried concrete or metal improvements. Corrosive soil could cause premature deterioration of underground structures or foundations. Constructing project improvements on corrosive soils could have a significant impact to the project.

The potential for and mitigation of the effects of corrosive soils on the proposed site must be addressed in a project-specific geotechnical report, per requirements of CBC 2013, or the most current version succeeding that code, and proposed Conditions of Certification **GEO-1**, and **FACILITY DESIGN** Conditions of Certification **GEN-1**, **GEN-5** and **CIVIL-1**. Mitigation of corrosive soil conditions may involve the use of concrete resistant to sulfate exposure. Corrosion protection for metals may be needed for underground foundations or structures in areas where corrosive groundwater or soil could potentially cause deterioration. Typical mitigation techniques include epoxy and metallic protective coatings, the use of alternative (corrosion resistant) materials, and selection of the appropriate type of cement and water/cement ratio.

Landslides

Landslides occur when masses of rock, earth, or debris move down a slope, including rock falls, deep failure of slopes, and shallow debris flows. Landslides are influenced by human activity (mining and construction of buildings, railroads, and highways) and natural factors (geology, precipitation, and topography). Frequently, they accompany other natural hazards. Although landslides sometimes occur during seismic events, earthquakes are rarely their primary cause.

The most common cause of a landslide is an increase in the down slope gravitational stress applied to slope materials (over steepening). This may be produced either by natural processes or human activities. Undercutting of a valley wall by stream erosion is a common way in which slopes may be naturally over steepened. Other ways include excessive rainfall or irrigation on a cliff or slope.

The site is relatively flat and located substantial distances from steep terrain. Therefore, the site is not subject to landslide hazards.

Tsunamis and Seiches

Tsunamis are large-scale seismic-sea waves caused by offshore earthquakes, submarine landslides and/or volcanic activity. Seiches are waves generated within enclosed water bodies such as bays, lakes or reservoirs caused by seismic shaking, rapid tectonic uplift, basin bottom displacement and/or land sliding. A tsunami can be categorized as local, regional, or Pacific-wide. Those terms describe the potential destruction relative to the tsunami source area.

Local (near-source) tsunamis occur soon after the generating event and allow little time for warning and evacuations. Their impact may be large, but in a limited area. For example, in 1958, waves from a local tsunami in Lituya, Alaska ran up 1,591 feet, but destruction was focused on a small area.

Regional (intermediate) tsunamis are by far the most common. Destruction may be limited because the energy released was not sufficient to generate a destructive Pacific-wide tsunami, or because the source area limited the destructive potential of the tsunami. These events can occur within 15 minutes to two hours after the generating event. Areas affected by the tsunamis may not have felt the generating event.

Pacific-wide (distant source) tsunamis are much less frequent, but have a far greater destructive potential. The waves are not only larger initially, but they subject distant coastal areas to their destructive impact as they cross the Pacific basin. For example, the Chilean tsunami of May 22, 1960, spread death and destruction across the Pacific from Chile to Hawaii, Japan, and the Philippines. These events may have long lead times (up to six hours), but the breadth of the destruction is wide (OES 1998).

All of coastal California is at risk from tsunamis (CSSC 2005). Eighty-two possible or confirmed tsunamis have been observed or recorded in California during historic times. Most of these events were small and only detected by tide gauges. Eleven were large enough to cause damage and four events caused deaths (CSSC 2005). Two tsunami events caused major damage. Tsunamis that damaged California’s coast have come from all around the Pacific basin including South America and Alaska. However, damaging tsunamis can also be caused by local offshore faults or coastal and submarine landslides. These local sources have the potential to cause locally greater wave heights and do pose a threat to the state. The largest historic local-source tsunami on the west coast was caused by the 1927 Point Arguello, California, earthquake that produced waves of about seven feet in the nearby coastal area (CSSC 2005).

Inundation Potential

The California Geological Survey (CGS) has published tsunami inundation maps for the entire California coastline (CGS 2009). Initial tsunami modeling was performed by the University of Southern California (USC) Tsunami Research Center funded through the California Emergency Management Agency (CalEMA) by the National Tsunami Hazard Mitigation Program. A suite of tsunami source events was selected for modeling, representing realistic local and distant earthquakes and hypothetical extreme undersea, near-shore landslides. Local tsunami sources that were considered include offshore reverse-thrust faults, restraining bends on strike-slip fault zones and large submarine landslides capable of significant seafloor displacement and tsunami generation. Distant tsunami sources that were considered include great subduction zone events that are known to have occurred historically (1960 Chile and 1964 Alaska earthquakes) and others which can occur around the Pacific Ocean "Ring of Fire."

As a disclaimer, the map states that it is not a legal document and does not meet disclosure requirements for real estate transactions nor for any other regulatory purpose (CGS 2009). However, the inundation map has been compiled with best currently available scientific information. The inundation line represents the maximum considered tsunami run-up from a number of extreme, yet realistic, tsunami sources. The map indicates that the areas in the site vicinity that are situated at elevations less than seven feet above sea level could be inundated by a tsunami (**Geology and Paleontology - Figure 8**).

Studies indicate that the Catalina fault is the most likely source of local tsunami generation (Legg 2002). . The Catalina fault is the northern continuation of the San Diego Trough fault zone discussed above (Ryan 2012). Near Catalina, the fault changes orientation to a more westerly trend forming a restraining bend. At this bend, crustal compression occurs and subsequent deformation creates up lift. Depending on the amount of underwater crustal uplift that takes place, a tsunami could be generated. Additionally, amplification of the wave form can occur due to ocean floor bathymetry causing wave refraction and constructive interference or wave amplification (Legg 2002). Areas considered susceptible to tsunami wave amplification include the coast from Los Angeles and Long Beach harbors to Newport Beach. Legg further states "*proximity to the coastal zone of urban Los Angeles and Orange Counties, orientation so as to direct tsunami energy towards the southern California coast and size of seafloor uplift (exceeding 1,300 square kilometers and almost 2,000 meters of seafloor relief) suggests that the Santa Catalina Island restraining bend represents the most serious local tsunami threat to coastal southern California*" (Legg 2002). Based on detailed earthquake modeling using variable earthquake scenarios, Legg determined the maximum runup of a tsunami in the project area caused by an earthquake on the Catalina Island restraining bend would have a height between 5 to 7.2 feet (Legg 2002).

In addition to tsunamis generated by earthquake rupture of the seafloor, the possibility that major tsunamis could be generated by massive submarine slumps was recognized a century ago (Synolakis 2002). In more recent years, a variety of studies have supported the scenario of the generation of a major tsunami by a large submarine mass failure, itself induced or triggered by a large earthquake in a coastal area. In addition to the classical documented cases of Grand Banks in 1929, Kalapana, Hawaii in 1975 and the ongoing speculation about the great 1946 Aleutian tsunami, careful analyses of run-up patterns along shorelines often reveal a peaked distribution, with very intense and localized maxima, generally attributed to a local submarine mass failure, against the background of a more regular wave amplitude reflecting the coseismic dislocation (Synolakis 2002). This would be the case, in particular, for localities in Prince William Sound during the great 1964 Alaska earthquake, at Riangkroko during the 1992 Flores, Indonesia event, and during the recent Izmit, Turkey earthquake (Yal¸ciner et al. 1999). This scenario can also explain minor tsunamis during strike–slip earthquakes on nearby on-land faults, for example, following the 1989 Loma Prieta earthquake (Ma et al .1991). It is clear that the exact timing of failure in this framework is variable, but delays of a few minutes to a few tens of minutes could easily be attributed to the complex nucleation of a failure plane in metastable sediment, or to a mild secondary trigger (aftershock) tipping a precarious balance (Murty 1979).

Characteristics of tsunamis generated by the two kinds of sources can be compared in very general terms by considering the vertical deformation of the sea floor caused by either event. Catastrophic earthquakes can result in coherent surface rupture over long distances (Kanamori 1975) with vertical displacement usually reaching several meters (Plafker 1965). Tsunamis generated by seafloor displacement caused by earthquakes typically have long wavelengths and long periods and have a high potential for transoceanic travel and subsequent impact to distant shores. Conversely, the linear dimension of an underwater landslide rarely exceeds 62 miles (Piper 1987). However the areal dimension of the sliding mass could easily reach thousands of square feet (Piper 1987). Tsunamis caused by submarine mass failures are more geographically contained, although they may give rise to higher amplitudes in the local field (Plafker 1969).

Bathymetric surveys show that the slopes of the southern California Borderland contain a large number of landslide deposits (Lee 2009). The submarine landslide most likely to affect the AEC site is the Palos Verdes debris avalanche. The Palos Verdes debris avalanche occurs on one of the steepest slopes in the Los Angeles offshore region (Lee 2009). Should it catastrophically reactivate, the Palos Verdes debris avalanche would likely cause a tsunami run-up of up to 10 feet over an 18 mile long stretch of low-lying coastline extending eastward from the entrance of Los Angeles harbor (Lee 2009).

Based on modeling a dozen distant and local “worst case” sources, USGS determined that the high incoming wave elevation is 13.2 feet and maximum onshore runup elevation would be approximately 16.4 feet in the LA Harbor area (Wood 2013). Coupled with the tsunami occurring at Mean High Water (MHW) conditions (approximately 2 feet above MSL, NOAA 2013) the modeling shows inundation would extend to about 18 feet NAVD88 (CGS 2009 in portions of the project site. The source that could produce a tsunami with this maximum flood level is a magnitude 9.2 earthquake from the Alaska-Aleutians 3 scenario. Although MHW and wave runup from the most likely local source are not as great, they do represent a potential hazard. Based on a submarine landslide such as the Palos Verdes slide Number 2 scenario (Wood 2013) the high incoming wave elevation would be approximately 7.54 feet, which if it occurred during MHW conditions would result in inundation to about 9.54 feet NAVD88.

Based on a 1:24,000 scale topographic map of the site area prepared using the NAD83 datum and 2011 topographic overlay (USGS 2015) the entire site lies at an elevation that is less than 10 ft Above Mean Sea Level. Therefore, regardless of the source generating the tsunami the entire site would be inundated if a tsunami occurred during MHW conditions. The entire site would also be inundated should a “worst case” scenario seismically-induced tsunami happen with current sea level conditions. Existing data is not sufficiently detailed to determine the precise extent of site inundation as a result of a submarine-landslide generated tsunami, but based upon existing data it would appear that most, if not all of the AEC site would be impacted should a Palos Verdes Slide Number 2 scenario tsunami occur with current sea level conditions.

Effects of Sea Level Rise

The effects of sea-level rise could exacerbate potential flooding and tsunami inundation impact at the site. Analysis of potential of flooding impacts from storm water flows coupled with sea level rise is included in the Soil and Water Resources section of this SA.

The National Academy of Sciences (NRC 2012), provides tables of expected sea level rise referenced to the sea level measured in the year 2000. The document provides a range of “possible” sea level changes from a low estimate to a high estimate. Using the maximum rate in the tables for the Los Angeles area (closest data point to the project site), sea level could rise at a rate of 0.4 inches per year (in/yr) between the years 2000 to 2030, and 0.6 in/yr between the years 2030 and 2050. Using these maximum rates, between the years 2020 and 2055, which is the project’s design life, sea level could rise 1.5 feet at the site, and 2 feet above the year 2000 sea level. Based on the rate of sea level rise of 0.4 in/yr, mean sea level in 1992 was 3 inches lower than sea level in 2000.

The 2011 USGS topographic map of the site shows elevations relative to North American Vertical Datum of 1988 (NAVD88). The 1992 sea level elevation corresponds to the mean of the last sea level elevations published for the 1982-2001 epoch and is the current mean sea level used throughout North America. At the time the mean sea level elevation was established, the NAVD88 benchmark was 2.6 feet below that sea level elevation. In order to evaluate the flooding and inundation impacts coupled with the maximum estimated sea level rise, staff had to reconcile site elevations shown on the grading plan and the 1992 mean sea level. Using the NRC 2012 projections, coupled with back calculating the rate of sea level rise between 1992 and 2000, in the year 2055 sea level is predicted to rise to a level 2.5 feet higher than what sea level was in 1992. Using the NAVD88 datum (-2.6 MSL 1992) and the NRC projections (+2.5 feet 1992 MSL), sea level in 2055 is predicted to be at an elevation of 5.1 feet above NAVD88. Therefore, if sea level rises as projected (5.1 feet above NAVD88), and the maximum tsunami (16.4feet) occurs during MHW (+ 2 feet MSL) at the end of the project’s design life, the leading edge of tsunami derived water inundation could approach an elevation of approximately 23.5 feet relative to NAVD88, effectively inundating the entire AES site.

It is possible tsunami events could be larger than those predicted or have higher levels of inundation than that predicted by the model. Estimates of sea level rise rates have also changed over recent time and it is likely that as more data becomes available sea level rise rates could be updated again. This in turn could affect future predicted tsunami flood level elevations during the life of the facility.

U.S. Building codes generally have not addressed the subject of designing structures in tsunami zones. The Federal Emergency Management Agency’s (FEMA), Coastal Construction Manual (FEMA P- 55) (FEMA 2013), developed to provide design and construction guidance for residential structures built in coastal areas, addresses seismic loads for coastal structures and provides information on tsunami and associated loads (CSSC 2005). FEMA P-55 cites ASCE Standard ASCE 7-10, Minimum Design Loads for Buildings and Other Structures as the reference to be consulted during design of structures. ASCE 7-10 is codified in CBC 2013.

A seiche is a standing wave in an enclosed or partially enclosed body of water. The effect is caused by resonances in a body of water that has been disturbed by one or more of a number of factors, most often meteorological effects (wind and atmospheric pressure variations), seismic activity, or tsunami. Seiches and seiche-related phenomena have been observed on lakes, reservoirs, swimming pools, bays, harbors and seas. The key requirement for formation of a seiche is that the body of water be at least partially bounded, allowing the formation of the standing wave. Los Cerritos Channel, connected to Alamitos Bay, is located immediately adjacent to the western side of the site. The channel and bay are both shallow and narrow, and while a seiche could possibly form within the bay or channel their diminutive size would suggest that the likelihood of a seiche is considered very low.

Tsunami Impact Mitigation

The planning scenarios discussed above evidence that the project site could be inundated by a tsunami (CGS 2009), and thus present a threat of impact to public health and safety from site flooding. Since the science behind estimating sea level rise is evolving it is also possible rates could change during the life of the project and project design would not adequately incorporate mitigation for potential site inundation. Staff concludes that the project owner needs to be prepared to respond to a potential tsunami event and ensure that all workers and site visitors would be safe.

Los Angeles County issued their 2014 All Hazard Mitigation Plan, which addresses the County tsunami hazard and describes the warning and notification systems that have been put in place (Los Angeles County 2014). The Los Angeles County Office of Emergency Services has identified primary tsunami evacuation routes (LACOA, 2006) that are clearly marked with blue and white signage. However, these systems do not provide detailed, site specific information on how individuals and institutions should respond to a tsunami or differentiate between Disaster Routes and Evacuation Routes.

Staff recommends the project owner be required to prepare and implement a Tsunami Hazard Mitigation Plan (THMP) in accordance with Condition of Certification **GEO-2**. The THMP would include among other things a discussion of criteria for a response to ensure public safety for a tsunami event, show where on and offsite refuge can be accessed, and provide detailed evacuation routes. The THMP would also include a training program for visitors and workers. The purpose of training would be to inform workers and visitors on how to respond to tsunami hazards and where they may obtain refuge in the event it is determined it is necessary to evacuate the project site. Integral to this training program would be periodic testing of the plan to ensure everyone at the site could actually implement the plan.

The THMP would be updated at least bi-annually, or whenever a later version of the Los Angeles County All Hazard Mitigation Plan is updated to ensure the current assessment of the tsunami hazard and risk assessment is representative and that appropriate measures are taken to comply with current requirements. Whenever there is an update in hazard response plans the project owner shall submit for CPM approval an updated THMP showing how the project owner proposes to comply.

The potential for, and mitigation of, the effects of tsunami or seiche caused inundation on the proposed site should also be addressed in a project-specific geotechnical report, per CBC 2015 in accordance with proposed Conditions of Certification **GEO-1** and proposed Conditions of Certification Facility Design **GEN-1**, **GEN-5** and **CIVIL-1**. Mitigation of tsunami run-up hazards includes structural and civil engineering evaluation, strengthening of seafront structures and providing emergency warning systems. Structural reinforcement at the site can be included for tsunami protection, as deemed appropriate at the detailed design stage by the project structural engineer.

OPERATION IMPACTS AND MITIGATION

Operation of the proposed plant facilities would not have any adverse impact on geologic, mineralogic, or paleontologic resources. Once the plant is constructed and operating, there would be no further disturbances that could affect these resources. Potential geologic hazards, including strong ground shaking, ground subsidence, liquefaction, settlement due to compressible soils, hydrocompaction, or dynamic compaction, corrosive soils and the possible presence of expansive clay soils can be effectively mitigated through facility design such that these potential hazards would not affect future operation of the facility. Compliance with Condition of Certification **GEO-1**, and Conditions of Certification **GEN-1, GEN-5** and **CIVIL-1** in the **Facility Design** section would ensure the project is constructed to current seismic building standards and potential impacts would be mitigated in accordance with current standards of engineering practice.

CUMULATIVE IMPACTS AND MITIGATION

No geologic and mineralogic resources have been identified in the project area. The site has not been identified as containing a significant mineral deposit that should be protected. Development of this project is not expected to lead to a significantly cumulative effect on geologic and mineralogic resources within the project area.

Paleontological resources have been documented in the general area of the proposed project but not in sediments that could be encountered beneath the site. If significant paleontological resources are uncovered during construction, they would be protected and preserved in accordance with **CONDITIONS OF CERTIFICATION PAL-1** to **PAL-8**. These conditions would also mitigate any potential cumulative impacts.

The proposed AEC would be situated in an active geologic environment. Strong ground shaking potential must be mitigated through foundation and structural design as required by CBC 2013, or the most current version succeeding that code. The potential for lateral spreading and liquefaction must be addressed and mitigated through appropriate facility design. Corrosive soils and soils that may be subject to settlement due to liquefaction and dynamic compaction, must be addressed and mitigated in accordance with a design-level geotechnical investigation as required by CBC 2013, or the most current successor to that code, and proposed Conditions of Certification **GEO-1**, and **FACILITY DESIGN** Conditions of Certification **GEN-1**, **GEN-5** and **CIVIL-1.**

FACILITY CLOSURE

Future facility closure activities would not be expected to impact geologic or mineralogic resources since no such resources are known to exist at either the project location. In addition, the decommissioning and closure of the proposed project would not negatively affect geologic, mineralogic, or paleontologic resources since the majority of the ground disturbed during plant decommissioning and closure would have been already disturbed, and mitigated as required, during construction and operation of the project.

CONCLUSIONS

Because of its geologic setting, the site could be subject to very strong levels of earthquake-related ground shaking. The significant effects of strong ground shaking on the AEC structures must be mitigated through structural designs required by the most recent edition of the California Building Code (currently CBC 2013). CBC 2013 requires that structures be designed to resist seismic stresses from anticipated maximum ground acceleration.

In addition to strong seismic shaking, the project may be subject to soil failure caused by liquefaction and/or dynamic compaction. A design-level geotechnical investigation required for the project by CBC 2013, or the most current version succeeding that code, and proposed Conditions of Certification **GEO-1** and, and proposed **FACILITY DESIGN** Conditions of Certification **GEN-1**, **GEN-5** and **CIVIL-1**, would present standard engineering design requirements for mitigation of strong seismic shaking, liquefaction and potential excessive settlement due to dynamic compaction.

While not likely to occur during the project design life, the site is subject to inundation by tsunami. Sea level rise could exacerbate the potential for inundation. Staff recommends **GEO-1** which would require the applicant to consider potential impacts from tsunami inundation on facility design. **GEO-2** would require the applicant to develop a tsunami hazard mitigation plan for preparedness and evacuation methods that would ensure public health and safety.

Petroleum is the only economic geologic resource in the project vicinity. Other than petroleum, there are no known viable mineralogical or geologic resources at the proposed AEC site.

The near surface of the project site is highly disturbed and partially covered by artificial fill, blacktop and onsite structures. Native soils beneath the fill have a potential to contain fossils. The underlying San Pedro formation has yielded numerous fossils within the Los Angeles Basin as reported by the applicant’s paleontologist during the paleontological archive and literature reviews.

While significant paleontological resources are not anticipated to be discovered during construction of the proposed project, potential impacts to paleontological resources due to construction activities would be mitigated through worker training and monitoring by qualified paleontologists, as required by proposed Conditions of Certification **PAL-1** through **PAL-8**.

Based on this information, Energy Commission staff concludes that the potential adverse cumulative impacts to project facilities from geologic hazards during its design life are less than significant. Similarly, staff concludes the potential adverse cumulative impacts to potential geologic, mineralogic, and paleontologic resources from the construction, operation, and closure of the proposed project, if any, are less than significant. It is staff's opinion that the proposed AEC can be designed and constructed in accordance with all applicable laws, ordinances, regulations, and standards (LORS), and in a manner that both protects environmental quality and assures public safety

PROPOSED CONDITIONS OF CERTIFICATION

General Conditions of Certification with respect to engineering geology are proposed under Conditions of Certification **GEN-1, GEN-5**, and **CIVIL-1** in the **FACILITY DESIGN** section and in **GEO-1** of this section. Staff proposes a condition of certification to ensure public health and safety in the event of inundation due to a tsunami in **GEO-2**. Proposed paleontological Conditions of Certification follow in **PAL-1** through **PAL-8**. It is staff's opinion that the likelihood of encountering paleontologic resources could be high in areas where native Pleistocene age deposits occur. Staff would consider reducing monitoring intensity, at the recommendation of the project PRS, following examination of sufficient, representative excavations that fully describe site stratigraphy.

GEO-1 **The project owner shall provide to the Certified Building Official (CBO) a** Soils Engineering Report, as required by Section 1803 of the California Building Code (CBC) (2013) or the most current version succeeding that code in effect at the time construction of the project were to commence, shall specifically include laboratory test data, associated geotechnical engineering analyses, and a thorough discussion of seismicity; liquefaction; dynamic compaction; compressible soils; corrosive soils; and tsunami. In accordance with CBC, the report must also include recommendations for ground improvement and/or foundation systems necessary to mitigate these potential geologic hazards, if present.

Verification: At least 15 days (or project owner- and CBO-approved alternative time frame) prior to the start of site grading the project owner shall submit the Soils Engineering Report to the CBO for design review and approval. Submittal of the report shall be coordinated with reports required in accordance with CIVIL-1.The submittal shall include a summary of how the results of the report were incorporated into the project foundation and grading plan design.

GEO-2 The project owner shall ensure that all staff and visitors at the project site are informed of tsunami hazards in the region and have been shown how and where to evacuate the site if there is potential for a tsunami to affect public health and safety at the site. The project owner shall ensure that the information provided to staff and visitors complies with the recommendations and procedures provided in the 2006 Tsunami Annex to the Los Angeles County Emergency Response Plan (LACOA 2006) and any of its successors. The project owner shall provide a Tsunami Hazard Mitigation Plan (THMP) to the Compliance Project Manager (CPM) for review and approval.

The THMP shall include:

A. A general discussion of tsunami hazards and the public safety risk they present at the site.

B. Identification of what tsunami hazards exist specific to the project site and how the project owner proposes to ensure compliance with applicable hazard response plans.

C. A discussion of the Tsunami Annex to the Los Angeles County Emergency Response Plan and how that plan applies to the project.

D. A discussion of criteria for a response to ensure public safety for a tsunami event and show where on and offsite refuge can be accessed, and evacuation routes.

E. Identification of any site modifications or signage that may be needed to show how and where refuge is accessible.

F. The THMP shall also include a training program for visitors and workers. The purpose of training is to inform workers and visitors on how to respond to tsunami hazards and where they may obtain refuge in the event it is determined necessary to evacuate the project site. The training shall include:

   i. Information on who and how staff and visitors will be notified that there is a potential for a tsunami event to impact the site and how they should respond;

   ii. Graphics showing methods of seeking refuge and routes for evacuation of the site;

   iii. A certification of completion form signed by each worker/visitor indicating that he/she has received the training; and

   iv. A sticker that shall be placed on workers hard hats indicating that training has been completed. Visitors will be escorted by trained personal while on site.

   v. Submittal of the training script and, if the project owner is planning to use a video for training, a copy of the training video, with the set of reporting procedures for workers to follow that will be used to present the training.

   vi. Provision for conducting a tsunami evacuation drill for the entire site at least once every two years. A report summarizing the results of an evacuation drill, including a list of participants and any recommendations for modification of the THPM arising from issues identified during conduct of these drills shall be prepared.

The THMP would be updated at least bi-annually, or whenever a later version of the Los Angeles County All Hazard Mitigation Plan is updated to ensure the current assessment of the tsunami hazard and risk assessment is representative and that appropriate measures are taken to comply with current requirements. Whenever there is an update in hazard response plans the project owner shall submit for CPM approval an updated THMP showing how the project owner proposes to comply**.**

Verification: The project owner shall submit the THMP 60 days prior to ground disturbance for CPM review and approval. The project owner shall submit any subsequent updates to the THMP to the CPM within 90 days after an update to an applicable THMP. The project owner shall submit a summary report of an evacuation drill within 60 days of the drill's conclusion.

PAL-1 The project owner shall provide the CPM with the resume and qualifications of its paleontological resource specialist (PRS) for review and approval. If the approved PRS is replaced prior to completion of project mitigation and submittal of the paleontological resources report (PRR), the project owner shall obtain CPM approval of the replacement PRS.

The PRS resume shall include the names and phone numbers of references. The resume shall also demonstrate to the satisfaction of the CPM the appropriate education and experience to accomplish the required paleontological resource tasks.

As determined by the CPM, the PRS shall meet the minimum qualifications for a Qualified Professional Paleontologist as defined in the Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources by the Society of Vertebrate Paleontology (SVP 2010). The experience of the PRS shall include the following:

1. Institutional affiliations, appropriate credentials, and college degree;
2. Ability to recognize and collect fossils in the field;
3. Local geological and biostratigraphic expertise;
4. Proficiency in identifying vertebrate and invertebrate fossils; and
5. At least three years of paleontological resource mitigation and field experience in California and at least one year of experience leading paleontological resource mitigation and field activities.

The project owner shall ensure that the PRS obtains qualified paleontological resource monitors to monitor as he or she deems necessary on the project. Paleontologic resource monitors (PRMs) shall have the equivalent of the following qualifications:

- BS or BA degree in geology or paleontology and one year of experience monitoring in California; or

- AS or AA in geology, paleontology, or biology and four years' experience monitoring in California; or
- Enrollment in upper division classes pursuing a degree in the fields of geology or paleontology and two years of monitoring experience in California.

The project owner shall submit to the CPM for review and approval, and keep on file, all resumes of qualified PRMs employed on the project.. If a PRM is replaced, the resume of the replacement PRM shall also be provided to the CPM for review and approval, and kept on file.

Verification:

1. At least 60 days prior to the start of ground disturbance, the project owner shall submit a resume and statement of availability of its designated PRS for on-site work to the CPM, whose approval must be obtained prior to initiation of ground disturbing activities.

2. At least 30 days prior to ground disturbance, the PRS or project owner shall provide a letter with resumes naming anticipated PRM's for the project. The letter shall state that the identified PRM's meet the minimum qualifications for paleontological resource monitoring as required by this condition of certification. If additional PRM's are obtained during the project, the PRS shall provide additional letters and resumes to the CPM. The letter shall be provided to the CPM for approval no later than one week prior to the monitor's beginning on-site duties.

3. Prior to any change of the PRS, the project owner shall submit the resume of the proposed new PRS to the CPM for review and approval.

PAL-2 The project owner shall provide to the PRS and the CPM, for approval, maps and drawings showing the footprint of the power plant, construction lay-down areas, and all related facilities. Maps shall identify all areas of the project where ground disturbance is anticipated. If the PRS requests enlargements or strip maps for linear facility routes, the project owner shall provide copies to the PRS and CPM. The site grading plan and the plan and profile drawings for the utility lines would be acceptable for this purpose. The plan drawings must show the location, depth, and extent of all ground disturbances and be at a scale between 1 inch = 40 feet and 1 inch = 100 feet. If the footprint of the project or its linear facilities change, the project owner shall provide maps and drawings reflecting those changes to the PRS and CPM.

If construction of the project proceeds in phases, maps and drawings may be submitted prior to the start of each phase. A letter identifying the proposed schedule of each project phase shall be provided to the PRS and CPM. Before work commences on affected phases, the project owner shall notify the PRS and CPM of any construction phase scheduling changes.

At a minimum, the project owner shall ensure that the PRS or PRM consults weekly with the project superintendent or construction field manager to confirm area(s) to be worked the following week, until ground disturbance is completed.

Verification:

1. At least 30 days prior to the start of ground disturbance, the project owner shall provide the maps and drawings to the PRS and CPM.

2. If there are changes to the footprint of the project, revised maps and drawings shall be provided to the PRS and CPM at least 15 days prior to the start of ground disturbance.

3. If there are changes to the scheduling of the construction phases, the project owner shall submit a letter to the CPM within 5 days of identifying the changes.

PAL-3 The project owner shall ensure that the PRS prepares a Paleontological Resources Monitoring and Mitigation Plan (PRMMP) and submits the PRMMP to the CPM for review and approval. Approval of the PRMMP by the CPM shall occur prior to any ground disturbance. The PRMMP shall function as the formal guide for monitoring, collecting, and sampling activities, and may be modified with CPM approval. The PRMMP shall be used as the basis of discussion when on-site decisions or changes are proposed. Copies of the PRMMP shall include all updates and reside with the PRS, each PRM, the project owner's on-site manager, and the CPM.

The PRMMP shall be developed in accordance with the guidelines of the Society of Vertebrate Paleontology (SVP 2010) and shall include, but not be limited, to the following:

1. Procedures for and assurance that the performance and sequence of project-related tasks, such as any literature searches, pre-construction surveys, worker environmental training, fieldwork, flagging or staking, construction monitoring, mapping and data recovery, fossil preparation and collection, identification and inventory, preparation of final reports, and transmittal of materials for curation will be performed according to PRMMP procedures;

2. Identification of the person(s) expected to assist with each of the tasks required by the PRMMP and these conditions of certification;

3. A thorough discussion of the anticipated geologic units expected to be encountered, the location and depth of the units relative to the project when known, and the known sensitivity of those units based on the occurrence of fossils either in that unit or in correlative units;

4. An explanation of why sampling is needed, a description of the sampling methodology, and how much sampling is expected to take place in which geologic units. Include descriptions of different sampling procedures that shall be used for fine-grained and coarse-grained units;

5. A discussion of the locations of where the monitoring of project construction activities is deemed necessary, and a proposed plan for monitoring and sampling at these locations;

6. A discussion of procedures to be followed: (a)in the event of a significant fossil discovery, (b) stopping construction, (c) resuming construction, and (d) how notifications will be performed;

7. A discussion of equipment and supplies necessary for collection of fossil materials and any specialized equipment needed to prepare, remove, load, transport, and analyze large-sized fossils or extensive fossil deposits;

8. Procedures for inventory, preparation, and delivery for curation into a retrievable storage collection in a public repository or museum, which meet the Society of Vertebrate Paleontology's standards and requirements for the curation of paleontological resources;

9. Identification of the institution that has agreed to receive data and fossil materials collected, requirements or specifications for materials delivered for curation, and how they will be met, and the name and phone number of the contact person at the institution; and

10. A copy of the paleontological resources conditions of certification.

Verification: At least 30 days prior to ground disturbance, the project owner shall provide a copy of the PRMMP to the CPM. Approval of the PRMMP by the CPM shall occur prior to any ground disturbance. The PRMMP shall include an affidavit of authorship by the PRS, and acceptance of the PRMMP by the project owner evidenced by a signature.

PAL-4 Prior to ground disturbance the project owner and the PRS shall prepare a CPM-approved Worker Environmental Awareness Program (WEAP).

The WEAP shall address the possibility of encountering paleontological resources in the field, the sensitivity and importance of these resources, and legal obligations to preserve and protect those resources. The purpose of the WEAP is to train project workers to recognize paleontologic resources and identify procedures they must follow to ensure there are no impacts to sensitive paleontologic resources. The WEAP shall include:

1. A discussion of applicable laws and penalties under the law;

2. Good quality photographs or physical examples of vertebrate fossils for project sites containing units of high paleontologic sensitivity;

3. Information that the PRS or PRM has the authority to stop or redirect construction in the event of a discovery or unanticipated impact to a paleontological resource;

4. Instruction that employees are to stop or redirect work in the vicinity of a find and to contact their supervisor and the PRS or PRM;

5. An informational brochure that identifies reporting procedures in the event of a discovery;

6. A WEAP certification of completion form signed by each worker indicating that he/she has received the training; and

7. A sticker that shall be placed on hard hats indicating that environmental training has been completed.

8. The project owner shall also submit the training script and, if the project owner is planning to use a video for training, a copy of the training video with the set of reporting procedures for workers to follow that will be used to present the WEAP and qualify workers to conduct ground disturbing activities that could impact paleontologic resources.

Verification:

1. At least 30 days prior to ground disturbance, the project owner shall submit to the CPM for review and comment the draft WEAP, including the brochure and sticker. The submittal shall also include a draft training script and, if the project owner is planning to use a video for training, a copy of the training video with the set of reporting procedures for workers to follow.

2. At least 15 days prior to ground disturbance, the project owner shall submit to the CPM for approval the final WEAP and training script.

PAL-5 No worker shall excavate or perform any ground disturbance activity prior to receiving CPM-approved WEAP training by the PRS, unless specifically approved by the CPM.

Prior to project ground disturbance the following workers shall be WEAP trained by the PRS in-person: project managers, construction supervisors, foremen, and all general workers involved with or who operate ground-disturbing equipment or tools. A CPM-approved video or in-person training may be used for new employees. The training program may be combined with other training programs prepared for cultural and biological resources, hazardous materials, or other areas of interest or concern. A WEAP certification of completion form shall be used to document who has received the required training.

Verification:

1. In the Monthly Compliance Report (MCR), the project owner shall provide copies of the WEAP certification of completion forms with the names of those trained and the trainer or type of training (in-person and/or video) offered that month. The MCR shall also include a running total of all persons who have completed the training to date.

2. If the project owner requests an alternate paleontological WEAP trainer, the resume and qualifications of the trainer shall be submitted to the CPM for review and approval prior to installation of an alternate trainer. Alternate trainers shall not conduct WEAP training prior to CPM authorization.

PAL-6 The project owner shall ensure that the PRS and PRM(s) monitor, consistent with the PRMMP, all construction-related grading, excavation, trenching, and auguring in areas where potential fossil-bearing materials have been identified, both at the site and along any constructed linear facilities associated with the project. In the event that the PRS determines full-time monitoring is not necessary in locations that were identified as potentially fossil-bearing in the PRMMP, the project owner shall notify and seek the concurrence of the CPM.

The project owner shall ensure that the PRS and PRM(s) have the authority to stop or redirect construction if paleontological resources are encountered. The project owner shall ensure that there is no interference with monitoring activities unless directed by the PRS. Monitoring activities shall be conducted as follows:

1. Any change of monitoring from the accepted schedule in the PRMMP shall be proposed in a letter or email from the PRS and the project owner to the CPM prior to the change in monitoring and be included in the monthly compliance report. The letter or email shall include the justification for the change in monitoring and be submitted to the CPM for review and approval.

2. The project owner shall ensure that the PRM(s) keep a daily monitoring log of paleontological resource activities. The PRS may discuss paleontological resource monitoring and mitigation activities with the CPM at any time.

3. The project owner shall ensure that the PRS notifies the CPM within 24 hours of the occurrence of any incidents of non-compliance with any paleontological resources conditions of certification. The PRS shall recommend corrective action to resolve the issues or achieve compliance with the conditions of certification.

4. For any significant paleontological resources encountered, either the project owner or the PRS shall notify the CPM within 24 hours, or Monday morning in the case of a weekend event, when construction has been stopped because of a paleontological find.

The project owner shall ensure that the PRS prepares a summary of monitoring and other paleontological activities that will be included in each MCR. The summary will include the name(s) of PRS or PRM(s) active during the month, general descriptions of training and monitored construction activities, and general locations of excavations, grading, and other activities. A section of the report shall include the geologic units or subunits encountered, descriptions of samplings within each unit, and a list of identified fossils. A final section of the report will address any issues or concerns about the project relating to paleontologic monitoring, including any incidents of non-compliance or any changes to the monitoring plan that have been approved by the CPM. If no monitoring took place during the month, the report shall include an explanation in the summary as to why monitoring was not conducted.

Verification: The project owner shall ensure that the PRS submits the summary of monitoring and paleontological activities in the MCR. When feasible, the CPM shall be notified 15 days in advance of any proposed changes in monitoring different from that identified in the PRMMP. If there is any unforeseen change in monitoring, the notice shall be given as soon as possible prior to implementation of the change.

PAL-7 The project owner shall ensure preparation of a Paleontological Resources Report (PRR) by the designated PRS. The PRR shall be prepared following completion of ground-disturbing activities. The PRR shall include an analysis of the collected fossil materials and related information, and shall be submitted to the CPM for approval.

The report shall include, but not be limited to, a description and inventory of recovered fossil materials; a map showing the location of paleontological resources encountered; and the PRS' description of sensitivity and significance of those resources ; and indicate if and how fossil material was curated in accordance with PAL-6.

Verification: Within 90 days after completion of ground-disturbing activities, including landscaping, the project owner shall submit the PRR under confidential cover to the CPM.

PAL-8 The project owner, through the designated PRS, shall ensure that all components of the PRMMP are adequately performed, including collection of fossil material, preparation of fossil material for analysis, analysis of fossils, identification and inventory of fossils, preparation of fossils for curation, and delivery for curation of all significant paleontological resource materials encountered and collected during project construction. The project owner shall pay all curation fees charged by the museum for fossil material collected and curated as a result of paleontological mitigation. The project owner shall also provide the curator with documentation showing the project owner irrevocably and unconditionally donates, gives, and assigns permanent, absolute, and unconditional ownership of the fossil material.

Verification: Within 60 days after the submittal of the PRR, the project owner shall submit documentation to the CPM showing fees have been paid for curation and the owner relinquishes control and ownership of all fossil material.

Certification of Completion
Worker Environmental Awareness Program
ALAMITOS ENERGY CENTER (13-AFC-01)

This is to certify these individuals have completed a mandatory California Energy Commission-approved Worker Environmental Awareness Program (WEAP). The WEAP includes pertinent information on cultural, paleontological, and biological resources for all personnel (that is, construction supervisors, crews, and plant operators) working on site or at related facilities. By signing below, the participant indicates that he/she understands and shall abide by the guidelines set forth in the program materials. Include this completed form in the Monthly Compliance Report.

No.	Employee Name	Title/Company	Signature
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Cultural Trainer: ______________ Signature: ___________________ Date: ___/___/____

PaleoTrainer: _______________ Signature: ___________________ Date: ___/___/____

Biological Trainer: ______________Signature:________________ Date: ___/___/__

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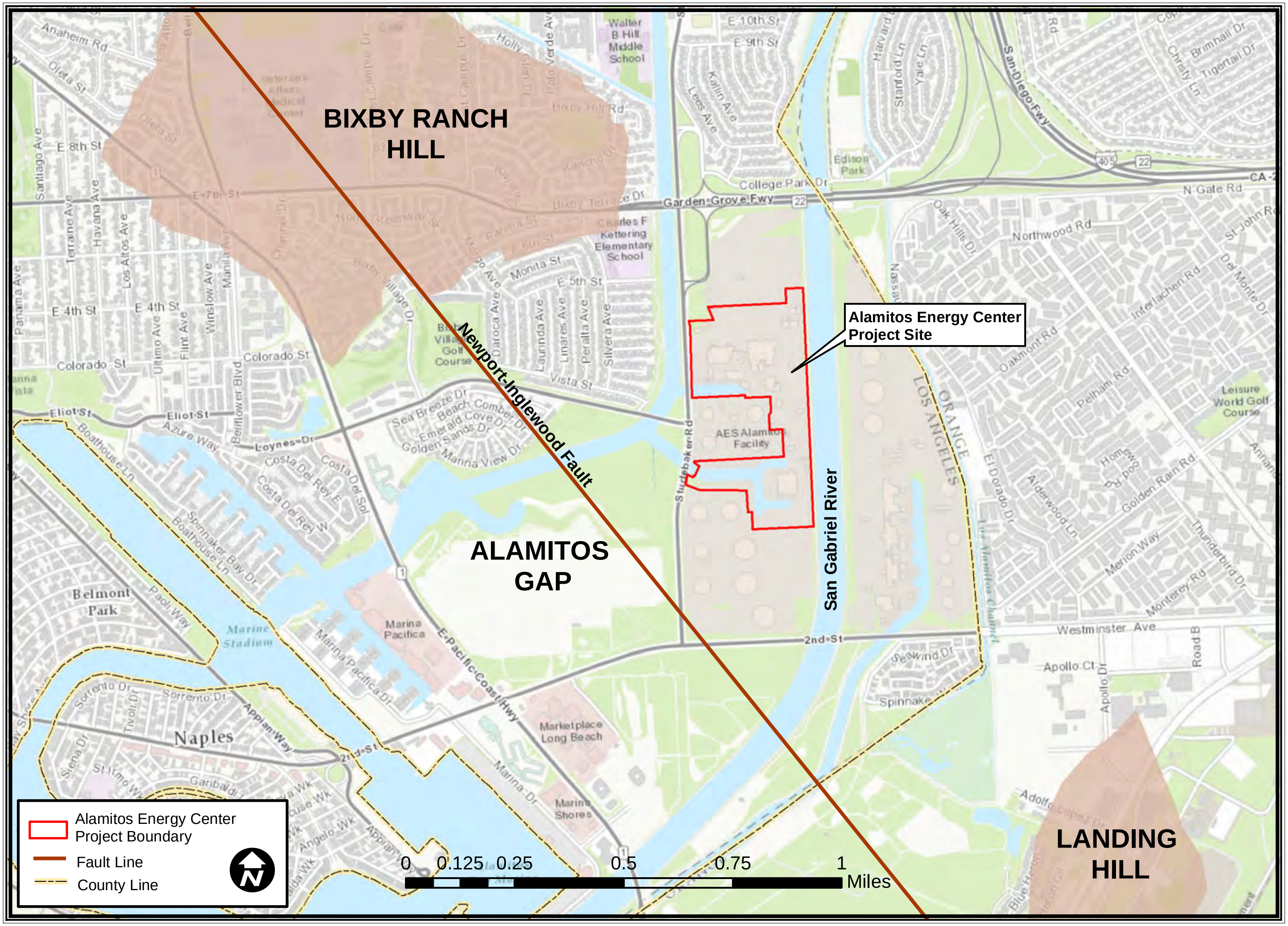
GEOLOGY AND PALEONTOLOGY - FIGURE 1
Alamitos Energy Center - Geomorphic Provinces

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: California Department of Conservation, California Geological Survey, 2002.

GEOLOGY AND PALEONTOLOGY- FIGURE 2

Alamitos Energy Center - Alamitos Gap

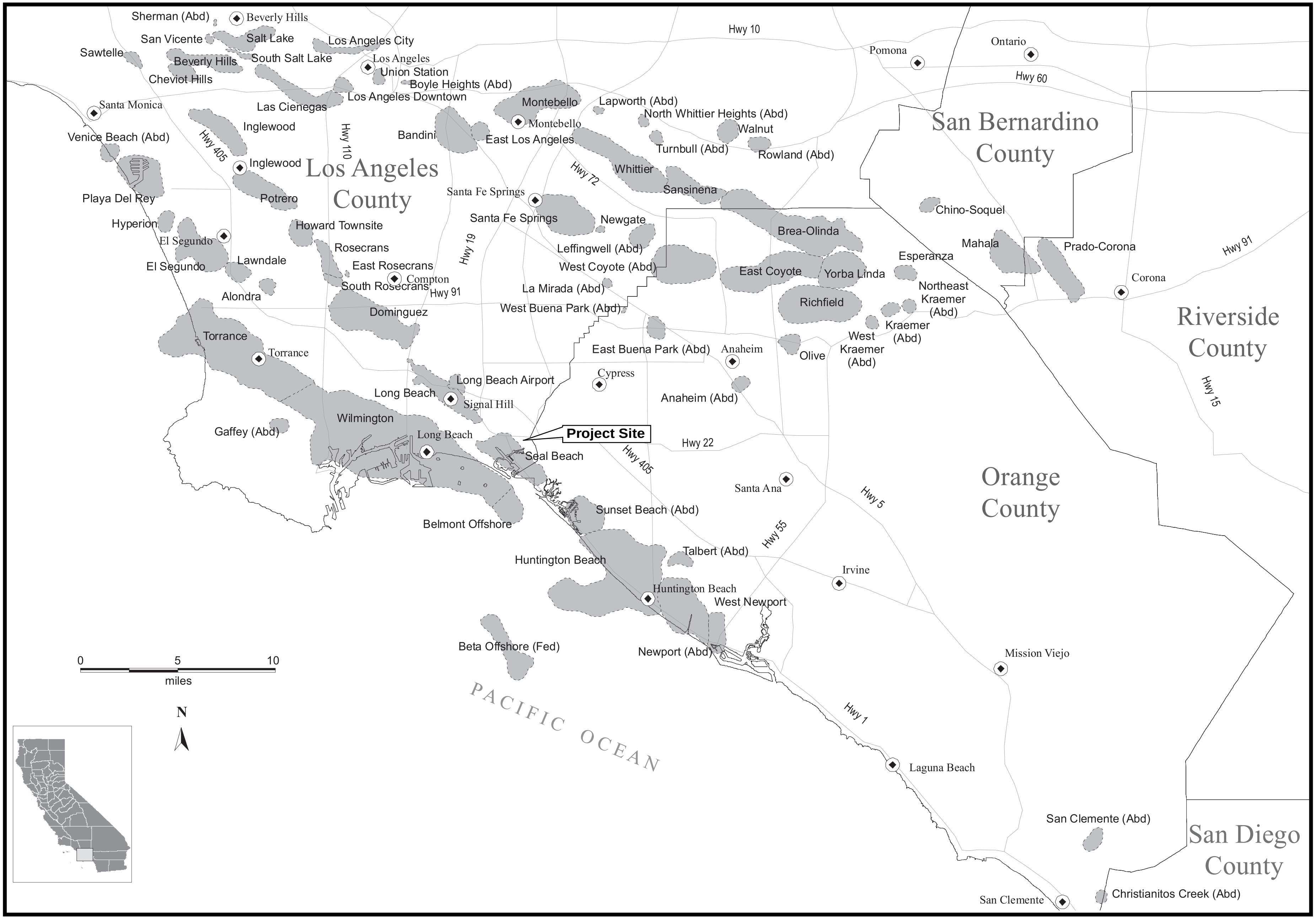


CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Orange County Drought Response Workshop, November 6, 2012

GEOLOGY AND PALEONTOLOGY - FIGURE 3

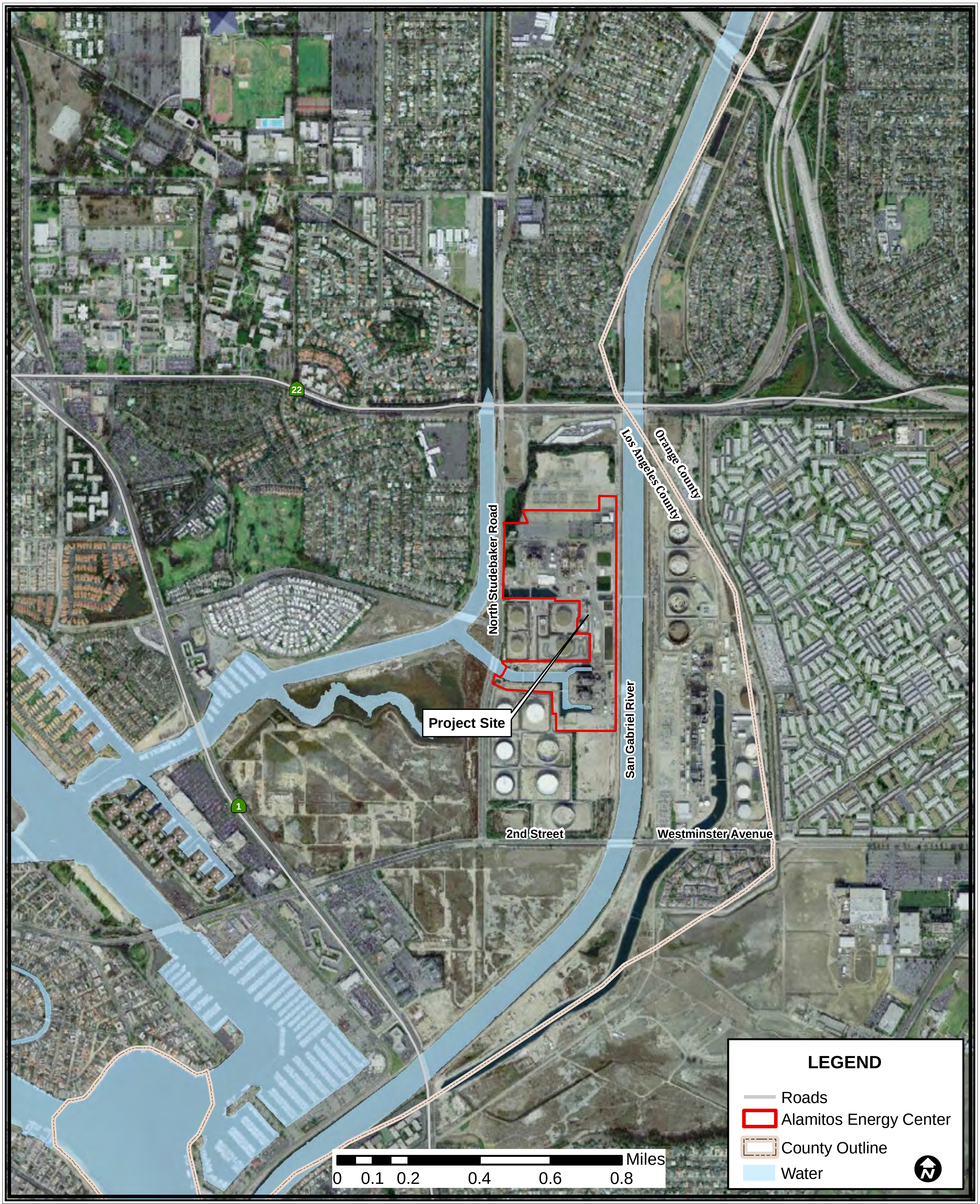
Alamitos Energy Center - Los Angeles Basin area oil fields



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Urban Development of Oil Fields in the Los Angeles Basin Area, 1983 to 2001 (Gamache 2003)

GEOLOGY AND PALEONTOLOGY - FIGURE 4
Alamitos Energy Center - Site Map



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
Source: Bing Map Image - CEC Staff

GEOLOGY AND PALEONTOLOGY - FIGURE 5
Alamitos Energy Center - Geology

Anticline

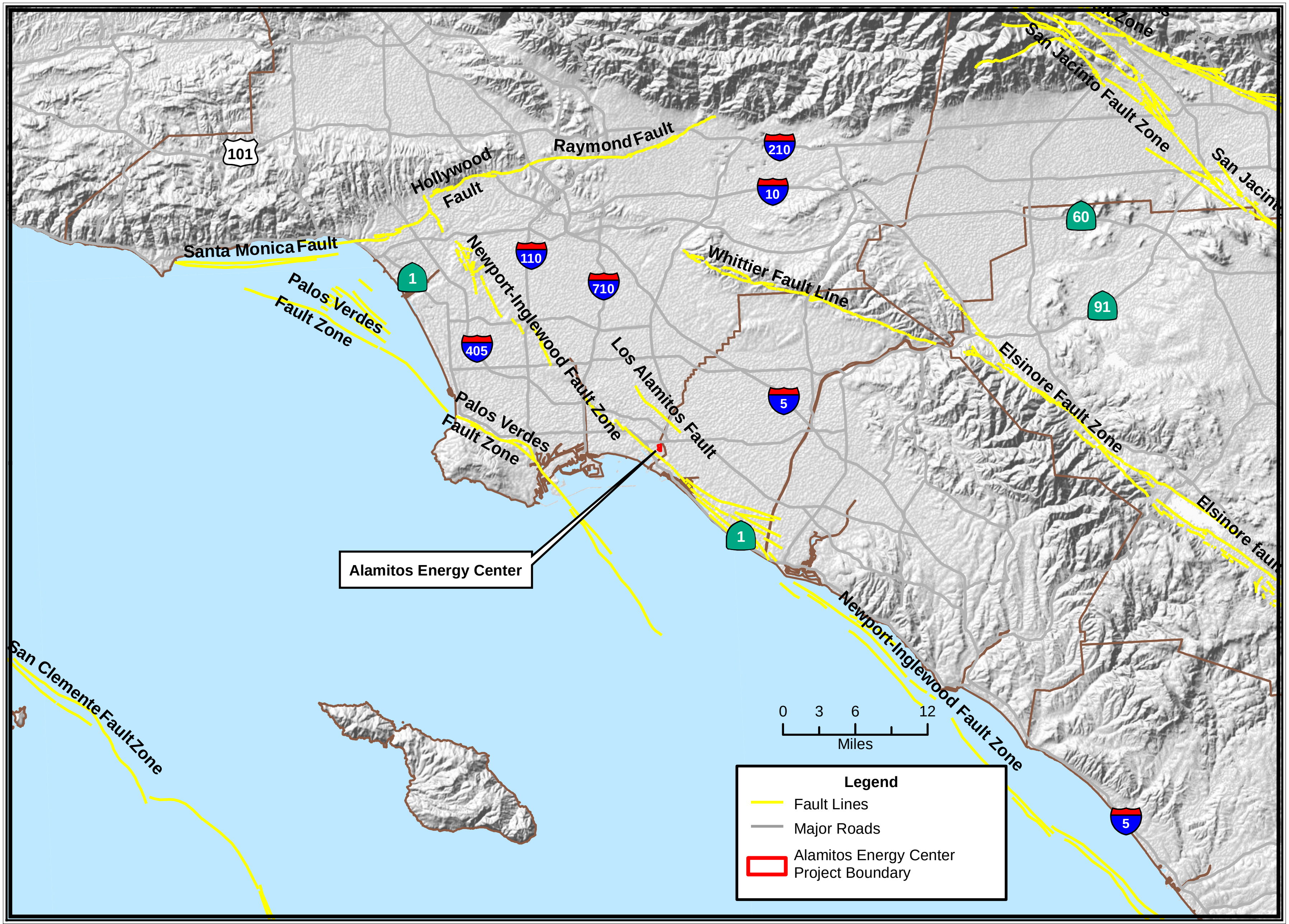
Fault, dashed where concealed

af	Artificial fill
Qop	Old paralic deposits, undivided, a = sand, s = silt, c = clay
Qyf	Young alluvial fan and valley deposits, undivided a = sand, s = silt, c = clay
Qype	Young paralic estuarine deposits

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
Source: Dept. of Conservation 2003 preliminary geologic map of Long Beach 30'x60' quadrangle, Southern California with modifications based on site investigations - CEC Staff

GEOLOGY AND PALEONTOLOGY- FIGURE 6

Alamitos Energy Center - Fault Locations



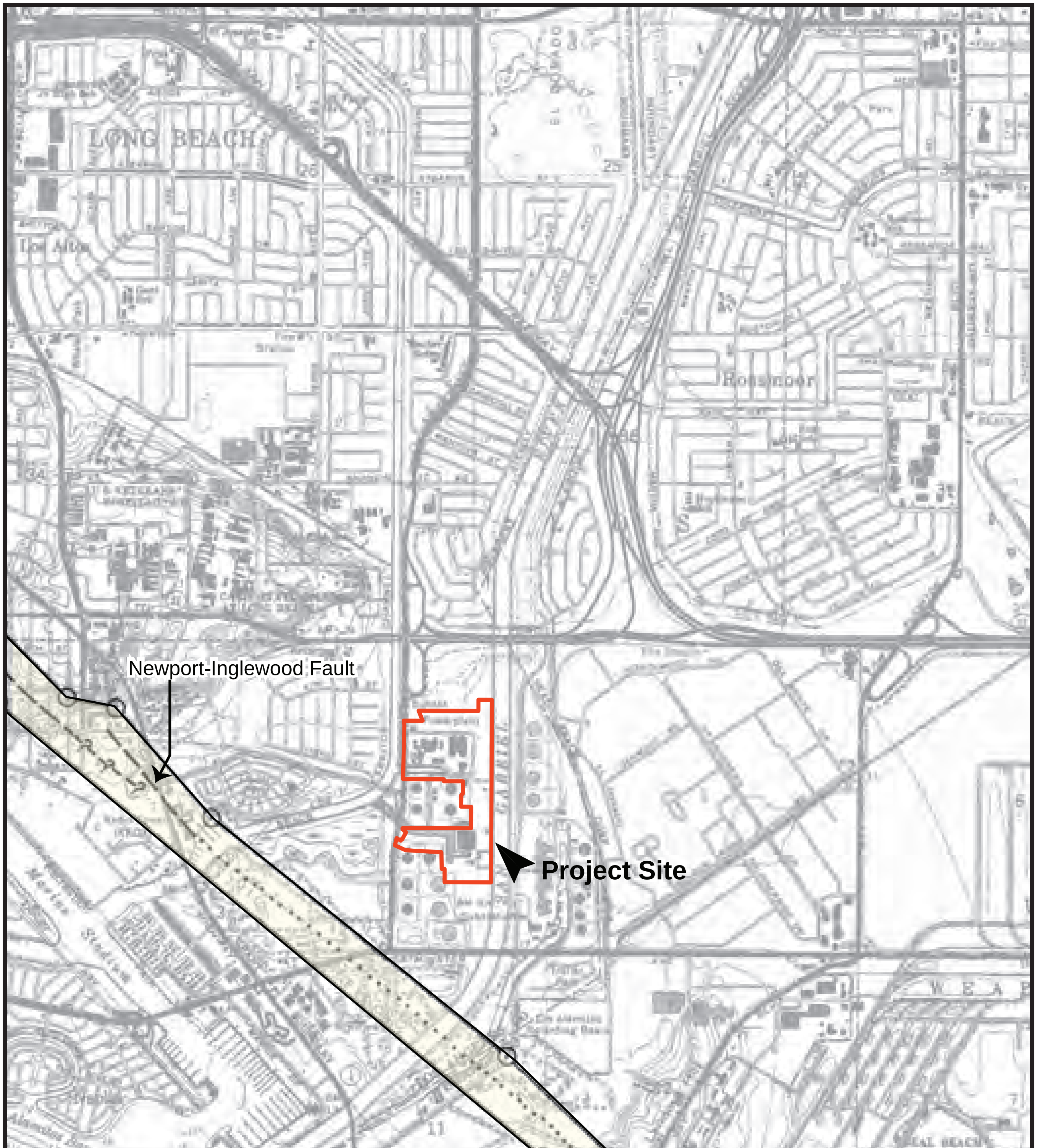
GEOLOGY AND PALEONTOLOGY

CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Dept of Conservation, California Geological Survey Seismic Hazard Assessment & Geologic Mapping Programs

GEOLOGY AND PALEONTOLOGY - FIGURE 7

Alamitos Energy Center - Earthquake Fault Zones



REFERENCE: STATE OF CALIFORNIA SPECIAL STUDIES ZONES, LOS ALAMITOS QUADRANGLE, JULY 1, 1986

Alamitos Energy Center

N

1 .5 0 1 MILE

NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

Potentially Active Faults

1906 C

Faults considered to have been active during Holocene time and to have a relatively high potential for surface rupture; solid line where accurately located, long dash where approximately located, short dash where inferred, dotted where concealed; query (?) indicates additional uncertainty. Evidence of historic offset indicated by year of earthquake-associated event or C for displacement caused by creep or possible creep.

Special Studies Zone Boundaries

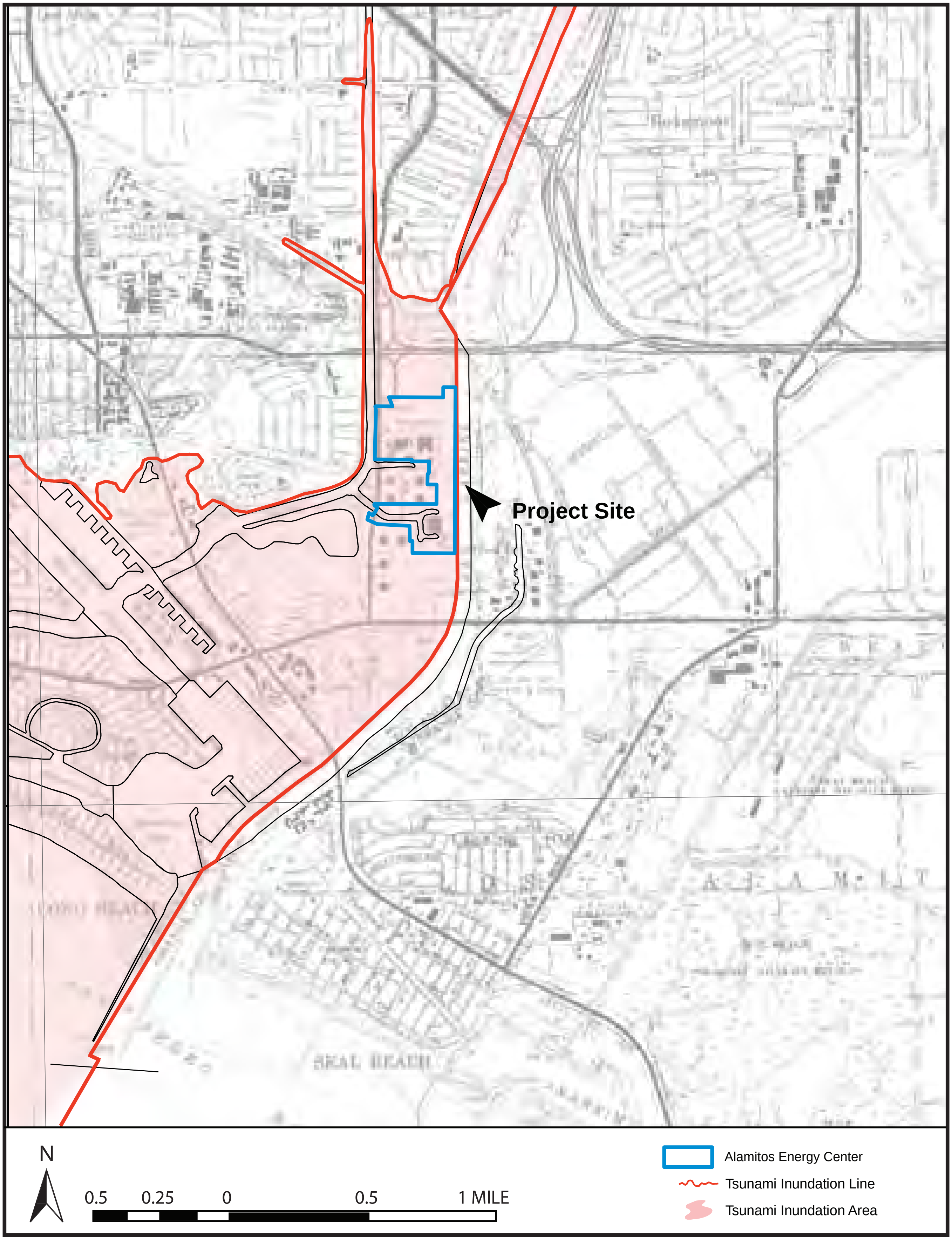
These are delineated as straight-line segments that connect encircled turning points so as to define special studies zone segments.

Seaward projection of zone boundary.

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: State of California Special Studies Zones, Los Alamitos Quadrangle, July 1, 1986

GEOLOGY AND PALEONTOLOGY - FIGURE 8
Alamitos Energy Center - Tsunami Inundation



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: Tsunami Inundation Map for Emergency Planning, Los Alamitos and Seal Beach Quadrangle, March 1, 2009

POWER PLANT EFFICIENCY

Shahab Khoshmashrab and Jacquelyn Record

SUMMARY OF CONCLUSIONS

Alamitos Energy Center (AEC) would generate 1,040 MW (net output[1]) of electricity. Power Block 1 would be in a combined-cycle configuration with a maximum thermal efficiency of 56 percent lower heating value (LHV)[2] at maximum full load and average design conditions[3]. Power Block 2 would be a simple-cycle configuration with a maximum thermal efficiency of 41 percent LHV at maximum full load at average design conditions. While the project would consume substantial amounts of energy, it would do so in a sufficiently efficient manner to satisfy the project's objectives of providing fast-ramping capabilities and ancillary load-following services. It would not create significant adverse effects on energy supplies or resources, would not require additional sources of energy supply, and would not consume energy in a wasteful or inefficient manner. No energy standards apply to the project. Staff therefore concludes that the project would present no significant adverse impacts upon energy resources.

INTRODUCTION

In keeping with the California Environmental Quality Act (CEQA), California Energy Commission (Energy Commission) must make findings on whether the energy use by a power plant would create significant adverse impacts on the environment. If the Energy Commission finds that a power plant's energy consumption creates a significant adverse impact, it must further determine if feasible mitigation measures could eliminate or minimize that impact. Therefore, in this analysis, staff addresses the potential for inefficient and unnecessary consumption of energy at AEC and examines:

- whether the project would present any adverse impacts upon energy resources;
- whether these adverse impacts are significant; and if so,
- whether feasible mitigation measures or alternatives could eliminate those adverse impacts or reduce them to a less-than-significant level.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS

No Federal, State or local/county laws, ordinances, regulations and standards (LORS) apply to the efficiency of this project.

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[1] Net output is the facility's gross electricity generation minus its parasitic electricity (load) requirements, or the amount of electricity that the facility delivers to the electricity grid.

[2] LHV is lower heating value, or a measurement of the energy content of a fuel correcting for post-combustion water vapor.

[3] At site average annual conditions of 65.3°F and relative humidity of 87 percent (AES 2015f, § 2.1.4)

SETTING

The applicant proposes to install and operate two power blocks. Power Block 1 would consist of two natural-gas-fired combustion turbine generators (CTGs) in a combined-cycle configuration, two heat recovery steam generators (HRSGs), one steam turbine generator (STG), an air-cooled condenser, an auxiliary boiler, and related ancillary equipment. Power Block 2 would consist of four simple-cycle CTGs with fin-fan coolers and ancillary equipment. (AEC 2015f § 2.0). AEC would provide peaking and load following power to the Western Los Angeles Basin sub-area (AEC 2015f, § 2.0). There are six existing natural gas-fired conventional steam turbine units on the project site referred to as Alamitos Generating Station (AGS) Units 1 through 6, which were constructed in the 1950s through the 1960s and have a combined generating capacity of 2,025 MW net. These units are to be retired, decommissioned, and removed and 1,040 MW of their total net capacity would be replaced by AEC.

Natural gas would be delivered to AEC via an existing 30-inch-diameter pipeline owned and operated by Southern California Gas Company (SoCalGas) natural gas pipeline (AEC 2015f §§ 2.0).

ASSESSMENT OF IMPACTS

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE OF ENERGY RESOURCES

CEQA guidelines state that the environmental analysis "…shall describe feasible measures which could minimize significant adverse impacts, including where relevant, inefficient and unnecessary consumption of energy" (California Code of Regulations, title 14, §15126.4[a][1]). Appendix F of the guidelines further suggests consideration of such factors as the project's energy requirements and energy use efficiency; its effects on local and regional energy supplies and energy resources; its requirements for additional energy supply capacity; its compliance with existing energy standards; and any alternatives that could reduce the wasteful, inefficient, and unnecessary consumption of energy (California Code of Regulations, title 14, §15000 et seq., Appendix F).

The inefficient and unnecessary consumption of energy, in the form of non-renewable fuels such as natural gas, constitutes an adverse environmental impact. An adverse impact can be considered significant if it results in:

- Adverse effects on local and regional energy supplies and energy resources;
- A requirement for additional energy supply capacity;
- Noncompliance with existing energy standards; or
- The wasteful, inefficient, and unnecessary consumption of fuel or energy.

PROJECT ENERGY REQUIREMENTS AND ENERGY USE EFFICIENCY

Any thermal power plant large enough to fall under Energy Commission siting jurisdiction (50 MW [net] or greater), by definition, consumes large amounts of energy.

The project would burn natural gas at a maximum rate of approximately 8,137 million Btu[4] (mmBtu) per hour and consume up to 29,318,594 mmBtu annually (§ 5.1, Table 5.1-21). Additional fuel would be consumed to support an estimated 500 annual start-up and shutdown sequences. This is a substantial rate of energy consumption, but would not impact energy supplies (See **ADVERSE EFFECTS ON ENERGY SUPPLIES AND RESOURCES** below for further discussion). AEC would generate electricity at a full-load efficiency of approximately 56 percent for the combined-cycle block (Power Block 1) and 41 percent for the simple-cycle block (Power Block 2) (AEC 2015f, § 2.0). This efficiency level of 56 percent compares favorably with the average fuel efficiency of a typical combined-cycle power plant and the efficiency level of 41 percent compares favorably with the average fuel efficiency of a simple-cycle plant. Also, the project would improve the overall thermal efficiency of electricity production compared to the existing, aging AGS Units 1 through 6 due to the higher efficiency of the AEC's modern and new CTGs.

ADVERSE EFFECTS ON ENERGY SUPPLIES AND RESOURCES

The applicant has described its sources of supply of natural gas for the project (AEC 2015f, § 2.1.1.1). Natural gas for the project would be supplied from an existing SoCalGas natural gas transmission pipeline. The SoCalGas natural gas system has access to gas from the Rocky Mountains, Canada and the southwest. This represents a resource of considerable capacity and offers access to adequate annual supplies of natural gas. However, gas demand is both instantaneous and long-term (e.g., annual), and the current closure and potential long-term de-rate of the SoCalGas' Aliso Canyon natural gas storage facility, located north/northwest of the San Fernando Valley near Los Angeles, may impact instantaneous natural gas deliveries to the power plants it serves. This includes the existing AGS and it could potentially impact the proposed AEC.

The state's program to bring once-through cooling power plants into compliance with water quality standards is forcing the retirement of a substantial amount of dispatchable generation in coastal areas and their replacement with new electrical generation to preserve the reliability of the California electric grid system. In keeping with this program, the approximately 50-60 year-old retiring once-through cooling AGS would be replaced by the modern and more efficient proposed AEC, resulting in less natural gas consumption per megawatt (MW) of generation. Additionally, dispatch orders generally call for the most efficiently-generated energy first; especially when peaking capacity is required (the proposed AEC would include peaking units). Therefore, the older, less efficient plants are being displaced by modern and more efficient gas-fired power generation. The electric grid system's reliance on new generation in the region rather than on the existing aging plants would result in further decreases in natural gas consumption per MW of generation and would help alleviate the potential effect of the closure of Aliso Canyon. The proposed AEC would start up first quarter of 2017 to the third quarter of 2021 (AEC 2015f, § 2.2).

[4] British thermal units

ADDITIONAL ENERGY SUPPLY REQUIREMENTS

Natural gas would be delivered to the project site via an existing natural gas pipeline that would be connected to an existing SoCalGas natural gas transmission pipeline (AEC 2015f, §§ 1.1, 2.7.4). Gas supplies would be acquired from gas providers in supply regions accessible through the SoCalGas' gas transmission system. As noted above, this transmission system represents a resource of considerable capacity. Thus, AEC would not require additional natural gas capacity.

COMPLIANCE WITH ENERGY STANDARDS

No standards apply to the efficiency of AEC.

ALTERNATIVES TO REDUCE WASTEFUL, INEFFICIENT AND UNNECESSARY ENERGY CONSUMPTION

The evaluation of alternatives to the proposed project that could reduce wasteful, inefficient, or unnecessary energy consumption first requires examination of the proposed project's energy consumption. Project fuel efficiency, and therefore its rate of energy consumption, is determined by both the configuration of the power producing system and the selection of equipment used to generate its power.

Project Configuration

AEC would be configured into two power blocks. Power Block 1 would use two General Electric (GE) 7FA.05 CTGs in a combined-cycle configuration. Power Block 2 would use four GE LMS100PB CTG units in a simply-cycle configuration. Each block would utilize the GE's fast-start, flexible technology. These two configurations, with their short start-up time and fast ramping[5] capabilities, are well suited for providing peaking and load-following power.

Efficiency of Alternatives to the Project

Alternative Generating Technologies

For purposes of this analysis, staff considered solar technology, other fossil fuels, nuclear, biomass, hydroelectric, wind, and geothermal technologies as alternative generating technologies for AEC. Due to regulatory prohibitions, nuclear technology was rejected. Biomass, hydroelectric, geothermal, wind, and solar technologies were ruled out due to the lack of adequate space on the project site and/or the unavailability of these energy resources in the project area. And, coal and oil are too highly polluting. Therefore, staff believes that the applicant's selection of a natural gas-burning technology is reasonable.

Natural Gas-Burning Technologies

Fuel consumption is one of the most important economic factors in selecting a turbine generator; fuel typically accounts for over two-thirds of the total operating costs of a natural gas-fired power plant. Under a competitive power market system, where operating costs are critical in determining the competitiveness and profitability of a

[5] Ramping is increasing and decreasing electrical output to meet fluctuating load requirements.

power plant, the plant owner is thus strongly motivated to purchase fuel-efficient machinery.

Modern gas turbines embody the most fuel-efficient electric generating technology currently available. The 7FA.05 heavy duty CTG and LMS100PB CTG proposed for the AEC project are nominally rated at 376 MW net with a 60.3 percent efficiency and 109 MW net with a 44.1 percent efficiency, respectively at ISO-conditions[6] (GTW 2016).

For Power Block 1, alternative machines that can meet the project's objectives of the generating capacity requirements of load following electricity would be the Mitsubishi M501G. The M501G gas turbine is nominally rated at 398 MW[7] net and 58.4 percent efficiency at ISO conditions in a combined-cycle configuration (GTW 2016). For the AEC SCGT (Power Block 2), alternative machines that can meet the project's objectives of the generating capacity requirements of peaking/load following services would be the Mitsubishi H-100 gas turbine in a simple-cycle configuration which is nominally rated at 101 MW and 37.8 percent efficiency LHV at ISO conditions (GTW 2016).

For the AEC CCGT (Power Block 1) the 7FA.05 also offers a significantly higher ISO rated efficiency than the Mitsubishi M501G. Similarly, for the AEC SCGT (Power Block 2) the LMS100 PB CTG offers a significantly higher ISO rated efficiency than the Mitsubishi H-100. However, actual performance may vary and is based on project site conditions, such as annual range of ambient temperature and humidity, and any differences in actual operating efficiency between these two machines may be insignificant. In order to meet the AEC generating capacity requirement of 1,040 MW net, the same amount of CTGs would be needed for each power block.

The efficiency of the combined cycle portion of the project would be 56 percent (AEC 2015f, § 2.1.3 and Figures 2.1-4a and 2.1-4b). The 7FA.05 is a modern CTG and its efficiency is comparable, if not superior, to the efficiency of other, currently-operating, modern combined cycle CTGs such as the Mitsubishi M501G. The efficiency of the simple-cycle portion of the project would be 41 percent (AEC 2015f, § 2.1.4 and Figures 2.1-3a and 2.1-3b).[8] The LMS100 PB is a modern CTG and its efficiency is comparable, if not superior, to the efficiency of other, currently-operating, modern simple cycle CTGs such as the Mitsubishi H-100.

Staff concludes that in terms of thermal efficiency, the GE 7FA.05 and LMS100 PB are appropriate choices of machines for the project.

---

[6] ISO (International Organization for Standardization): In this case, ISO Standard 27.040 for measurement of gas turbine capacity. These standard conditions are 15°C (59°F), 60 percent relative humidity, and one atmosphere of pressure.

[7] ISO rated MW net values are used here because site-specific values are not available for the comparable systems. The MW net rating used here for the 7FA.05 and LMS100 PB machines, does not reflect the site-specific design conditions such as site elevation, air inlet and outlet pressures, and parasitic loads, which result in 667 MW net for the CCGT and 379 MW for the SCGT referenced elsewhere in this analysis.

[8] This efficiency is based on the average climatic conditions at the project site.

Inlet Air Cooling

A gas turbine's power output decreases as ambient air temperatures rise. Cooling the air as it enters the turbine increases its power output and cycle efficiency. Therefore, alternative gas turbine inlet air cooling methods are usually evaluated as a part of the equipment selection process for a power plant. The two most common techniques are evaporative coolers or foggers, and chillers. Both increase power output by cooling gas turbine inlet air. A mechanical chiller offers greater gross power output than the evaporative cooler on hot, humid days; however, it consumes electricity to operate its refrigeration process, slightly reducing the turbine's overall net power output and efficiency. An absorption chiller uses less electricity but necessitates the use of a substantial amount of ammonia. An evaporative cooler or fogger boosts power output most efficiently on dry days; it uses less electricity than a mechanical chiller, possibly producing a slightly higher operating efficiency. Efficiency differences between these alternatives are relatively minor.

The project site climate is mild, tempered by cool sea breezes. This usually mild climatological pattern can be interrupted by periods of extremely hot weather, winter storms, or Santa Ana winds (AEC 2015f § 5.1.3.2). Staff believes that the evaporative gas turbine inlet air cooling system proposed by the applicant (AEC 2015f Table 2.7-1) would have no significant adverse energy impacts.

In conclusion, the project configuration (combined cycle and simple-cycle) and generating equipment (7FA.05 and LMS100 PB) chosen represent a sufficiently efficient combination to satisfy the project objectives of efficient power production with operational flexibility as identified in the Supplemental AFC (AEC 2015f, § 2.1). There are no alternatives that could significantly reduce energy consumption.

CUMULATIVE IMPACTS

No nearby projects have been identified that could potentially combine with the project to create cumulative impacts on natural gas resources. Note that the SoCalGas natural gas supply system draws from extensive supplies originating in the Rocky Mountains, in the southwest, and in Canada. Staff concludes that the SoCalGas system is adequate to supply the project without creating a significant cumulative impact. For further discussion, see **Adverse Effects on Energy Supplies and Resources** above.

CONCLUSIONS

The project would generate 1,040 MW (net output); AEC CCGT would have a maximum thermal efficiency of 56 percent LHV at maximum full load and average design conditions. AEC SCGT would have a maximum thermal efficiency of 41 percent LHV at maximum full load and average design conditions. While it would consume substantial amounts of energy, it would do so in a sufficiently efficient manner to satisfy the project's objectives of producing peak-load electricity and base load services. It would not create significant adverse effects on energy supplies or resources, would not require additional sources of energy supply, and would not consume energy in a wasteful or inefficient manner. No energy standards apply to the project. Staff therefore concludes that the project would present no significant adverse impacts upon energy resources.

PROPOSED CONDITIONS OF CERTIFICATION

No conditions of certification are proposed.

REFERENCES

AEC 2015f - Alamitos Energy Center Supplemental AFC (TN 206427-1). Submitted on October 26, 2015. CEC/Docket on October 26, 2015.

GTW 2016 – Gas Turbine World, January-February 2016, Turbine Specifications

POWER PLANT RELIABILITY

Shahab Khoshmashrab and Jacquelyn Record

SUMMARY OF CONCLUSIONS

Staff concludes that Alamitos Energy Center (AEC) would be built to operate in a manner consistent with industry norms for reliable operation and would be able to achieve the equivalent availability factor of approximately 98 percent predicted in the Application for Certification. (The equivalent availability factor of a power plant is the percentage of time it is available to generate power, accounting for both planned and unplanned outages.) No conditions of certification are proposed for power plant reliability.

INTRODUCTION

This analysis evaluates AEC to determine if the power plant would be built in accordance with typical industry norms for reliable power generation. Staff uses these norms because they ensure that the resulting project would not degrade the overall reliability of the electric system it serves (see the "**SETTING**" subsection, below). The scope of this power plant reliability analysis covers the following benchmarks:

- equipment availability;
- plant maintainability and maintenance program;
- fuel and water availability; and
- power plant reliability in relation to natural hazards.

Staff uses the above benchmarks as appropriate industry norms to evaluate the project's reliability and determine if its availability factor is achievable.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

No federal, state, or local/county laws, ordinances, regulations, or standards (LORS) apply to power plant reliability.

SETTING

In the restructured competitive electric power industry, the responsibility for maintaining system reliability falls largely to the state's control area operators, such as the California Independent System Operator (California ISO), which purchase, dispatch, and sell electricity throughout the state. How the California ISO and other control area operators ensure system reliability is an evolving process; new protocols are being developed and put in place to ensure sufficient reliability with the integration of renewable power sources in the competitive market system.

Historically, one of the primary mechanisms used to ensure system reliability was the California ISO's "Reliability Must-Run" (RMR) power purchase agreement. In recent years, the means of ensuring system reliability have shifted from RMR agreements to the California Public Utilities Commission's (CPUC's) Resource Adequacy (RA) program. Nearly all RAs have "Participating Generator Agreement", or PGA, to ensure an adequate supply of reliable power. PGA allows the California ISO operators to invoke "command and control" authority on PGA resources and forces resources to conform to the California ISO Tariff.

The California ISO also requires that power plants selling ancillary services fulfill certain requirements, including:

- filing periodic reports on power plant reliability;
- reporting all outages and their causes; and
- scheduling all planned maintenance outages with the California ISO.

The above mechanisms to ensure adequate power plant reliability have apparently been developed with the assumption that each new power plant in California will exhibit reliability levels similar to those of other power plants currently serving the state's electric system. New power plants should operate in a manner to at least maintain the industry's current level of reliability.

ASSESSMENT OF IMPACTS

METHOD FOR DETERMINING RELIABILITY

The Energy Commission must make findings as to how a project is designed, sited, and operated in order to ensure its safe and reliable operation (Cal. Code Regs., tit. 20, § 1741[b][3]). Staff takes the approach that a project is acceptable if it does not degrade the reliability of the utility system to which it is connected. This is the case if a project is at least as reliable as other power plants on that system.

The equivalent availability factor of a power plant is the percentage of time it is available to generate power, accounting for both planned and unplanned outages. Measures of power plant reliability are based upon both the plant's actual ability to generate power when it is considered to be available, and upon starting failures and unplanned (or forced) outages. For practical purposes, reliability can be considered a combination of these industry measures, making a reliable power plant one that is available when called upon to operate. Power plant systems must be able to operate for extended periods without shutting down for maintenance or repairs. Achieving this reliability requires adequate levels of equipment availability, power plant maintainability, fuel and water availability, and resistance to natural hazards. The following analysis evaluates these measures.

EQUIPMENT AVAILABILITY

Equipment availability would be ensured by adoption of appropriate quality assurance/ quality control (QA/QC) programs during the design, procurement, construction, and operation of the plant and by providing for adequate maintenance and repair of project equipment and systems.

Quality Control Program

The applicant describes a QA/QC program (AEC 2015f, § 2.5.7) that is typical of the power industry. Equipment would be purchased from qualified suppliers based on technical and commercial evaluations. The QA/QC program would include performing receipt inspections, testing of components, and administering independent testing contracts. Implementation of this program would result in adequate reliability of operational equipment.

Equipment Redundancy

A generating facility must be capable of being maintained while operating. A typical approach to this is to provide redundant examples of those pieces of equipment that are most likely to require service or repair.

The applicant plans to provide an appropriate redundancy of function for the project (AEC 2015f, § 2.5.2 and 2.5.3). For example, the combustion turbine generator's (CTG's) lube oil system would include redundant pumps, filters, and coolers, and redundant microprocessors and sensors would be provided in the turbine's control system. Also, technology advancements have led to extremely high reliability for the CTGs considered for this project. Staff concludes that the project's proposed equipment redundancy would be sufficient for its reliable operation.

PLANT MAINTAINABILITY AND MAINTENANCE PROGRAM

Equipment manufacturers provide maintenance recommendations for their products, and power plant owners usually develop their plant's maintenance program based on those recommendations. Such a program encompasses both preventive and predictive maintenance techniques. AEC would develop its maintenance program the same way (AEC 2015f, § 2.5.7.2). Additionally, because AEC would be expected to operate only up to 50 percent of the time (AEC 2015f, § 2.6), there would be plenty of opportunity for planned maintenance to be done during the times the project is offline, thus not affecting its operation. Therefore, staff believes the project would be adequately maintained to ensure an acceptable level of reliability.

FUEL AND WATER AVAILABILITY

The long-term availability of fuel and of water for cooling or process use is necessary to ensure the reliability of any power plant. The need for reliable sources of fuel and water is obvious; lacking long-term availability of either source, the service life of the plant could be curtailed, threatening the power supply.

Fuel Availability

AEC would use natural gas supplied by Southern California Gas Company (SoCalGas) and would connect to a new gas metering station, one for each AEC power block (AEC 2015f, § 2.1.1.1). Gas supplies would be acquired from gas providers in supply regions accessible through the SoCalGas' natural gas transmission system. This transmission system is connected to natural gas resources spanning the Rocky Mountains, Canada, and the southwest. This represents a resource of considerable capacity and offers access to adequate annual supplies of natural gas. However, gas demand is both instantaneous and long-term (e.g., annual), and the closure and potential long-term de-rate of the SoCalGas' Aliso Canyon natural gas storage facility, located north/northwest of the San Fernando Valley near Los Angeles, may impact instantaneous natural gas deliveries to the power plants it serves. This includes the existing AGS and it could potentially impact the proposed AEC.

The state's program to bring once-through cooling power plants into compliance with water quality requirements is forcing the retirement of a substantial amount of dispatchable generation in coastal areas and their replacement with new electrical generation to preserve the reliability of the California electric grid system. In keeping with this program, the approximately 50-60 year-old retiring once-through cooling AGS would be replaced by the modern and more efficient proposed AEC, resulting in less natural gas consumption per megawatt (MW) of generation. Additionally, dispatch orders generally call for the most efficiently-generated energy first; especially when peaking capacity is required (the proposed AEC would include peaking units). Therefore, the older, less efficient plants are being displaced by modern and more efficient gas-fired power generation. The electric grid system's reliance on new generation in the region rather than on the existing aging plants would result in further decreases in natural gas consumption per MW of generation and would help alleviate the potential effect of the closure of Aliso Canyon. The proposed AEC would start up first quarter of 2017 to the third quarter of 2021 (AEC 2015f, § 2.2).

Water Supply Reliability

AEC would be both a simple-cycle and a combined cycle project. With the elimination of once through cooling and most of the steam cycle make-up, the consumptive demand for AEC is projected to be substantially less than the amount of water currently provided to AGS Units 1 through 6 (AEC 2015f, Tables 2.1-1 and 2.1-2). The project's process water and potable water source would be from the Long Beach Water District(LBWD); the point of connection would be to the existing onsite AGS Units 1 through 6 water supply pipeline that enters the site along Studebaker Road (AEC 2015f, §§ 2.1.1, 2.5.5, 5.15.1.4). LBWD has provided a will-serve letter (see Appendix 2D) confirming the adequacy of the regional water supply into the foreseeable future.

Therefore, staff concludes that this source of water supply is a reliable source of water for the project (see the **Soil and Water Resources** section of this document for a detailed discussion of water supply).

POWER PLANT RELIABILITY IN RELATION TO NATURAL HAZARDS

Natural forces can threaten the reliable operation of a power plant. Seiches (waves in inland bodies of water) are not likely to present hazards for this project, but seismic shaking (earthquakes), flooding, and tsunamis (tidal waves) could present credible threats to the project's reliable operation.

Seismic Shaking

The site is located in a seismically active area, as is the majority of southern California, and the potential for strong ground motion in the project area is considered significant during the design life of the proposed structures (AEC 2015f, §§ 2.4.2); see the

"Faulting and Seismicity" portion of the **Geology and Paleontology** section of this document. The project would be designed and constructed to the latest applicable engineering LORS (AEC 2015f, § 2.4, Appendix 2C). Compliance with the latest seismic design LORS represents an upgrading of performance during seismic shaking compared to older facilities since these LORS have been continually upgraded. Because the project would be built to the latest seismic design LORS applicable at the time the project's final design would be underway, this project would perform at least as well as, and perhaps better than, existing plants in the electric power system.

Staff has proposed conditions of certification to ensure project compliance with these LORS; see **Geology and Paleontology** Condition of Certification **GEO-1 and GEO-2** and **Facility Design** Conditions of Certification **GEN-1**, **GEN-5**, and **CIVIL-1**. These conditions include standard engineering design requirements for mitigation of strong seismic shaking, liquefaction, and potential excessive settlement due to dynamic compaction. Therefore, staff believes there are no special concerns with power plant functional reliability due to seismic shaking.

Flooding

The AEC power blocks are at an elevation of approximately 12-15 feet above mean sea level (AEC 2015f, § 5.4.1.1). It is not in the Federal Emergency Management Agency (FEMA) 100-year flood zone (AEC 2015f, § 2.4.2). Nevertheless, project features would be designed and built to provide adequate levels of flood resistance by complying with Conditions of Certification **GEN-1**, **CIVIL-1**, **CIVIL-3**, and **CIVIL-4**. Therefore, staff believes there are no special concerns with power plant functional reliability due to flooding.

Tsunami

In the vicinity of the project site, the potential tsunami inundation area is adjacent to the AEC site along the river channel and within 0.5 mile of an enclosed bay or harbor that could be subject to tsunamis (AEC 2015f, § 5.15.2.2). Because the site's existing elevation is approximately 12 to 15 feet above existing mean sea level, there would still be a buffer of at least 5.5 feet on the AEC site.

U.S. building codes generally have not addressed the subject of designing structures in tsunami zones (Reynolds 2013). The FEMA's Coastal Construction Manual (FEMA 2013), developed to provide design and construction guidance for structures built in coastal areas, addresses seismic loads for coastal structures and provides information on tsunami and associated loads. This manual cites ASCE Standard ASCE 7-10, *Minimum Design Loads for Buildings and Other Structures* as the reference to be consulted during design of structures. ASCE 7-10 is codified in the California Building Code. AEC would be designed and constructed in accordance with this code (as required by **GEN-1** and **GEO-1**). This, combined with an additional buffer of 5.5 feet on the site, would adequately protect the project from tsunami. (For further discussion, see the **Geology and Paleontology** section of this PSA).

COMPARISON WITH EXISTING FACILITIES

Industry statistics for equivalent availability factors are maintained by the North American Electric Reliability Corporation (NERC). NERC regularly polls North American utility companies on their project reliability through its Generating Availability Data System, and periodically summarizes and publishes those statistics on the Internet [http://www.nerc.com]. In its latest report, for the years 2009 through 2014, NERC reports an equivalent availability factor of 80 percent for CTGs (combustion turbine generators) with a capacity of 100-299 MW (NERC 2014). Since AEC, consisting of 1,040-MW CTGs, falls within this range, staff uses this 80 percent availability factor for comparison to AEC.

The project's CTG would be modern General Electric (GE) 7FA turbines combined with modern GE LMS100 turbines. The GE 7F model has been in commercial operation for many years and has exhibited high reliability; similarly the GE LMS100 has been in commercial operation now for many years. The AEC's CTGs could well be expected to outperform the fleet of various, mostly older CTGs that make up the NERC statistics. The anticipated maturation period of AEC's power blocks would range between 6 and 12 months following commercial operation. The applicant has committed to functional testing, performance testing, punch-list resolution, reliability runs, and warranty claims, as well as extensive QA/QC during the commissioning and start-up of the facility (AEC 2015f, § 2.5). These measures would accelerate the maturation process and ensure that the project would exhibit high reliability throughout its operating life.

Also, as explained above, the CTGs would be equipped with redundant features, and would be expected to operate only up to 50 percent of the time; there would be plenty of opportunity for planned maintenance to be done during the times the project is offline, thus not affecting its operation. Therefore, the applicant's expectation of an annual availability factor of 98 percent (beyond the 6- to 12- month maturation period) is reasonable when compared to the NERC's availability factor of 80 percent.

CONCLUSIONS

The applicant predicts an equivalent availability factor of between 98 percent, which staff believes is achievable. Staff concludes that AEC would be built to operate in a manner consistent with industry norms for reliable operation.

PROPOSED CONDITIONS OF CERTIFICATION

No Conditions of Certification are proposed.

REFERENCES

FEMA 2013 — Federal Emergency Management Agency, FEMA P-55, Coastal Construction Manual: Principles and Practices of Planning, Siting, Designing, Constructing, and Maintaining Residential Buildings in Coastal Areas (4th edition), Nov 13, 2013.

NERC (North American Electric Reliability Council) 2014 – 2009–2014 Generating Availability Report.

AEC 2015f - Alamitos Energy Center Supplemental AFC (TN 206427-1). Submitted on October 26, 2015. CEC/Docket on October 26, 2015.

Reynolds 2013 — Reynolds, David, Engineers Design Tsunami-Resistant Port in California, ASCE Civil Engineering Magazine, January 15, 2013.

TRANSMISSION SYSTEM ENGINEERING

Ajoy Guha, P. E. and Mark Hesters

SUMMARY OF CONCLUSIONS

The proposed project facilities from the generator to the interconnection with the Southern California Edison (SCE) Alamitos switchyard, including, the step-up transformer, the project switchyards, the 230 kV overhead transmission line, and the termination are acceptable, in accordance with good utility practices and would comply with applicable Laws, Ordinances, Regulations and Standards (LORS).

Staff expects the California Independent System Operator (California ISO) will find the Alamitos Energy Center (AEC) project to be substantially unchanged from the existing Alamitos Generating Station (AGS) plant and to have no significant impacts on the existing transmission system. The applicant has requested exemption from the California ISO generator interconnection study process in accordance with section 25.1 of the California ISO tariff which allows the California ISO to exempt a generator from the interconnection queue study process if the new generator is found to be substantially unchanged from the generator it replaces (CH2 2016q). The applicant is expected to submit the California ISO study report allowing exemption before staff publishes the Final Staff Assessment.

INTRODUCTION

STAFF ANALYSIS

This **Transmission System Engineering (TSE)** analysis examines whether or not the facilities associated with the proposed interconnection conform to all applicable LORS required for safe and reliable electric power transmission. Staff's analysis evaluates the power plant switchyard, outlet line, termination and downstream facilities identified by the applicant. Additionally, under the California Environmental Quality Act (CEQA), the California Energy Commission (Energy Commission) must conduct an environmental review of the "whole of the action," which may include facilities not licensed by the Energy Commission (California Code of Regulations, title 14, §15378). Therefore, the Energy Commission must identify the system impacts and necessary new or modified downstream transmission facilities (beyond the first point of the proposed interconnection) that are required for interconnection and represent the "whole of the action." Any downstream network upgrade mitigation measures that will be required to maintain system reliability for the addition of the power plant are used to identify the requirement for any additional CEQA analysis for potential indirect impacts.

Energy Commission staff relies on the interconnecting authority, in this case the California ISO, for the analysis of impacts on the transmission grid from the proposed interconnection as well as the identification and approval of new or modified facilities downstream that may be required as mitigation measures. The proposed AEC would connect to the SCE transmission network and requires analysis and approval by SCE and the California ISO.

ROLE OF SCE

SCE is responsible for ensuring electric system reliability on its transmission system and the integration of the proposed generating plant into the grid. Normally SCE will provide analysis in their Phase 1 and Phase 2 Interconnection Studies, if required, and identify any proposed downstream changes required in its transmission system to interconnect the AEC.

ROLE OF CALIFORNIA ISO

The California ISO is responsible for system operation on the California ISO grid, ensuring electric system reliability for all participating transmission owners and for developing the standards and procedures necessary to achieve system reliability. The California ISO is responsible for completing the interconnection studies of the SCE system to ensure adequacy of the proposed transmission interconnection. The California ISO will also determine the reliability and delivery impacts of the proposed transmission modifications on the SCE transmission system in accordance with all applicable reliability criteria. According to the California ISO tariff, the California ISO will determine the need for transmission additions or upgrades downstream from the interconnection point to ensure reliability of the transmission grid. The proposed AEC project is expected to be exempted from these studies by the California ISO because the project replaces the existing AGS and would not impact the transmission grid much differently than the existing generator. The California ISO tariff Section 25.1 allows a proposed generator to be excused from the interconnection study process if the California ISO and the PTO find that the project is substantially unchanged from the existing project it replaces. If necessary, the California ISO may also provide written and verbal testimony on their findings at the Energy Commission hearings.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS

- California Public Utilities Commission (CPUC) General Order 95 (GO-95), “Rules for Overhead Electric Line Construction,” formulates uniform requirements for construction of overhead lines. Compliance with this order ensures adequate service and safety to persons engaged in the construction, maintenance and operation or use of overhead electric lines and to the public in general.
- California Public Utilities Commission General Order 128 (GO-128), “Rules for Construction of Underground Electric Supply and Communications Systems,” formulates uniform requirements and minimum standards to be used for underground supply systems to ensure adequate service and safety to persons engaged in the construction, maintenance and operation or use of underground electric lines and to the public in general.
- The National Electric Safety Code (NESC), 2007 provides electrical, mechanical, civil and structural requirements for overhead electric line construction and operation.
- The North American Electric Reliability Corporation (NERC) Reliability Standards define the plans, policies & procedures, methodologies & system models, coordination & responsibilities, and performance criteria for reliable planning, control and operation of the North American bulk electric system (BES) over a broad spectrum of system

conditions and following a wide range of probable disturbances. The standards cover all aspects of an interconnected BES such as: Transmission system planning & operation, consistent data (steady-state and dynamic) for modeling and simulation, facility ratings methodology and connections, balancing real power, resources & load demand, procedures for voltage control & reactive power, system protection, control, communications & security, nuclear plant interface coordination, emergency operation planning, and system restoration plans. The transmission planning standards stipulate periodic system simulations and associated assessments over a planning horizon by the planning authority and transmission planner to ensure that reliable systems are planned with sufficient lead time to meet the system performance requirements and continue to be modified or upgraded as necessary for operating the network reliably to supply projected customer demands and firm transmission services under normal and forced or maintenance outage system conditions.

For an interconnected bulk electric system, Table I in the NERC Transmission Planning Standards specifies the system performance requirements during normal system conditions with all facilities in service (pre-contingency) and normal operating procedures in effect under Category A, and during probable and rational contingencies of a single BES element under Category B and two or more (multiple) BES elements under Category C. The performance limits or impacts for the above Categories A-C are specified for a reliable system as to remain stable, and within applicable normal and emergency facility thermal ratings and system voltage limits as determined and applied by the transmission owner according to the NERC Facility Ratings Standards. Specified system performance limits may vary from no loss of load demand or curtailed generation/firm transfers for insignificant adverse impacts (for Categories A & B) to planned/controlled loss of load demand or curtailed generation/firm transfers (for Category C) without any cascading outages. However, during major extreme disturbances such as loss of multiple 500 kV lines on a common right-of-way with cascading outages or multiple generators with loss of a major load center as stated under Category D in the Table I, some of the interconnected systems may become unstable resulting in widespread black out in islanded areas. The standards require the planning authority to evaluate the risks and consequences for such catastrophic events, and be prepared according to the NERC Emergency Operation Planning Standard and/or to restore the system to normal according to the NERC standard for System Restoration Plans (NERC 2005-10).

- The Western Electric Coordinating Council (WECC) Regional System Performance Criteria is similar to the system performance limits as defined in NERC transmission planning standards. The WECC performance criteria incorporate Table I NERC transmission planning standards and include the WECC Disturbance-Performance Table W-1 which provides standards for transient voltage and frequency limits, and post-transient system voltage variation. Certain aspects of the WECC performance criteria are either more stringent or specific than the NERC standards, such as inclusion of contingency event frequencies and additional Category C & D contingencies. Adequate reactive power resources planning criteria for transfer path ratings and post-transient voltage stability are also included. For any past disturbance that actually resulted in cascading outages in the interconnected system, the WECC performance criteria require remedial action so that future occurrences of such events would not result in cascading outages(WECC 2008).

- California ISO planning standards also provide standards and guidelines to ensure the adequacy, security, and reliability in the planning of the California ISO grid transmission facilities. The standards incorporate the current NERC Reliability Planning Standards and WECC Regional System Performance Criteria. However, the California ISO standards are more stringent or specific than the NERC standards and WECC performance criteria. The standards include additional Category B disturbance elements and criteria for existing nuclear plant unit's control. The standards also address new transmission versus involuntary load interruptions. The California ISO Standards apply to the electric systems of all participating transmission owners interconnecting to the California ISO controlled grid. They also apply when there are any impacts to the California ISO grid due to facilities interconnecting to adjacent controlled grids not operated by the California ISO (California ISO 2002a).
- California ISO/FERC Electric Tariff provides rules, procedures and guidelines for construction of all transmission additions/upgrades (projects) within the California ISO controlled grid. The California ISO determines the "need" for the proposed project where it will promote economic efficiency or maintain system reliability. The California ISO also determines the cost responsibility of the proposed project and provides an operational review of all facilities that are to be connected to the California ISO grid. The tariff specifies the required Generator Interconnection and Delivery Allocation Procedures (GIDAP) and Large Generator Interconnection Agreement (LGIA) to be followed for any large generator interconnection to the California ISO controlled grid (California ISO 2010a).

EXISTING FACILITIES AND RELATED SYSTEMS

The applicant proposes to replace the existing AGS plant (1950's era steam turbine technology with ocean water once-through-cooling (OTC) system and related facilities) which is scheduled to be shut down by 2020 as part of the State Water Resources Control Board's OTC phase out. The proposed AEC project, includes air-cooled condensers and modern fast-starting combined-cycle (CC) technology. The AGS plant located at the coast line of the city of Long Beach, is now operating with six natural gas -fired steam turbine /Generator (Gen) Units with a total 1,950 MW net generating capacity. The AGS combustion turbine Unit 7 is non-operational. Each of the six operating units is interconnected individually at the existing SCE-owned Alamitos 230 kV switchyard located near the site of the AGS plant.

EXISTING SCE ALAMITOS 230 kV SWITCHYARD

The existing SCE-owned Alamitos 230 kV switchyard situated just outside the north fence line of the Alamitos property, has a double bus, double breaker arrangement in two sections, section A (west bus) and section B (east bus). Section A and section B each have a north and south bus. Thus the Alamitos switchyard has four busses, section A north, section A south, section B north and section B south.

The two section A (west) buses have eight 230 kV switching bays (SB) each with two 230 kV, 2,500/3,000-ampere circuit breakers (CB). The existing AGS generating units 1 through 4 connect to the section A buses at the SB no. 2, 4, 6 and 8 respectively. There are two 2,500-ampere, 230 kV breakers and two 2,500-ampere associated disconnect switches for each breaker. The four remaining SB bays at the section A buses each have two 3,000-ampere breakers and two associated 3,000-ampere disconnect switches for each breaker and connect to SCE's Lighthipe, Barre and Long Beach substations.

The two Section B (east) buses have four 230 kV SBs and the existing AGS Generating units 5 and 6 are connected to section B buses at SB no. 1 and 3 respectively, each with two 2,500-ampere breakers and two 2,500-ampere associated disconnect switches for each breaker. The remaining two bays at section B buses, each with two 3,000-ampere, 230 kV breakers and two associated disconnect switches for each breaker, connect to SCE's Barre and Center Line substations.

There is a bus-section 3,000-ampere breaker with two associated 3,000-ampere disconnect switches between section A (west) and section B (east) north 230 kV buses.

PROJECT DESCRIPTION

The proposed AEC plant would reuse approximately 21 acres of the existing 71-acre AGS power plant site and the existing plant infrastructure, including the existing SCE-owned Alamitos 230 kV switchyard just on the north side of the property line and its transmission outlets.

In Power Block 1, the proposed AEC Plant would consist of a natural gas-fired 2-on-1 CC Generating Unit with a steam-turbine generator (STG) unit rated at 241.1MW (290 MVA),18 kV, 0.85 power factor (PF) and two CTG units each rated at 234.5 MW (272 MVA),18 kV, 0.85 PF. The maximum turbine output for the STG would be 241.1 MW, and each CTG 234.5 MW.

Power Block 2, would be divided into two sub-blocks, as shown in the physical layout diagram, each sub-block would consist of two natural gas-fired CTGs for a total of four CTG units in Power Block 2. Each of the CTGs in Power Block 2 would be rated at 103.3 MW (121.5 MVA), 13.8 kV, 0.85 PF (CH2 2016q, Revised Electrical System One-Line Diagram, and Figure DR173-1R).

The proposed AEC plant would have a total gross generating installed capacity of about 1,123.3 MW and a net generating capacity of 1,092.2 MW.

In Power Block 1, the Applicant expects that the STG unit would be connected through a 10,000-ampere, 18 kV circuit breaker (CB), a disconnect switch and an approximately 100-foot-long 10,000-ampere segregated bus duct to the low voltage terminal of a dedicated 171/228/285 MVA, ONAN/ONAF, 18/230 kV generator step-up (GSU) transformer. Each of the two CTG units in Power Block 1 are expected to be connected through a 10,000-ampere, 18 kV breaker, a disconnect switch and an approximately 100-foot long 10,000-ampere segregated bus duct to the low side voltage terminal of a dedicated 169/225/282 MVA ONAN/ONAF, 18/230 kV GSU. The high side of each the above three GSU transformers would be connected by a short overhead span of 1113 ACSR “Bluejay” conductor and a 230 kV 1,200-ampere CB with a 1,200-ampere disconnect switch to the switchyard 4 inch schedule 80, 6063 aluminum overhead 230 kV bus (CH2 2016t and Alamitos Energy Center Supplement to Data Response 8, 7/12/2016).

In Power Block 2, the Applicant expects that each of the four simple-cycle CTG units would be connected through a 7,000-ampere, 13.8 kV breaker, a disconnect switch and an approximately 100-foot long 7,000-ampere segregated bus duct to the low side voltage terminal of a dedicated 72/96/120 MVA ONAN/ONAF,13.8/230 kV GSU transformer. The high side of the GSU transformers for each of the two CTG units would be connected to a 230 kV, 2,000-ampere CB with a 2,000-ampere disconnect switch and then to a 230 kV 4-inch schedule-80, 6063 aluminum overhead 230 kV bus through an approximately 50-foot long overhead 1113 ACSR "Bluejay" conductor. Similarly the high side of the GSU transformers for the other two simple-cycle CTG units would be connected to a 230 kV CB with a 2,000-ampere disconnect switch and then to another 230 kV overhead bus of 4-inch schedule-80, 6063 aluminum through an approximately 50-foot long 1113 ACSR "Bluejay" overhead conductor. Each of the two 230 kV overhead buses would terminate to a 230 kV common overhead bus of 4 inch schedule-80, 6063 aluminum bus through a 2,000-amp disconnect switch (CH2 2016t and Alamitos Energy Center Supplement to Data Response 8, 7/12/2016).

The proposed gen tie line for the four CTG units would be connected to the 230 kV overhead common bus through a 230 kV 2,000-ampere breaker with a 2,000-ampere disconnect switch.

INTERCONNECTION FACILITIES

The 230 kV bus in the Power Block 1 switchyard would be connected to a new overhead generator tie line through a 230 kV, 2,000-ampere breaker and two 2,000-ampere disconnect switches. The new 0.31-mile long overhead gen tie line would be built with 1113 kcmil bundled "Bluejay" Aluminum Conductor Steel-supported (ACSS) on 95-foot high dead end steel structures and 95-foot high steel poles. The line would terminate at the SCE Alamitos switching station on the section Bus B double buses, switching Bay No.1, with two 2,500-ampere breakers and two 2,500-ampere disconnect switches for each breaker. At the maximum output from the generators in Power Block 1 and a 0.85 power factor, the full load current in the overhead tie line would be 2,100 Amperes, and the line rating of the bundled tie line would be 4,200 Amperes at 200 degree Celsius. Since the line would be protected by a 230kV, 25 ohms (66.31 MH) current limiting reactor, and the line conductor size rating is more than twice of the full load current, it is expected that the conductor temperature would be limited within 130 degree Celsius as required by the SCE interconnection requirements(CH2 2016q).

For Power Block 2, the switchyard 230 kV bus would be connected to a new overhead generator tie line through a 230 kV, 2,000 Ampere breaker with an associated 2,000 Ampere disconnect switch. The overhead tie line would be built on 95-foot high dead-end steel structures and 95-foot high steel poles. The second, 0.16 mile long overhead generator tie line, would be built with 1431 kcmil "Bobolink" ACSS conductor on the proposed 95-foot high steel structures and 95-foot dead end steel poles. The generator tie line for Power Block 2 would terminate at the SCE Alamitos switching station at the section Bus B double buses, switch bay No.3, with two 2,500-ampere breakers and two

2, 500-ampere disconnect switches for each breaker. (AEC 2014a, Figures DR 173-1R, 2.1-2R, 3.1-2aR, & 3.1-2bR)

SCE ALAMITOS 230 kV SWITCHYARD

The configurations of the existing SCE-owned Alamitos 230 kV switchyard buses, switching bays, breakers, and associated disconnect switches, terminations of the existing AGS generating Units 1 through 6 and transmission outlets to the SCE network have been described in the previous section of “Existing Facilities and Related System”.

With the decommissioning of the AGS Units 1 through 4, all the related SBs with 2,500-ampere breakers and the associated 2,500-ampere disconnect switches in the Alamitos 230 kV Switchyard Bus A section would be available. With the decommissioning and disconnection/demolition of existing AGS Units 5 & 6, SB 1 & 3 with associated 2,500-ampere breakers and 2,500-ampere disconnect switches, would be available for the interconnection of the proposed CC units from Power Block 1 and the CTG units from Power Block 2 respectively (AEC 2014a, Figures 3.1-1R and Dr173-1R).

The proposed interconnection facilities are acceptable, in accordance with good utility practices and would comply with applicable LORS.

TRANSMISSION SYSTEM ANALYSIS AND IMPACTS

For the interconnection of a proposed generating unit or transmission facility to the grid, the interconnecting utility or participating transmission owner (PTO), SCE in this case, and the control area operator (California ISO) are responsible for ensuring grid reliability. *Normally these entities perform the Phase 1 and Phase 2 Interconnection cluster studies,* determine the transmission system impacts of the proposed project, and any mitigation measures needed to ensure system conformance with performance levels required by utility reliability criteria, NERC reliability standards, WECC system performance criteria, and California ISO planning standards. Staff relies on these studies and any review conducted by the responsible agencies to determine the project’s effect on the transmission grid and to identify any necessary downstream facilities or indirect project impacts required to bring the transmission network into compliance with applicable reliability standards.

The proposed AEC project is expected to be exempted from these studies by the California ISO because the project replaces the existing AGS and would not impact the transmission grid significantly differently than the existing generator. The California ISO tariff Section 25.1 allows a proposed generator to be excused from the interconnection queue study process if the California ISO and the PTO find that the project is substantially unchanged from the existing project it replaces.

Staff expects the California ISO will find the repowered AEC project to be substantially unchanged from the existing AGS plant and to have no significant impacts on the existing transmission system. The applicant has requested exemption from the California ISO generator interconnection study process in accordance with section 25.1 of the California ISO Tariff which allows the California ISO to exempt a generator from the interconnection queue study process if the new generator is found to be substantially unchanged from the generator it replaces.

According to section 25.1.2.1 of the California ISO tariff pre-LGIA requirement, the applicant would need to submit switchyard/substation final design drawings to SCE along with final impedances of the new GSU transformers for their review and approval during final engineering of the SCE interconnection facilities at the SCE Alamitos 230 kV substation. The engineering would be followed by a final interconnection analysis by SCE and/or the California ISO, including a short circuit duty study during the California Energy Commission post-licensing period. All data requirements for the final design drawings and the study report will, therefore, be included in the conditions of certification for TSE for compliance by the applicant along with submittal of LGIA(s).

DOWNSTREAM FACILITIES

Since the proposed AEC plant is replacing the existing AGS OTC plant, and its total generation output and electrical characteristics are substantially unchanged, there is no expectation of additional downstream impacts. Hence, the interconnection of the AEC project should not require any new downstream facilities or any downstream upgrades.

CUMULATIVE IMPACTS

The proposed AEC generating project replaces the existing AGS plant with almost equal generating capability. Hence the new AEC project would not create any cumulative adverse impacts in the surrounding SCE transmission network.

CONFORMANCE WITH LORS AND CEQA REVIEW

Staff expects the California ISO will find the proposed AEC project would be substantially unchanged from the existing AGS plant and would have no significant impacts on the existing transmission system. The applicant requested exemption from the California ISO generator interconnection study process in accordance with section 25.1 of the California ISO tariff, which allows the California ISO to exempt a generator from the study process if the new generator is found to be substantially unchanged from the generator it replaces. The applicant is expected to submit the California ISO decision on the exemption before staff publishes its testimony in the FSA.

According to section 25.1.2.1 of the California ISO tariff, the applicant has the obligation to submit switchyard/substation final design drawings along with final impedances of the new GSU transformers for review and approval by SCE during engineering of the SCE interconnection facilities at the Alamitos 230 kV switchyard followed by a final interconnection analysis during CEC post-licensing. All data requirements would be included in the conditions of certification for TSE for compliance by the applicant along with submittal of the LGIA.

Staff’s proposed conditions of certification **TSE-1** through **TSE-5** would help ensure that construction and operation of the transmission facilities for the proposed AEC would comply with applicable LORS:

1. Staff proposed Condition of Certification **TSE-1** to ensure that the preliminary equipment is in place for construction of the transmission facilities of the proposed project to comply with industry standards and utility practices with applicable LORS.

2. Staff proposed Condition of Certification **TSE-2** to ensure the final design of the proposed transmission facilities would comply with industry standards, utility practices, and applicable LORS.

3. Staff proposed Condition of Certification **TSE-3** to ensure that the proposed project would be properly interconnected to the transmission grid. **TSE-3** also ensures that the generator output would be properly delivered to the transmission system.

4. Staff proposed Condition of Certification **TSE-4** to ensure that the project would synchronize with the existing transmission system and the operation of the facilities would comply with applicable LORS.

5. Staff proposed Condition of Certification **TSE-5** to ensure that the proposed project would be built to required specifications and the operation of the facilities would comply with applicable LORS.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

No agency or public comments related to the TSE discipline have been received.

CONCLUSIONS AND RECOMMENDATIONS

1. The proposed interconnection including facilities, including, the step-up transformer, the project switchyards, the 230 kV overhead transmission lines, and the termination at the SCE Alamitos switchyard are acceptable, in accordance with good utility practices and would comply with applicable LORS are acceptable and would comply with applicable LORS.

2. Staff expects the California ISO will find the AEC project would be substantially unchanged from the existing AGS plant and would have no significant impacts on the existing transmission system. The applicant is expected to submit the California ISO decision on the exemption before staff publishes its testimony.

RECOMMENDATIONS

If the Energy Commission approves the project, staff recommends the following conditions of certification to ensure system reliability and conformance with industry standards, utility practices, and LORS.

CONDITIONS OF CERTIFICATIONS FOR TSE

TSE-1 The project owner shall furnish to the CPM and to the CBO a schedule of transmission facility design submittals, a Master Drawing List, a Master Specifications List, and a Major Equipment and Structure List. The schedule shall contain a description and list of proposed submittal packages for design, calculations, and specifications for major structures and equipment. To facilitate audits by Energy Commission staff, the project owner shall provide designated packages to the CPM when requested.

Verification: Prior to the start of transmission facilities construction, the project owner shall submit the schedule, a Master Drawing List, and a Master Specifications List to the CBO and to the CPM. The schedule shall contain a description and list of proposed submittal packages for design, calculations, and specifications for major structures and equipment (see a list of major equipment in **Table 1: Major Equipment List** below). Additions and deletions shall be made to the table only with CPM and CBO approval. The project owner shall provide schedule updates in the Monthly Compliance Report.

Table 1: Major Equipment List
Breakers
Step-up Transformer
Switchyard
Busses
Surge Arrestors
Disconnects and Wave-traps
Take off facilities
Electrical Control Building
Switchyard Control Building
Transmission Pole/Tower
Insulators and Conductors
Grounding System

TSE-2 For the power plant switchyard, outlet line and termination, the project owner shall not begin any increment of construction until plans for that increment have been approved by the CBO. These plans, together with design changes and design change notices, shall remain on the site for one year after completion of construction. The project owner shall request that the CBO inspect the installation to ensure compliance with the requirements of applicable LORS. The following activities shall be reported in the Monthly Compliance Report:

A. receipt or delay of major electrical equipment;

B. testing or energization of major electrical equipment; and

C. the number of electrical drawings approved, submitted for approval, and still to be submitted.

Verification: Prior to the start of each increment of construction, the project owner shall submit to the CBO for review and approval the final design plans, specifications and calculations for equipment and systems of the power plant switchyard, outlet line and termination, including a copy of the signed and stamped statement from the responsible electrical engineer attesting to compliance with the applicable LORS, and send the CPM a copy of the transmittal letter in the next Monthly Compliance Report.

TSE-3 The project owner shall ensure that the design, construction, and operation of the proposed transmission facilities will conform to all applicable LORS, and the requirements listed below. The project owner shall submit the required number of copies of the design drawings and calculations, as determined by the CBO.

Once approved, the project owner shall inform the CPM and CBO of any anticipated changes to the design, and shall submit a detailed description of the proposed change and complete engineering, environmental, and economic rationale for the change to the CPM and CBO for review and approval.

a) The power plant switchyard and outlet line shall meet or exceed the electrical, mechanical, civil, and structural requirements of CPUC General Order 95 or National Electric Safety Code (NESC); Title 8 of the California Code and Regulations (Title 8); Articles 35, 36 and 37 of the *High Voltage Electric Safety Orders*, California ISO standards, National Electric Code (NEC) and related industry standards.

b) All components, including breakers and busses in the power plant switchyard and other switchyards, where applicable, shall be sized to comply with a short-circuit analysis.

c) Outlet line crossings and line parallels with transmission and distribution facilities shall be coordinated with the transmission line owner and comply with the owner's standards.

d) The project conductors and all components like buses, Breakers, and Transformers etc. shall be sized to accommodate the full output of the project.

e) Termination facilities shall comply with industry standards and applicable SCE interconnection standards.

f) The project owner shall provide the following for all seven AEC units to the CPM

    i) The Special Protection System (SPS) sequencing and timing if applicable,

    ii) The pre-LGIA final interconnection analysis report by the California ISO and/or SCE including the short circuit report.

    iii) The electrical one-line diagrams for two AEC switchyards with all updates for generator ratings, including final percentage impedances of the GSU transformers.

    iv) The electrical one-line diagram of the SCE Alamitos Switchyard West and East 230 kV buses, with all updates including configuration of buses and circuit breakers with associated disconnect switches, including their types and/or ampere ratings and leveled transmission outlets, considering decommissioning and disconnection of all the existing AGS generator units.

v) The operational study report(s) based on in-service dates or current commercial operation dates (CODs) system conditions from the California ISO and/or SCE.

vi) A copy of the executed LGIA (s) signed by the California ISO and the project owner, and approved by the Federal Energy Regulatory Commission.

Verification: Prior to the start of construction or start of modification of transmission facilities, the project owner shall submit to the CBO for approval:

a) Design drawings, specifications, and calculations conforming with CPUC General Order 95 or National Electric Safety Code (NESC); Title 8 of the California Code of Regulations (Title 8); Articles 35, 36 and 37 of the *High Voltage Electric Safety Orders*, CA ISO standards, National Electric Code (NEC) and related industry standards, for the poles/towers, foundations, anchor bolts, conductors, grounding systems, and major switchyard equipment;

b) For each element of the transmission facilities identified above, the submittal package to the CBO shall contain the design criteria, a discussion of the calculation method(s), a sample calculation based on "worst-case conditions"[1] and a statement signed and sealed by the registered engineer in responsible charge, or other acceptable alternative verification, that the transmission element(s) will conform with CPUC General Order 95 or National Electric Safety Code (NESC); Title 8 of the California Code and Regulations (Title 8); Articles 35, 36 and 37 of the *High Voltage Electric Safety Orders*, California ISO standards, National Electric Code (NEC), and related industry standards;

c) Electrical one-line diagrams signed and sealed by the registered professional electrical engineer in charge, a route map, and an engineering description of the equipment and configurations covered by requirements **TSE-3** a) through f);

d) The project owner shall provide the following for all four AEC generator units to the CBO for approval:

   i) The Special Protection System (SPS) sequencing and timing if applicable,

   ii) The pre-LGIA final interconnection analysis report by the California ISO and/or SCE including the short circuit report.

   iii) The electrical one-line diagrams for two AEC switchyards with all updates including final percentage impedances of the GSU transformers.

   iv) The electrical one-line diagram of the SCE Alamitos Switchyard West and East 230 kV buses, with all updates including configuration of buses and circuit breakers with associated disconnect switches including their types and/or ampere ratings and leveled transmission outlets, considering decommissioning and disconnection of all the existing AGS generator units.

[1] Worst-case conditions for the foundations would include for instance, a dead-end or angle pole.

v) A copy of the executed LGIA(s) signed by the California ISO and the project owner, and approved by the Federal Energy Regulatory Commission.

vi) The operational study report(s) based on in in-service dates or current commercial operation dates (CODs) system conditions from the California ISO and/or SCE.

Prior to the construction of, or start of modification of transmission facilities, the project owner shall inform the CBO and the CPM of any anticipated changes to the design that are different from the design previously submitted and approved and shall submit a detailed description of the proposed change and complete engineering, environmental, and economic rationale for the change to the CPM and CBO for review and approval.

TSE-4 The project owner shall provide the following notice to the California Independent System Operator (California ISO) prior to synchronizing the facility with the California transmission system:

1. At least one week prior to synchronizing the facility with the grid for testing, provide the California ISO a letter stating the proposed date of synchronization; and

2. At least one business day prior to synchronizing the facility with the grid for testing, provide telephone notification to the California ISO Outage Coordination Department.

Verification: The project owner shall provide copies of the California ISO letter to the CPM when it is sent to the California ISO one week prior to initial synchronization with the grid. The project owner shall contact the California ISO Outage Coordination Department, Monday through Friday, between the hours of 0700 and 1530 at (916) 351-2300 at least one business day prior to synchronizing the facility with the grid for testing. A report of conversation with the California ISO shall be provided electronically to the CPM one day before synchronizing the facility with the California transmission system for the first time.

TSE-5 The project owner shall be responsible for the inspection of the transmission facilities during and after project construction, and any subsequent CPM and CBO approved changes thereto, to ensure conformance with CPUC GO-95 or NESC, Title 8, CCR, Articles 35, 36 and 37 of the, “High Voltage Electric Safety Orders”, applicable interconnection standards, NEC and related industry standards. In case of non-conformance, the project owner shall inform the CPM and CBO in writing within 10 days of discovering such non-conformance and describe the corrective actions to be taken.

Verification: Within 60 days after first synchronization of the project, the project owner shall transmit to the CPM and CBO:

A. “As built” engineering description(s) and one-line drawings of the electrical portion of the facilities signed and sealed by the registered electrical engineer in responsible charge. A statement attesting to conformance with CPUC GO-95 or NESC, Title 8, California Code of Regulations, Articles 35, 36 and 37 of the “High Voltage Electric

Safety Orders", and applicable interconnection standards, NEC, related industry standards, and these conditions shall be provided concurrently.

B. An "as built" engineering description of the mechanical, structural, and civil portion of the transmission facilities signed and sealed by the registered engineer in responsible charge or acceptable alternative verification. "As built" drawings of the electrical, mechanical, structural, and civil portion of the transmission facilities shall be maintained at the power plant and made available, if requested, for CPM audit as set forth in the "**Compliance Monitoring Plan**".

C. A summary of inspections of the completed transmission facilities, and identification of any nonconforming work and corrective actions taken, signed and sealed by the registered engineer in charge.

REFERENCES

California ISO (California Independent System Operator) 1998a. California ISO Tariff Scheduling Protocol posted 1998, Amendments 1,4,5,6, and 7 incorporated in 1998.

California ISO (California Independent System Operator) 1998b. California ISO Dispatch Protocol posted April 1998.

California ISO (California Independent System Operator) 2002a. California ISO Planning Standards, 2002.

California ISO (California Independent System Operator) 2010a. California ISO, FERC Electric Tariff, First Replacement Vol. No. 1, 2010.

California ISO (California Independent System Operator) 2009a, Large Generator AEC 2013a – Alamitos Energy Center (TN 201620 -1-72) Application for Certification Volume 1 & 2, dated December 27, 2013. Submitted to CEC/Docket Unit on December 27, 2013.

AEC 2013a – Alamitos Energy Center (TN 201620 -1-72) Application for Certification Volume 1 & 2, dated December 27, 2013. Submitted to CEC/Docket Unit on December 27, 2013. Volume 2, Appendix 3A: The California ISO letters dated May 24, June 6 and August 12, 2014 addressed to the applicant regarding application of section 25.1 of the California ISO tariff in order to forgo the interconnection queue process study.

AEC 2014a -- Alamitos Energy Center (TN 201751) Data Adequacy Supplement dated February 17, 2014. Submitted to CEC/Docket Unit on February 17, 2014.

AEC 2014b - Alamitos Energy Center (TN 202381) Data Response Set 1A dated May 27, 2014. Submitted to CEC/Dockets Unit on May 27, 2014.

AEC 2015f- Alamitos Energy Center Supplemental AFC (TN 206427-1). Submitted on October 26, 2015. CEC/Docket on October 26, 2015.

AEC 2015i- Alamitos Energy Center Supplemental AFC (TN 206428-1). Submitted on October 26, 2015. CEC/ Docket on October 26, 2015.

CEC 2015n- Alamitos Energy Center Report 8 (TN 205359). Submitted on July 15, 2015. CEC/Docket Unit on July 15, 2015.

CH2 2014b - CH2M Hill (TN 201751) Data Adequacy Supplement dated February 17, 2014. Submitted to CEC/Dockets Unit on February 18, 2014.

CH2 2016q – AEC CAISO Section 25.1 Affidavit Application (TN 211006) dated April 12, 2016 Submitted to. CEC/Docket on April 12, 2016

CH2 2016t – Alamitos Energy Center Data Response Set 6-R2 (TN 211169) dated April 21, 2016 Submitted to. CEC/Docket on April 21, 2016

CH2 Supplement To Data Response 8 dated July 12, 2016 Submitted to CEC/Docket on July 12, 2016

NERC (North American Electric Reliability Council) 2006 (ongoing). Reliability Standards for the Bulk Electric Systems of North America, May 2 2006, http://www.nerc.com/docs/standards/rs/Reliability_Standards_Complete_Set.pdf

WECC (Western Electricity Coordinating Council) 2008 (ongoing) - The WECC Regional System Performance Criteria.

DEFINITION OF TERMS

ACSR	Aluminum cable steel reinforced.
AAC	All Aluminum conductor.
ACSS	Aluminum conductor steel-supported.
Ampacity	Current-carrying capacity, expressed in amperes, of a conductor at specified ambient conditions, at which damage to the conductor is nonexistent or deemed acceptable based on economic, safety, and reliability considerations.
Ampere	The unit of current flowing in a conductor.
Kiloampere (kA)	1,000 Amperes
Bundled	Two wires, 18 inches apart.
Bus	Conductors that serve as a common connection for two or more circuits.
Conductor	The part of the transmission line (the wire) that carries the current.
Congestion Management	Congestion management is a scheduling protocol, which provides that dispatched generation and transmission loading (imports) would not violate criteria.
Emergency Overload	See Single Contingency. This is also called an L-1.
Hertz	The unit for System Frequency.
Kcmil or KCM	Thousand circular mil. A unit of the conductor's cross sectional area, when divided by 1,273, the area in square inches is obtained.
Kilovolt (kV)	A unit of potential difference, or voltage, between two conductors of a circuit, or between a conductor and the ground. 1,000 Volts.
Loop	An electrical cul de sac. A transmission configuration that interrupts an existing circuit, diverts it to another connection and returns it back to the interrupted circuit, thus forming a loop or cul de sac.
MVAR or	Megavolt Ampere-Reactive. One million Volt-Ampere-Reactive.

Megavars Reactive power is generally associated with the reactive nature of motor loads that must be fed by generation units in the system.

Megavolt Ampere (MVA) A unit of apparent power, equals the product of the line voltage in kilovolts, current in amperes, the square root of 3, and divided by 1000.

Megawatt (MW) A unit of power equivalent to 1,341 horsepower.

Normal Operation/ Normal Overload When all customers receive the power they are entitled to without interruption and at steady voltage, and no element of the transmission system is loaded beyond its continuous rating.

N-1 Condition See Single Contingency.

Outlet Transmission facilities (circuit, transformer, circuit breaker, etc.) linking generation facilities to the main grid.

Power Flow Analysis A power flow analysis is a forward looking computer simulation of essentially all generation and transmission system facilities that identifies overloaded circuits, transformers and other equipment and system voltage levels.

Reactive Power Reactive power is generally associated with the reactive nature of inductive loads like motor loads that must be fed by generation units in the system. An adequate supply of reactive power is required to maintain voltage levels in the system.

Remedial Action Scheme (RAS) A remedial action scheme is an automatic control provision, which, for instance, would trip a selected generating unit upon a circuit overload.

SSAC Steel Supported Aluminum Conductor.

SF6 Sulfur hexafluoride is an insulating medium.

Single Contingency Also known as emergency or N-1 condition, occurs when one major transmission element (circuit, transformer, circuit breaker, etc.) or one generator is out of service.

Solid Dielectric Cable Copper or aluminum conductors that are insulated by solid polyethylene type insulation and covered by a metallic shield and outer polyethylene jacket.

SVC Static VAR Compensator: A piece of equipment made of capacitors and reactors with electronic controls for producing and controlling reactive power in the power system.

Switchyard	A power plant switchyard (switchyard) is an integral part of a power plant and is used as an outlet for one or more electric generators.
Thermal rating	See ampacity.
TSE	Transmission System Engineering.
TRV	Transient recovery voltage
Tap	A transmission configuration creating an interconnection through a sort single circuit to a small or medium sized load or a generator. The new single circuit line is inserted into an existing circuit by utilizing breakers at existing terminals of the circuit, rather than installing breakers at the interconnection in a new switchyard.
Undercrossing	A transmission configuration where a transmission line crosses below the conductors of another transmission line, generally at 90 degrees.
Underbuild	A transmission or distribution configuration where a transmission or distribution circuit is attached to a transmission tower or pole below (under) the principle transmission line conductors.
VAR	Voltage Ampere Reactive, a measure for Reactive power in the power system.

WASTE MANAGEMENT

Ellie Townsend-Hough

SUMMARY OF CONCLUSIONS

The Alamitos Energy Center (AEC) would be located on 21-acres within the existing AES Alamitos Generating Station (AGS) project site. The AGS site is a highly disturbed brownfield site that requires remediation. The applicant, current owner, or previous owner Southern California Edison (SCE), would ensure that impacted or contaminated areas on the AEC site are remediated where necessary. The applicant would also implement a Soil Management Plan to provide guidance for proper identification, handling, disposal and containment of contaminated soil during demolition, construction and ground-disturbing activities. The AEC project's proposed waste management methods and mitigation measures, along with the proposed conditions of certification and demolition waste recycling and diversion requirements would ensure that wastes generated by the proposed project would not result in a significant impact to local waste management and disposal facilities.

INTRODUCTION

This Preliminary Staff Assessment (PSA) presents an analysis of issues associated with wastes generated from the proposed partial AGS demolition, and construction and operation of the AEC. It evaluates the proposed waste management plans and mitigation measures designed to reduce the risks and environmental impacts associated with handling, storing, and disposing of project-related hazardous and non-hazardous wastes. The technical scope of this analysis encompasses solid wastes existing on site and those to be generated during demolition, facility construction, and operation. Management and discharge of wastewater is addressed in the **Soil and Water Resources** section of this document. Additional information related to waste management may also be covered in the **Worker Safety & Fire Protection** and **Hazardous Materials Management** sections of this document.

The Energy Commission staff's (staff) objectives in conducting this waste management analysis are to ensure that:

- the management of project wastes would be in compliance with all applicable laws, ordinances, regulations, and standards (LORS). Compliance with LORS ensures that wastes generated during the construction and operation of the proposed project would be managed in an environmentally safe manner.
- the disposal of project wastes would not result in significant adverse impacts to existing waste disposal facilities, or result in other waste-related significant adverse effects on the environment.
- upon project completion, the site is managed in such a way that project wastes and waste constituents would not pose a significant risk to humans or the environment.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The following federal, state, and local environmental LORS have been established to ensure the safe and proper management of both solid and hazardous wastes in order to protect human health and the environment. Project compliance with the various LORS is a major component of staff's determination regarding the significance and acceptability of the AEC with respect to management of waste.

Waste Management Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
Title 42, United States Code, §§ 6901, et seq. Solid Waste Disposal Act of 1965 (as amended and revised by the Resource Conservation and Recovery Act of 1976, et al.)	The Solid Waste Disposal Act, as amended and revised by the Resource Conservation and Recovery Act (RCRA) et al., establishes requirements for the management of solid wastes (including hazardous wastes), landfills, underground storage tanks, and certain medical wastes. The statute also addresses program administration, implementation, and delegation to states, enforcement provisions, and responsibilities, as well as research, training, and grant funding provisions. RCRA Subtitle C establishes provisions for the generation, storage, treatment, and disposal of hazardous waste, including requirements addressing: • generator record keeping practices that identify quantities of hazardous wastes generated and their disposition; • waste labeling practices and use of appropriate containers; • use of a manifest when transporting wastes; • submission of periodic reports to the United States Environmental Protection Agency (U.S. EPA) or other authorized agency; and • corrective action to remediate releases of hazardous waste and contamination associated with RCRA-regulated facilities. RCRA Subtitle D establishes provisions for the design and operation of solid waste landfills. RCRA is administered at the federal level by U.S. EPA and its 10 regional offices. The Pacific Southwest regional office (Region 9) implements U.S. EPA programs in California, Nevada, Arizona, and Hawaii.
Title 42, United States Code, §§ 9601, et seq. Comprehensive Environmental Response, Compensation and Liability Act	The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), also known as Superfund, establishes authority and funding mechanisms for cleanup of uncontrolled or abandoned hazardous waste sites, as well as cleanup of accidents, spills, or emergency releases of pollutants and contaminants into the environment. Among other things, the statute addresses: • reporting requirements for releases of hazardous substances; • requirements for remedial action at closed or abandoned hazardous waste sites and brownfields; • liability of persons responsible for releases of hazardous substances or waste; and • requirements for property owners/potential buyers to conduct "all appropriate inquiries" into previous ownership and uses of the property to 1) determine if hazardous substances have been or may have been released at the site and 2) establish that the owner/buyer did not cause or contribute to the release. A Phase I Environmental Site Assessment is commonly used to satisfy CERCLA "all appropriate inquiries" requirements. •
Title 40, Code of Federal Regulations (CFR), Subchapter I – Solid Wastes	These regulations were established by U.S. EPA to implement the provisions of the Solid Waste Disposal Act and RCRA (described above). Among other things, the regulations establish the criteria for classification of solid waste disposal facilities (landfills), hazardous waste characteristic criteria and regulatory thresholds, hazardous waste generator requirements, and requirements for

	management of used oil and universal wastes. • Part 246 addresses source separation for materials recovery guidelines. • Part 257 addresses the criteria for classification of solid waste disposal facilities and practices. • Part 258 addresses the criteria for municipal solid waste landfills. • Parts 260 through 279 address management of hazardous wastes, used oil, and universal wastes (i.e., batteries, mercury-containing equipment, and lamps). U.S. EPA implements the regulations at the federal level. However, California is an authorized state so the regulations are implemented by state agencies and authorized local agencies in lieu of U.S. EPA.
Title 49, CFR, Parts 172 and 173 Hazardous Materials Regulations	U.S. Department of Transportation established standards for transport of hazardous materials and hazardous wastes. The standards include requirements for labeling, packaging, and shipping of hazardous materials and hazardous wastes, as well as training requirements for personnel completing shipping papers and manifests. Section 172.205 specifically addresses use and preparation of hazardous waste manifests in accordance with Title 40, CFR, section 262.20.
State	
California Health and Safety Code, Chapter 6.5, §§ 25100, et seq. Hazardous Waste Control Act of 1972, as amended	This California law creates the framework under which hazardous wastes must be managed in California. The law provides for the development of a state hazardous waste program that administers and implements the provisions of the federal RCRA program. It also provides for the designation of California-only hazardous wastes and development of standards (regulations) that are equal to or, in some cases, more stringent than federal requirements. The California Environmental Protection Agency (Cal/EPA), Department of Toxic Substances Control (DTSC) administers and implements the provisions of the law at the state level. Certified Unified Program Agencies (CUPAs) implement some elements of the law at the local level.
Title 22, California Code of Regulations (CCR), Division 4.5 Environmental Health Standards for the Management of Hazardous Waste	These regulations establish requirements for the management and disposal of hazardous waste in accordance with the provisions of the California Hazardous Waste Control Act and federal RCRA. As with the federal requirements, waste generators must determine if their wastes are hazardous according to specified characteristics or lists of wastes. Hazardous waste generators must obtain identification numbers, prepare manifests before transporting the waste off site, and use only permitted treatment, storage, and disposal facilities. Generator standards also include requirements for record keeping, reporting, packaging, and labeling. Additionally, while not a federal requirement, California requires that hazardous waste be transported by registered hazardous waste transporters. The standards addressed by Title 22, CFR include: • Identification and Listing of Hazardous Waste (Chapter 11, §§ 66261.1, et seq.) • Standards Applicable to Generators of Hazardous Waste (Chapter 12, §§ 66262.10, et seq.) • Standards Applicable to Transporters of Hazardous Waste (Chapter 13, §§ 66263.10, et seq.) • Standards for Universal Waste Management (Chapter 23, §§ 66273.1, et seq.) • Standards for the Management of Used Oil (Chapter 29, §§ 66279.1, et seq.) • Requirements for Units and Facilities Deemed to Have a Permit by Rule

	(Chapter 45, §§ 67450.1, et seq.) The Title 22 regulations are established and enforced at the state level by DTSC. Some generator standards are also enforced at the local level by CUPAs.
California Health and Safety Code, Chapter 6.11 §§ 25404–25404.9 Unified Hazardous Waste and Hazardous Materials Management Regulatory Program (Unified Program)	The Unified Program consolidates, coordinates, and makes consistent the administrative requirements, permits, inspections, and enforcement activities of the six environmental and emergency response programs listed below: • Aboveground Storage Tank Program • Business Plan Program • California Accidental Release Prevention (CalARP) Program • Hazardous Material Management Plan / Hazardous Material Inventory Statement Program • Hazardous Waste Generator / Tiered Permitting Program • Underground Storage Tank Program The state agencies responsible for these programs set the standards for their programs while local governments implement the standards. The local agencies implementing the Unified Program are known as Certified Unified Program Agencies (CUPAs). Los Angeles County Department of Environmental Health is the area CUPA. Note: The Waste Management analysis only considers application of the Hazardous Waste Generator/Tiered Permitting element of the Unified Program. Other elements of the Unified Program may be addressed in the **Hazardous Materials Management** and/or **Worker Health and Safety** analysis sections.
Title 27, CCR, Division 1, Subdivision 4, Chapter 1, §§ 15100, et seq. Unified Hazardous Waste and Hazardous Materials Management Regulatory Program	While these regulations primarily address certification and implementation of the program by the local CUPAs, the regulations do contain specific reporting requirements for businesses. • Article 9 – Unified Program Standardized Forms and Formats (§§ 15400–15410). • Article 10 – Business Reporting to CUPAs (§§ 15600–15620).
Public Resources Code, Division 30, §§ 40000, et seq. California Integrated Waste Management Act of 1989.	The California Integrated Waste Management Act of 1989 (as amended) establishes mandates and standards for management of solid waste. Among other things, the law includes provisions addressing solid waste source reduction and recycling, standards for design and construction of municipal landfills, and programs for county waste management plans and local implementation of solid waste requirements. The act was amended in 2011 (AB 341) to include a legislative declaration of a state policy goal that not less than 75 percent of solid waste generated be source reduced, recycled, or composted by the year 2020. The 2011 amendments expand recycling to businesses and apartment buildings; require the state to develop programs to recycle three-quarters of generated waste; and require commercial and public entities that generate more than four cubic yards of commercial solid waste per week, and multifamily residential dwellings of five units or more, to arrange for recycling services beginning July 1, 2012.
Title 14, CCR, Division 7, § 17200, et seq. California Integrated	These regulations further implement the provisions of the California Integrated Waste Management Act and set forth minimum standards for solid waste handling and disposal. The regulations include standards for solid waste management, as well as enforcement and program administration provisions. • Chapter 3 – Minimum Standards for Solid Waste Handling and Disposal.

Waste Management Board	• Chapter 3.5 – Standards for Handling and Disposal of Asbestos Containing Waste. • Chapter 7 – Special Waste Standards. • Chapter 8 – Used Oil Recycling Program. • Chapter 8.2 – Electronic Waste Recovery and Recycling. •
California Health and Safety Code, Division 20, Chapter 6.5, Article 11.9, §25244.12, et seq. Hazardous Waste Source Reduction and Management Review Act of 1989 (also known as SB 14).	This law was enacted to expand the state's hazardous waste source reduction activities. Among other things, it establishes hazardous waste source reduction review, planning, and reporting requirements for businesses that routinely generate more than 12,000 kilograms (~ 26,400 pounds) of hazardous waste in a designated reporting year. The review and planning elements are required to be done on a 4-year cycle, with a summary progress report due to DTSC every 4th year.
Title 22, CCR, § 67100.1 et seq. Hazardous Waste Source Reduction and Management Review.	These regulations further clarify and implement the provisions of the Hazardous Waste Source Reduction and Management Review Act of 1989 (noted above). The regulations establish the specific review elements and reporting requirements to be completed by generators subject to the act.
California Health and Safety Code Section 101480 101490	These regulations authorize a local officer, such as the director of the Los Angeles County Department of Environmental Health to enter into voluntary agreements for the oversight of remedial action at sites contaminated by wastes.
Title 22, CCR, Chapter 32, §67383.1 – 67383.5	This chapter establishes minimum standards for the management of all underground and aboveground tank systems that held hazardous waste or hazardous materials, and are to be disposed, reclaimed or closed in place.
Title 8, CCR §1529 and §5208	These regulations require the proper removal of asbestos containing materials in all construction work and are enforced by California Occupational Safety and Health Administration (Cal-OSHA).
Title 14, Chapter 9 Division 7 –(AB 939)	AB 939 established the organization, structure, and mission of California Integrated Waste Management Board (CIWMB) in 1989. AB 939 not only mandated local jurisdictions to meet numerical diversion goals of 25% by 1995 and 50% by 2000, but also established an integrated framework for program implementation, solid waste planning, and solid waste facility and landfill compliance. Other elements included encouraging resource conservation and considering the effects of waste management operations. The diversion goals and program requirements are implemented through a disposal based reporting system by local jurisdictions under CIWMB regulatory oversight. Facility compliance requirements are implemented under a different approach primarily through local government enforcement agencies. Cal Recycle, formerly known as the CIWMB, is the state's leading authority on recycling, waste reduction, and product reuse officially known as the Department of Resources Recycling and Recovery
Cal OSHA's Lead in Construction Standard is contained in Title 8, Section 1532.1 of the	The regulations address all of the following areas: permissible exposure limits (PELs); exposure assessment; compliance methods; respiratory protection; protective clothing and equipment; housekeeping; medical surveillance; medical removal protection (MRP); employee information, training, and certification; signage; record keeping; monitoring; and agency notification.

California Code of Regulations	
Title 17, CCR, Division 1, Chapter 8, Section 35001	Requirements for lead hazard evaluation and abatement activities, accreditation of training providers, and certification of individuals engaged in lead-based paint activities.
Local	
South Coast Air Quality Management District (SCAQMD) Rule 1403	This rule establishes survey requirements, notification and work practice requirements to prevent asbestos emissions from emanating during renovation and demolition activities. SCAQMD Rule 1403 incorporates the requirements of the federal asbestos requirements found in National Emissions Standard for Hazardous Air Pollutants (NESHAP) in code of Federal Regulations (CFR) Title 40, Part 61, Subpart M.
City of Long Beach Integrated Waste Management Plan	The plan provides guidance for local management of solid waste and household hazardous waste (incorporates the county's Source Reduction and Recycling Elements, which detail means of reducing commercial and industrial sources of solid waste).
City of Long Beach Department of Health and Human Services, Environmental Health Bureau Hazardous Materials Programs	Long Beach Environmental Health Bureau and the City of Long Beach Fire Department are the Certified Unified Program Agency (CUPA) for Los Angeles County that regulates and conducts inspections of businesses that handle hazardous materials, hazardous wastes, and/or have underground storage tanks. Hazardous Material Division programs include assistance with oversight on property re-development (i.e., brownfields) and voluntary or private oversight cleanup assistance.
City of Long Beach Municipal Code Chapter 18.47	The incorporation by reference in full in this chapter the 2013 Edition of the California Green Building Standards Code. The California Green Building Standards code is Part II of the California Code of Regulations, Title 24, also referred to as the California Building Standards Code.
City of Long Beach Municipal Code Chapter 18.97, Ordinance Number ORD-07-002	City's rules for construction and demolition recycling program and waste management plan. Sixty percent of all material generated must be diverted and a Waste Management Plan submitted.
South Coast Air Quality Management District Rule 1166 – Volatile Organic Compound (VOC) Emissions from Decontamination of Soil	This rule sets requirements to control the emission of VOCs from excavating, grading, handling, and treating VOC-contaminated soil as a result of leakage from storage or transfer operations, accidental spillage, or other deposition.

SETTING

Proposed Project

The AEC project site would be located within the 71-acre AGS footprint at 690 North Studebaker Road, in the city of Long Beach, Los Angeles County, California. The parcel includes the AGS electric generating station and a former aboveground storage tank farm. AGS is an existing operating electrical generating station formerly owned by the Southern California Edison Company (SCE). The project laydown area would include eight acres located throughout the AGS site and 10 acres located south of AGS Units 5 and 6 (AEC 2015f Page 5.14-2).

AGS is a highly disturbed industrial brownfield site. The site is located in an area surrounded by mixed commercial/industrial and residential use. The site is bordered to the north by the SCE switchyard, beyond which are State Highway 22 and Long Beach city residences; to the east by the San Gabriel River and the Los Angeles Department of Water and Power Haynes Generating Station; and to the south by a combination of undeveloped property and the Plains West Coast Terminals petroleum storage facility. Studebaker Road, a major north-south thoroughfare in the city of Long Beach bounds the site towards the west (AEC 2015f, page 5.6-3).

The AGS site consists of six generating units, underground fuel–oil pipelines, a portion of an aboveground storage tank farm, and wastewater retention basins. The generating units were commissioned in pairs starting with Units 1 and 2 constructed in 1956 and 1957. Units 3 and 4 were constructed in 1961 and 1962, and Units 5 and 6 were commissioned in 1964 and 1965. Unit 7 was a peaker unit located on the AGS property; the unit was decommissioned and partially demolished. The unit utilized fuel oil and natural gas for production of electricity until the late 1980s. AGS is currently operating the units using natural gas. AES has operated AGS since 1998 (AEC 2015f Page 5.14-2). Refer to **Waste Management Figure 1** for the layout of the AGS plant.

The AEC project would consist of two generation blocks, one combined-cycle power block and one simple-cycle power block. Refer to AEC **Project Description** for a complete overview of the project. Units 1 through 6 would continue to operate through the construction of AEC. The balance of Unit 7 remains on the AGS site and would be removed. The Unit 7 components that remain on site and would be demolished include:

- certain buildings;
- foundations;
- underground water, fuel, and other lines;
- fuel tank;
- two existing retention basins; and
- a small maintenance shop (AEC page 1-3).

The partial AGS demolition and construction of the AEC project would produce a variety of mixed wastes, such as soil, wood, metal, and concrete, etc. The demolition of the remainder of Unit 7, and the construction of the AEC would take approximately 56 months (AEC 2015f page 5.14-2). Hazardous waste generated would include asbestos debris, heavy metal dust, used oils, universal wastes, solvents, and empty hazardous waste material containers. Universal wastes are hazardous wastes that contain mercury, lead, cadmium, copper, and other substances hazardous to human and environmental health. Examples of universal wastes are batteries, fluorescent tubes, and some electronic devices.

Operation and maintenance of the plant and associated facilities would generate a variety of wastes, including a small quantity of hazardous wastes. To control air emissions, the project's turbine units would use selective catalytic reduction and oxidation catalyst equipment and chemicals, which generate both solid and hazardous waste. Nonhazardous and hazardous waste would be recycled where practical and non-recyclable waste would be deposited in a Class III landfill or Class I landfill.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

This waste management analysis addresses: a) existing project site conditions and the potential for contamination associated with prior activities on or near the project site, and b) the impacts from the generation and management of wastes during project construction and operation.

A. For any site in California proposed for the construction of a power plant, the applicant must provide documentation about the nature of any potential or existing releases of hazardous substances or contamination at the site. If potential or existing releases or contamination at the site are identified, the significance of the release or contamination would be determined by site-specific factors, including, but not limited to: the amount and concentration of contaminants or contamination; the proposed use of the area where the contaminants/contamination is found; and any potential pathways where workers, the public, sensitive species, or the environment could be exposed to the contaminants. Any unmitigated contamination or releases of hazardous substances that pose a risk to human health or environmental receptors would be considered significant by staff.

   As a first step in documenting existing site conditions, the Energy Commission's power plant site certification regulations require that a Phase I Environmental Site Assessment (ESA) be prepared[1] and submitted as part of an application for certification. The Phase I ESA is conducted to identify any conditions indicative of releases and threatened releases of hazardous substances at the site and to identify any areas known to be contaminated (or a source of contamination) near the site.

   In general, the Phase I ESA uses a qualified environmental professional to conduct inquiries into past uses and ownership of the property, research hazardous substance releases and hazardous waste disposal at the site and within a certain distance of the site, and visually inspect the property, making observations about the potential for contamination and possible areas of concern. After conducting all necessary file reviews, interviews, and site observations, the environmental professional then provides findings about the environmental conditions at the site. In addition, since the Phase I ESA does not include sampling or testing, the environmental professional may also give an opinion about the potential need for any additional investigation. Additional investigation may be needed, for example, if there were significant gaps in the information available about the site, an ongoing release is suspected, or to confirm an existing environmental condition.

   If additional investigation is needed to identify the extent of possible contamination, a Phase II ESA may be required. The Phase II ESA usually includes sampling and testing of potentially contaminated media to verify the level of contamination and the potential for remediation at the site.

[1] Title 20, California Code of Regulations, section 1704(c) and Appendix B, section (g)(12)(A). Note that the Phase I ESA must be prepared according to American Society for Testing and Materials protocol or an equivalent method agreed upon by the applicant and the Energy Commission staff.

In conducting its assessment of a proposed project, staff will review the project's Phase I ESA and work with the appropriate oversight agencies as necessary to determine if additional site characterization work is needed and if any mitigation is necessary at the site to ensure protection of human health and the environment from any hazardous substance releases or contamination identified.

B. Regarding the management of project-related wastes generated during construction and operation of the proposed project, staff reviewed the applicant's proposed solid and hazardous waste management methods and determined if the methods proposed are consistent with the LORS identified for waste disposal and recycling. The federal, state, and local LORS represent a comprehensive regulatory system designed to protect human health and the environment from impacts associated with management of both non-hazardous and hazardous wastes. Absent any unusual circumstances, staff considers project compliance with LORS to be sufficient to ensure that no significant impacts would occur as a result of project waste management.

   Staff then reviewed the capacity available at off-site treatment and disposal sites and determines whether or not the proposed power plant's waste would have a significant impact on the volume of waste a facility is permitted to accept. Staff used a waste volume threshold equal to 10 percent of a disposal facility's remaining permitted capacity to determine if the impact from disposal of project wastes at a particular facility would be significant.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Existing Site Contamination

An environmental site assessment is a report prepared for a real estate holding that identifies potential or existing environmental contaminants or liabilities. Staff uses this report to identify whether there are any site conditions which may pose a hazard to the environment, construction workers or to the general public, and evaluate whether any mitigation should be required to ensure no significant impacts to any of these receptors. Three Phase I ESAs were completed, in 2012, 2013 and 2015, in support of the power development plans at the facility.

The July 2015 Phase I ESA for AEC was prepared for the 71-acre AGS project site (AEC 2015c, Appendix 5.14A). The ESA was completed in accordance with the American Society for Testing and Materials Standard Practice E 1527-13 for ESAs. Recognized Environmental Concern (REC) is the presence or likely presence of any hazardous substances or petroleum products on a property under the conditions that indicate an existing release, past release, or a material threat of a release of any hazardous substance or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. The RECs and Historical RECs for AGS are listed in **Waste Management Table 2**.

Waste Management Table 2
Recognized Environmental Conditions

AREAS OF CONCERN	TYPE OF CONTAMINATION	REGULATING AGENCY
North and Central Retention Ponds	Nickel, Vanadium, Arsenic, PCBs	DTSC – by stipulated order (Envirostor 80001647)
North fuel oil storage tank	Fuel oil	Long Beach Fire Department or Los Angeles County Public Works Department
Well AW-33	Elevated levels of Nickel	Long Beach Fire Department
Large AST Peaker Unit 7	Residual jet fuel	Long Beach Fire Department, Los Angeles County Public Works Department
Aboveground & underground pipelines	Fuel oil, PCB	Long Beach Fire Department
Groundwater	Metals, VOCs, 1,4-dioxane, PCE, TCE, and TCA	DTSC – thru corrective action
Several spills	Petroleum	DTSC – thru corrective action
Concrete degreasing pits		DTSC – thru corrective action
Near retention basin	TCE, PCE	DTSC – thru corrective action
Machine shop area	Various chemicals	DTSC – thru corrective action
Transformers	PCB	DTSC
Number of USTs	Various	Long Beach Fire Department, Los Angeles County Public Works Department
Contaminated Groundwater (adjacent to the property)	Various	DTSC
Site buildings were constructed prior to 1980.	Asbestos	South Coast Air Quality Management District
Site buildings were constructed prior to 1980.	Lead	Cal OSHA
Trash Dump around South Retention Basin	Asbestos	DTSC, SCAQMD
Area around Units 3 & 4	Agricultural chemicals	DTSC

Source: AEC 2015f pages 5.14-2 and 5.14-3

The demolition and construction activities on the project would come in contact with many of the RECs listed in **Waste Management Table 2**. Construction of AEC would require eight acres of lay down throughout the AGS parcel and 10 acres of laydown area adjacent to AGS Units 5 and 6. A portion of the AEC facility would occupy a portion of land where the decommissioned AGS Unit 7 was located (AECs 2015s Data Response 85). The AEC simple cycle Block 2 would be located on the northern portion of the AEC site next to the San Gabriel River (AEC 2015f page 2-3). Stormwater runoff from the power block areas would be directed to new oil/water separators and sumps and directed to the existing south retention basin and discharged to the Los Cerritos Channel via existing stormwater outfalls (AEC 2015f pages 2-5). Refer to **Waste Management Figure 2**.

Stormwater would be collected into a single existing South retention basin. There are three wastewater retention basins and a boiler chemical cleaning basin located along the eastern edge of AEC immediately adjacent to the San Gabriel River. Wastewater generated at the various station facilities is conveyed to these basins through a series of pipelines. The North and Central retention basins were installed in the 1960s. The South Basin was constructed in the mid-1960s. The Boiler Chemical Cleaning Basin (BCCB) was constructed in 1978. SCE implemented a Water Quality Monitoring Program in response to a Final Judgement pursuant to a Stipulation, handed down by the Superior Court of California, Los Angeles County, Number BC 121219 in February 1995. The stipulation alleged that SCE had stored hazardous wastes in non-permitted wastewater retention basins at their electrical generating stations in southern California. SCE agreed to close these basins according to Chapter 15 of Title 22, California Code of Regulations. The Alamitos Generating Station is one of the facilities cited in the agreement. The North, Central, South and Boiler Chemical Cleaning Basins are all covered by the stipulation.

The North Basin would require minor cleanup, the Central Basin would require cleanup, the Boiler Chemical Cleaning Basins do not appear to have any issues, and the South Basin would require additional cleanup. SCE believes that the southern third of the South Basin may be the site of a 1940/1950 dump (Johnsen 2016c). SCE is currently working with the Department of Toxic Substances Control on the closure of the AGS retention basins (Envirostor 80001647) (Randy 2014). The retention basins currently collect and store non-hazardous wastewater from the facility. SCE implemented a Water Quality Monitoring Program in response to a Final Judgment pursuant to a Stipulation. Most of the soil removal/cleanup procedures for the retention basin were approved by the Department of Toxic Substance Control.

The Long Beach Fire Department Bureau of Fire Prevention and the Long Beach Department of Health and Human Services form a Certified Unified Program Agency (CUPA). Among the responsibilities of the Long Beach CUPA is the regulatory oversight of the underground and aboveground storage tank programs. Information related to the removal, upgrade, repair, and monitoring of underground and aboveground storage tanks would be submitted to the CUPA for review. Prior to transportation of tanks off-site, an Industrial Hygienist or Marine Chemist would certify the tanks are inert and safe for travel. Additionally, when the tanks or piping are removed, ground soil samples shall be collected, the chain of custody documented witnessed and tested by the Industrial Hygienist or Marine Chemist with a report provided to the Long Beach Fire and Health Department.

Condition of Certification **WASTE-1**, would ensure the applicant provides relevant information to the CUPA, and where necessary, require completion of Phase II investigations to evaluate the extent of contamination and identify the necessary remedial actions. If a site is considered contaminated, a Phase II environmental site assessment may be conducted (ASTM test E1903), with a more detailed investigation involving chemical analysis for hazardous substances and/or petroleum hydrocarbons performed. The applicant would also be required to coordinate with the appropriate regulatory authority that would otherwise regulate the activity if not for the in-lieu authority of the Energy Commission. The condition would then require monitoring and reporting on the progress of remediation of the various areas of contamination located on the AEC site.

Condition of Certification **WASTE-1** would ensure the applicant adequately characterizes the site and completes remediation in accordance applicable LORS. Condition of Certification **WASTE-1** also requires that any additional work must be conducted under the oversight of the Energy Commission compliance project manager (CPM), in consultation with the DTSC, and the Long Beach Fire Department.

Based on historic use of the AEC, property there is potential for subsurface impacts. The applicant would use the Soil Management Plan (SMP) to provide guidance for proper identification, handling, onsite management, and disposal of impacted soil that may be encountered during construction and ground-disturbing activities. The objective of the SMP is to describe the procedures that would be followed during the soil disturbances so workers can be protected from adverse reactions to any adverse soil conditions that may be encountered. Staff proposes Condition of Certification **WASTE-2** to ensure the applicant has procedures in place to properly handle and dispose of contaminated soil. The scope of the SMP would be limited to activities involving the excavation, characterization, management, reuse and/or disposal of soils at this site.

The SMP would include engineering controls, Health and Safety Plans, earthwork schedules and list of responsible staff. Staff is recommending Condition of Certification **WASTE-2** to provide protective measures as needed. These measures include soil removal, dust suppression techniques, workers wearing personal protective equipment for short durations, and a combination of all three measures. Specific methods for refined or enhanced airborne dust mitigation measures are also currently proposed in the **Air Quality** section of this document so as to better control emissions of fugitive dust containing hazardous wastes (such as increased watering frequency, use of a chemical “fiberlocking surfactant” or “wetting agent”, continuously covering stockpiled soils). The implementation of refined and enhanced dust suppression measures and using personal protective equipment can be implemented immediately upon the start of demolition.

Asbestos would be generated from the demolition of tanks, vessels and piping. Flaking or peeling lead-based paint could also be present in facilities to be demolished. The petitioner would comply with Title 17, CCR, Division 1, Chapter 8, Section 35001, to maintain a safe environment for workers. Additional analysis and requirements for LORS compliance related to lead abatement may be found in the **Worker Safety** section of this PSA.

The site buildings were constructed prior to 1980; therefore, asbestos-containing building materials and lead based paint may be present on-site. Condition of Certification **WASTE-3** requires that the project owner submit the SCAQMD’s Asbestos Notification Form for review prior to removal and disposal of asbestos. One hundred and fifty tons of asbestos is expected to be generated from the demolition of AGS Unit 7 (page 5.14-17) All friable asbestos (Class I) collected during demolition activities would be disposed of as hazardous waste. Flaking or peeling lead-based paint could also be present in facilities to be demolished. The petitioner would comply with Title 17, CCR, Division 1, Chapter 8, Section 35001, to maintain a safe environment for workers. Additional analysis and requirements for LORS compliance related to lead abatement may be found in the **Worker Safety** section of this FSA.

Furthermore, staff proposes Conditions of Certification **WASTE-4** and **WASTE-5** be adopted to address any soil contamination contingency that may be encountered during project construction. **WASTE-4** would require that an experienced and qualified Professional Engineer or Professional Geologist be available for consultation in the event contaminated soil not previously identified is encountered. If contaminated soil is identified, **WASTE-5** would require that the Professional Engineer or Professional Geologist inspect the site, determine what is required to characterize the nature and extent of contamination, and provide a report to the CPM with findings and recommended actions. **WASTE-5** also addresses identification and investigation of any previously unidentified soil or groundwater contamination that may be encountered.

Demolition and Construction Impacts and Mitigation

Site preparation, demolition, and construction of the proposed power plant and associated facilities would last approximately 56 months and generate both nonhazardous and hazardous wastes in solid and liquid forms (AEC 2015f, § 5.14.1.2). Before demolition and construction can begin, the project owner would be required to develop and implement a Demolition and Construction Waste Management Plan, per proposed Condition of Certification **WASTE-6**.

Nonhazardous Wastes

Nonhazardous waste would be generated from the demolition of AGS Unit 7 and the construction of AEC. Demolition and construction waste would consist of wood, glass, plastic, paper, scrap metals, concrete, and asphalt. All non-recyclable wastes would be collected by a licensed hauler and disposed in a solid waste disposal facility, in accordance with Title 14, California Code of Regulations, section 17200 et seq. During construction, paper, wood, glass, plastics, and metal would be generated and recycled where practical. Quantities of nonhazardous waste are listed in **Waste Management Table 3**.

The California Department of Resources Recycling and Recovery (now CalRecycle, formerly California Integrated Waste Management Board (CIWMB)) is responsible for recycling, waste reduction, and product reuse programs in California. CalRecycle also promotes innovation in technology to encourage economic and environmental sustainability. The 2008 California Green Building Standards Code Requires all construction projects to develop a recycling plan to divert and/or recycle at least 50 percent of waste generated during construction, (CalGreen Building Standards Code Section 708 construction Waste Reduction, Disposal and Recycling).

The city of Long Beach has a Construction & Demolition Debris Recycling (C&D) Program, Long Beach Ordinance, ORD-07-0025, Chapter 18.97. The program is designed to encourage permit applicants to recycle all C&D materials by offering a refundable performance deposit. A waste management plan, a Performance Security Deposit, and an administrative review fee would accompany the building permit application. Applicants must demonstrate 60 percent demolition and construction project waste diversion. A final report detailing the amount of reuse, recycling, and disposal actually generated from the project would be required for the applicant to receive a Performance Security Deposit refund[2].

[2] http://www.lbds.info/planning/advance_planning/green_building/#cd

Waste Management Table 3
Demolition & Construction Nonhazardous Waste

Waste Generated	Demolition	CCGT[1] Construction	SCGT[2] construction	Disposal Method
Scrap wood, glass, plastic, paper, calcium silicate insulation, and mineral wool insulation	16,000 pounds per week	10,000 pounds per month	50 tons	Recycle and/or in a Class II or III landfill
Scrap Metals	2,500 tons	1,500 pounds per month	12 tons	Recycle and/or in a Class II or III landfill
Concrete	188 tons	880 tons during construction	34 tons	Recycle and/or in a Class II or III landfill
Asphalt	8 tons			Recycle and/or in a Class II or III landfill
Spent welding and cutting materials	100 pounds per month	150 pounds per month	2 tons	Recycle with vendors or Dispose at a Class I landfill if hazardous
Waste oil filters	200 pounds per month	50 pounds per month	60 pounds per month	Recycle at a permitted TSDF[3]
Empty liquid material containers		100 containers	4 cubic yards	Containers <5 gallons would be disposed as normal refuse. Containers >5 gallons would be returned to vendors for recycling or reconditioning.

Sources: AEC AFC Section 5.14.1.2, Tables 5.14-1, 5.14-2A and 5.14-2B.
[1]CCGT – combined cycle gas turbine.
[2]SCGT – simple cycle gas turbine
[3]TSDF – treatment, storage, and disposal facility

Adoption of Condition of Certification **WASTE-6** would facilitate proper management of project demolition and construction wastes since the city of Long Beach maintains a (C&D) program. Staff proposes Condition of Certification **WASTE-6** requiring the project owner to develop and implement a Construction Waste Management Plan and submit copies of C&D paperwork to the CPM. These conditions would require the applicant to identify type, volume, and waste disposal and recycling methods to be used during construction of the facility. Staff believes that compliance with proposed Conditions of Certification **WASTE-6** would assist the applicant's compliance with the CalGreen Building Code requirements.

Nonhazardous liquid wastes would also be generated during construction, including sanitary wastes, dust suppression and stormwater drainage, and equipment wash and test water. Sanitary wastes would be collected in portable, self-contained chemical toilets and pumped periodically for disposal at an appropriate facility. Potentially contaminated equipment wash and/or test water would be contained at designated areas, tested to determine if hazardous, and either discharged to the storm water retention basin (if nonhazardous) or transported to an appropriate treatment/disposal facility. Please see the **Soil and Water Resources** section of this document for more information on the management of project wastewater.

Hazardous Wastes

The AEC would produce hazardous waste during demolition and construction. It is anticipated that 150 tons of asbestos would be generated during demolition. The generation of hazardous wastes anticipated during construction includes empty hazardous material containers, solvents, waste paint, oil absorbents, used oil, oily rags, batteries, and cleaning wastes. The amount of waste generated would be minor if handled in the manner identified in the **Waste Management Table 4** (AEC 2015f, § 5.14.1.2).

Wastes would be accumulated on site for less than 90 days and then properly manifested, transported, and disposed at a permitted hazardous waste management facility by licensed hazardous waste collection and disposal companies. Staff reviewed the disposal methods described in AFC section 5.14.1.2.2 and concluded that all wastes would be disposed in accordance with all applicable LORS. Should any construction waste management-related enforcement action be taken or initiated by a regulatory agency, the project owner would be required by proposed Condition of Certification **WASTE-7** to notify the CPM whenever the owner becomes aware of any such action.

In the event that construction excavation, grading, or trenching activities for the proposed project encounter potentially contaminated soils and/or specific handling, disposal, and other precautions that may be necessary pursuant to hazardous waste management LORS, staff finds that proposed Conditions of Certification **WASTE-4** and **WASTE-5** would be adequate to address any soil contamination contingency that may be encountered during construction of the project and would ensure compliance with LORS. Absent any unusual circumstances, staff considers project compliance with LORS to be sufficient to ensure that no significant impacts would occur as a result of project waste management activities.

WASTE MANAGEMENT TABLE 4
Demolition & Construction Hazardous Waste

Waste Generated	Demolition	CCGT Construction	SCGT construction	Disposal Method
Used and waste lube oil	45 drums	100 drums	10,000 gallons	Recycle at a permitted TSDF
Oily rags, oil sorbent excluding lube oil flushes	100 pounds per month	50 pounds per month	800 pounds per month	Recycle or dispose at a permitted TSDF
Residual fuel oil from decommissioned storage tanks and piping	150 gallons			
Spent lead batteries	5 batteries per year	5 batteries per year	4 batteries per year	Store no more than 10 batteries (up to one year) then recycle offsite
Spent alkaline batteries	10 batteries per month	100 batteries per month	60 batteries per month	Recycle or dispose offsite at an Universal Waste Destination Facility
Asbestos waste	Minimum 25 tons			Recycle with vendors or dispose at a Class I landfill if hazardous
Waste oil	40 gallons per month	50 gallons per month	60 gallons per month	Dispose at a permitted TSDF
Solvents, paints, adhesives		125 pounds per month	16 gallons per month	Recycle or dispose at a permitted TSDF
Universal waste solids **Fluorescent and mercury vapor lamps (Metals and PCBs)**	100 pounds per year	30 pounds per year	70 pounds per year	Recycle or dispose offsite at an Universal Waste Destination Facility

Source: AEC AFC Section 5.14.1.2, Tables 5.14-1, 5.14-2A and 2B.

Operation Impacts and Mitigation

The proposed AEC would generate non-hazardous and hazardous wastes in both solid and liquid forms under normal operating conditions. Table 5.14-3A and 5.14-3B of the supplemental AFC provides a summary of the operation waste streams, expected waste volumes and generation frequency, and management methods proposed. Before operations can begin, the project owner would be required to develop and implement an Operation Waste Management Plan pursuant to proposed Condition of Certification **WASTE-8**.

Non-Hazardous Solid Wastes

The generation of 35 tons per year of non-hazardous solid wastes is expected during project operation. Wastes would include routine maintenance wastes (such as used air filters, spent deionization resins, sand and filter media), as well as domestic and office wastes (such as office paper, newsprint, aluminum cans, plastic, and glass). All non-hazardous wastes would be recycled to the extent possible, and non-recyclable wastes would be regularly transported off site to a local solid waste disposal facility (AEC 2015f, § 5.14.1.2.).

Non-Hazardous Liquid Wastes

Non-hazardous liquid wastes would be generated during facility operation and are discussed in the **Soil and Water Resources** section of this document.

Hazardous Wastes

The generation of hazardous wastes expected during routine project operation includes used hydraulic fluids, oils, greases, oily filters and rags, spent selective catalytic reduction catalysts, cleaning solutions and solvents, and batteries. In addition, spills and unauthorized releases of hazardous materials or hazardous wastes may generate contaminated soils or materials that may require corrective action and management as hazardous waste. Proper hazardous material handling and good housekeeping practices would help keep spill wastes to a minimum. However, to ensure proper cleanup and management of any contaminated soils or waste materials generated from hazardous materials spills, staff proposes Condition of Certification **WASTE-9** requiring the project owner/operator to report, clean up, and remediate as necessary, any hazardous materials spills or releases in accordance with all applicable federal, state, and local requirements. More information on hazardous material management, spill reporting, containment, and spill control and countermeasures plan provisions for the project are provided in the **Hazardous Materials Management** section of the PSA.

The amount of hazardous wastes generated during the operation of AEC would be minor, with source reduction and recycling of wastes implemented whenever possible. Lubricating oil filters, lubricating oil, and laboratory analysis recycle would be recycled with a certified recycler. Selective catalytic reduction catalyst units and carbon monoxide catalyst units would be recycled with the manufacturer (AEC 2015f, Table 5.14-3A and B). The hazardous wastes would be temporarily stored on site, transported off site by licensed hazardous waste haulers, and recycled or disposed at authorized disposal facilities in accordance with established standards applicable to generators of hazardous waste (Title 22, CCR, §§ 66262.10 et seq.). Should any operations waste management-related enforcement action be taken or initiated by a regulatory agency, the project owner would be required by proposed Condition of Certification **WASTE-6** to notify the CPM whenever the owner becomes aware of any such action.

Impact on Existing Waste Disposal Facilities

Non-Hazardous Wastes

The AEC facility would generate nonhazardous solid waste that would add to the total waste generated in Los Angeles County, California. The proposed project would generate approximately 3,000 tons (4,290 cubic yards) of solid waste during demolition, and construction. Approximately 35 tons (50 cubic yards) per year of nonhazardous waste would be produced during operation (AEC 2015f page 5.14-11). Nonhazardous waste that is not recycled would be disposed in a California Class III landfill.

CalRecycle is the state agency responsible for implementing the California Integrated Waste Management Act and is the state's leading authority on recycling, waste reduction, and product reuse. The county is required to submit an Integrated Waste Management Plan (IWMP) in accordance with state waste diversion mandates for jurisdictions (Chapter 764, Statutes of 1999). The Source Reduction and Recycling Element (SRRE), a Household Hazardous Waste Element (HHWE) and a Non-Disposal Facility Element (NDFE) are all elements that comprise the IWMP. For enforcement purposes, jurisdictions are evaluated on the effectiveness of their SRRE.

Once a California jurisdiction adopts an SRRE, it must implement the SRRE to the best of its ability. The jurisdiction can update the SRRE through CalRecycle's electronic annual reporting system at any time as diversion programs need to be modified (e.g., a new program to address commercial waste and the expansion of educational programs.)

To help CalRecycle determine whether a jurisdiction is taking the appropriate steps to implement its SRRE, the jurisdiction submits an annual report to CalRecycle. The annual report includes the jurisdiction's program information and per capita disposal information (Note: The per capita disposal data is derived from the statewide disposal reporting system). CalRecycle requires the county to report to the disposal reporting system all waste disposed in the county pursuant to Title 14, CCR, Sections 18800-18814.11. The disposal data is compiled for each jurisdiction to measure, whether the jurisdiction has met its 50 percent equivalent diversion requirement.

CalRecycle reviews each jurisdiction's annual report information and conducts site visits to verify program implementation. Depending on the particular review cycle of the jurisdiction, CalRecycle staff review the jurisdiction's progress toward implementation of its SRRE, as well as its overall achievement of the 50 percent diversion requirement.

Los Angeles County is required to submit an annual report that is reviewed by CalRecycle at a minimum every four years to determine if it is meeting the 50 percent diversion requirement and implementing its programs. Condition of Certification **WASTE-6** would require the project owner to submit a construction waste management plan for approval by the CPM and for review by the city of Long Beach that demonstrates that they met the construction waste diversion requirements of 60 percent pursuant to the CalGreen Building Codes. Pursuant to recommended Condition of Certification **WASTE-8,** the applicant would also be required to submit to the CPM for approval an Operation Waste Management Plan (OWMP), discussing how the project would divert to the maximum extent feasible the recyclable materials that would be generated during construction and operation of the facility. The CPM and county would determine if the plan is diverting recyclables to the maximum extent feasible. If the OWMP is approved, as a condition prior to issuance of the project's building permit, the applicant would be required to divert all materials from the solid waste stream that could reasonably be diverted for alternate uses.

Waste Management Table 5 presents details of two non-hazardous (Class III) waste disposal facilities that could potentially take the non-hazardous construction and operation wastes that would be generated but could not be diverted by the AEC. Total solid waste disposal in Los Angeles County in 2015 was 4,885,628 tons[3]. The remaining capacity for the two Los Angeles County landfills listed in the AFC combined is approximately 45 million cubic yards. Fifty thousand tons or 104,000 cubic feet of metal would be recycled. The total amount of non-hazardous waste generated from project construction and operation after the material has been diverted to the maximum extent feasible would contribute less than one percent of the available landfill capacity. Staff concludes that disposal of the solid wastes generated by AEC could occur without significantly impacting the capacity or remaining life of any of these facilities.

Hazardous Wastes

Waste Management Table 3 displays information on Class III landfills in the vicinity of the project and Class I landfills available in California. The Kettleman Hills facility also accepts Class II and Class III wastes. Kettleman Hills and Buttonwillow landfills have a combined approximately 15 million cubic yards of remaining hazardous waste disposal capacity, with up to 31years of combined remaining operating lifetime (AEC 2015f Section 5.14.2.3)

Waste Management Table 5
Recycling/Disposal Facilities

Landfill	Location	Permitted Capacity	Remaining Capacity	Estimated Closure Date
	City	Cubic yards	Cubic yards	
Class III - Nonhazardous				
Savage Canyon Landfill	Whittier, CA	15 million	9.5 million	2048
Puente Hills Landfill	Industry, CA	74 million	35 million	2043
Class I -Hazardous Waste				
Chemical Waste Management- Kettleman (Class I, II, III)	Kettleman, CA	10.7 million	6 million	2044
Clean Harbors Buttonwillow (Class I)	Kern, CA	13.1 million	9.2 million	2040

Source: AEC 2015f Section 5.14.2.3

Hazardous wastes generated during construction and operation would be recycled to the extent possible and practical. Those wastes that cannot be recycled would be transported off site to a permitted treatment, storage, or disposal facility. Approximately 200 tons of

[3] http://www.calrecycle.ca.gov/SWFacilities/Landfills/Tonnages/.

hazardous waste would be generated from the AEC facility (AEC 2015f page 5.14-16). The total amount of hazardous wastes generated by the AEC project would consume less than one percent of the 15 million cubic yards of remaining permitted capacity. Therefore, impacts from disposal of AEC generated hazardous wastes would have a less than significant impact on the remaining capacity at Class I landfills.

CUMULATIVE IMPACTS AND MITIGATION

In general, cumulative impacts consist of impacts that are created as a result of the proposed project in combination with impacts from other closely related past, present, or reasonably foreseeable future projects. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over time (Cal. Code Regs., tit. 14, §15355.).

The **Land Use Section Cumulative Impacts Table** lists 55 projects that include transportation, energy, commercial and residential projects. The wastes generated by these projects and the proposed AEC would incrementally increase the volumes of waste requiring offsite management and disposal at local or regional landfills.

The projects vary in size and there is no data detailing the amount of waste that would be generated from the various projects, however, all residential, commercial and industrial projects would have to comply with Cal Recycle, Mandatory Commercial Recycling, Title 14, Division 7, Chapter 9.1.[4] and Title 24 (CALGreen). The implementation of these regulations would reduce solid waste disposal in the City of Long Beach and Los Angeles County. All of the projects listed would be required to recycle 60 percent of the waste generated from their project, thus minimizing the amount of waste generated from construction and demolition of new and current projects.

Staff has concluded that the AEC project’s proposed waste management methods and mitigation measures (implementation of source reduction, waste minimization and recycling), along with staff’s proposed conditions of certification , would ensure that wastes generated by the proposed project would not result in a significant cumulative impact to local waste management and disposal facilities. The implementation of these regulations would reduce solid waste disposal in Los Angeles County. In 2015, 4,885,628 tons of solid waste was landfilled in Los Angeles County. AEC’s contribution would be significantly less than one percent of the county’s waste generation.

COMPLIANCE WITH LORS

Energy Commission staff concludes that the proposed AEC would comply with all applicable LORS regulating the management of hazardous and non-hazardous wastes during both facility construction and operation. The applicant is required to recycle and/or dispose hazardous and non-hazardous wastes at facilities licensed or otherwise approved to accept the wastes. Because hazardous wastes would be produced during both project construction and operation, the AEC would be required to obtain a hazardous waste generator identification number from U.S. EPA. The AEC would also be required to properly store, package, and label all hazardous waste; use only approved transporters; prepare hazardous

[4] Regulatory requirements; Businesses and public entities that generate four or more cubic yards of solid waste per week, and multifamily residential dwellings that have five units or more, take action to reuse, recycle, compost or otherwise divert commercial solid waste from disposal.

waste manifests; keep detailed records; and appropriately train employees in accordance with state and federal hazardous waste management requirements.

CONCLUSIONS

Consistent with the three main objectives for staff's waste management analysis (as noted in the Introduction section of this analysis), staff provides the following conclusions:

1) After review of the applicant's proposed waste management procedures, staff concludes that project wastes would be managed in compliance with all applicable waste management LORS. Staff notes that demolition, construction, and operation wastes would be characterized and managed as either hazardous or non-hazardous waste. All non-hazardous wastes would be recycled to the extent feasible, and nonrecyclable wastes would be collected by a licensed hauler and disposed of at a permitted solid waste disposal facility. Hazardous wastes would be accumulated onsite in accordance with accumulation time limits (90,180, 270, or 365 days depending on waste type and volumes generated), and then properly manifested, transported to, and disposed of at, a permitted hazardous waste management facility by licensed hazardous waste collection and disposal companies.

   However, to help ensure and facilitate ongoing project compliance with LORS, staff proposes Conditions of Certification **WASTE-1** through **9**. These conditions would require the project owner to do all of the following:

   - Once the AEC project owner identifies which areas of contamination would be remediated, staff proposes conditions that ensure the project site is investigated and any contamination identified is remediated as necessary, with appropriate professional and regulatory agency oversight (**WASTE-1**, **2**, **3**, **4** and **5**).
   - Prepare Construction Waste Management and Operation Waste Management Plans detailing the types and volumes of wastes to be generated and how wastes would be managed, recycled, and/or disposed of after generation (**WASTE-6** and **8**).
   - Report any waste management-related LORS enforcement actions and how violations would be corrected (**WASTE-7**).
   - Ensure that all spills or releases of hazardous substances are reported and cleaned-up in accordance with all applicable federal, state, and local requirements (**WASTE-9)**.

2) Existing conditions at the AEC project site do include areas where prior site uses and/or demolition activities may have resulted in releases of hazardous substances or soil contamination. To ensure that the project site is investigated and remediated as necessary and to reduce any impacts from prior or future hazardous substance or hazardous waste releases at the site to a level of insignificance, staff proposes Conditions of Certification **WASTE-1**, **2**, **3**, **4**, **5**, **7** and **9**. These conditions would require the project owner to ensure that the project site is investigated and remediated as necessary; demonstrate that project wastes are managed properly; and ensure that any future spills or releases of hazardous substances or wastes are properly reported, cleaned-up, and remediated as necessary. Therefore, staff concludes that construction and operation of the proposed AEC project would not result in contamination or releases of hazardous substances that would pose a substantial risk to human health or the environment.

3) Regarding impacts of project wastes on existing waste disposal facilities, staff uses a waste volume threshold equal to ten (10) percent of a disposal facility's remaining capacity to determine if the impact from disposal of project wastes at a particular facility would be significant. The existing available capacity for the two Class III landfills that may be used to manage nonhazardous project wastes exceeds 44.5 million cubic yards. The total amount of nonhazardous wastes generated from construction and operation of AEC would contribute less than 0.1 percent of the remaining landfill capacity. Therefore, disposal of project generated non-hazardous wastes would have a less than significant impact on Class III landfill capacity.

   In addition, the two Class I disposal facilities that could be used for hazardous wastes generated by the construction and operation of AEC have a combined remaining capacity in excess of 15 million cubic yards. The total amount of hazardous wastes generated by the AEC project would contribute less than one percent of the remaining permitted capacity. Therefore, impacts from disposal of AEC generated hazardous wastes would also have a less than significant impact on the remaining capacity at Class I landfills.

Staff concludes that management of the waste generated during demolition, construction and operation of the AEC project would not result in any significant adverse impacts, and would comply with applicable LORS, if the waste management practices and mitigation measures proposed in the AEC project AFC and staff's proposed conditions of certification are implemented.

PROPOSED CONDITIONS OF CERTIFICATION

WASTE-1 The project owner shall ensure that the project site is properly characterized and remediated as necessary pursuant to the corrective action plans reviewed by Department of Toxic Substances Control (DTSC) and the Long Beach Fire Department (LBFD). In no event shall project construction commence in areas requiring characterization and remediation until the CPM determines, that all necessary remediation has been accomplished.

Prior to and during grading and construction, discovery of additional soil contamination not previously identified or already included in corrective action plans, work plans, or closure plans, must be reported to the CPM, DTSC, and the LBFD immediately.

Verification: At least 45 days prior to remediation the project owner shall submit to the CPM for approval copies of remediation documentation, such as, but not limited to, soil sample results, work plans, and agreements regarding the corrective action plan requirements and activities at the project site. Pertinent correspondence such as, but not limited to, soil sample results, work plans, agreements, and authorizations involving LBFD, and/or (if applicable) the DTSC, regarding the corrective action plan requirements and activities at the project site will be provided to the CPM within 10 days of receipt.

At least 15 days prior to the start of site mobilization, the project owner shall provide to the CPM written notice from the appropriate regulatory agency that the project site has been investigated and remediated as necessary in accordance with the corrective action plan.

If soil contamination not previously identified or already included in corrective action plans, work plans or closure plans is encountered prior to or during grading, the project owner shall notify the CPM and DTSC, revise the approved work plan and submit it for concurrent CPM, LBFD, and DTSC review within 30 days after contamination is identified. Comments received within 30 days from all parties will be incorporated and provided to the CPM for approval.

WASTE-2 The project owner shall prepare and submit to the CPM a Soils Management Plan (SMP) prior to any earthwork. The SMP must be prepared by a California-Registered Geologist or a California-Registered Civil Engineer with sufficient experience in hazardous waste management. The SMP shall be updated as needed to reflect changes in laws, regulations or site conditions. An SMP summary report, which includes all analytical data and other findings, must be submitted once the earthwork has been completed. Topics covered by the SMP shall include, but not be limited to:

- Land use history, including description and locations of known contamination.
- The nature and extent of previous investigations and remediation at the site.
- The nature and extent of unremediated areas at the Alamitos Generating Station.
- A listing and description of institutional controls, such as the county's excavation ordinance and other local, state, and federal regulations and laws that would apply to Alamitos Power Plant.
- Names and positions of individuals involved with soils management and their specific role.
- An earthwork schedule.
- Requirements for site-specific Health and Safety Plans (HSPs) to be prepared by all contractors at Alamitos Power Plant. The HSP should be prepared by a Certified Industrial Hygienist and would protect onsite workers by including engineering controls, personal protective equipment, monitoring, and security to prevent unauthorized entry and to reduce construction related hazards. The HSP should address the possibility of encountering subsurface hazards including hazardous waste contamination and include procedures to protect workers and the public.
- Hazardous waste determination and disposal procedures for known and previously unidentified contamination.
- Requirements for site specific techniques at the site to minimize dust, manage stockpiles, run-on and run-off controls, waste disposal procedures, etc.
- Copies of relevant permits or closures from regulatory agencies.

Verification: At least 45 days prior to any earthwork, the project owner shall submit the SMP to the CPM for review and approval. All earthwork at the site shall be based on the SMP. A SMP summary shall be submitted to CPM within 25 days of completion of any earthwork.

WASTE-3 Prior to demolition of existing structures the project owner shall complete and submit a SCAQMD Asbestos Demolition Notification Form to the CPM and the SCAQMD. Once submitted the project owner shall remove all asbestos-containing material (ACM) from the site prior to demolition.

Verification: No less than sixty (60) days prior to commencement of structure demolition, the project owner shall provide the Asbestos Demolition Notification Form and any update notifications to the CPM and to the SCAQMD. The project owner shall inform the CPM via the monthly compliance report, of the data when all ACM is removed from the site.

WASTE-4 The project owner shall provide the resume of an experienced and qualified professional engineer or professional geologist, who shall be available for consultation during site characterization (if needed), demolition, excavation, and grading activities, to the CPM for review and approval. The resume shall show experience in remedial investigation and feasibility studies.

The professional engineer or professional geologist shall be given full authority by the project owner to oversee any earth moving activities that have the potential to disturb contaminated soil.

Verification: At least 30 days prior to the start of site mobilization, the project owner shall submit the resume of the professional engineer or professional geologist to the CPM for review and approval.

WASTE-5 If potentially contaminated soil is identified during site characterization, demolition, excavation, or grading at either the proposed site or linear facilities, as evidenced by discoloration, odor, detection by instruments, or other signs, the professional engineer or professional geologist shall inspect the site, determine the need for sampling to confirm the nature and extent of contamination, and provide a written report to the project owner, representatives of DTSC, and the CPM stating the recommended course of action.

Depending on the nature and extent of contamination, the professional engineer or professional geologist shall have the authority to temporarily suspend construction activity at that location for the protection of workers or the public. If, in the opinion of the professional engineer or professional geologist, significant remediation may be required, the project owner shall contact the CPM and representatives of the DTSC and the LBFD for guidance and possible oversight.

Verification: The project owner shall submit any final reports filed by the professional engineer or professional geologist to the CPM within 5 days of their receipt. The project owner shall notify the CPM within 24 hours of any orders issued to halt construction.

WASTE-6 The project owner shall prepare a Construction Waste Management Plan for all wastes generated during construction of the facility and shall submit the plan to the CPM for review and approval. The plan shall contain, at a minimum, the following:

- a description of all construction waste streams, including projections of frequency, amounts generated, and hazard classifications;
- management methods to be used for each waste stream, including temporary on-site storage, housekeeping and best management practices to be employed, treatment methods and companies providing treatment services, waste-testing methods to assure correct classification, methods of transportation, disposal requirements and sites, and recycling and waste minimization/source reduction plans.
- a method for collecting weigh tickets or other methods for verifying the volume of transported and or location of waste disposal; and,
- a method for reporting to demonstrate project compliance with construction waste diversion requirements of 60 percent pursuant to the CalGreen Code and Construction and city of Long Beach Construction & Demolition Debris Program.

Verification: The project owner shall submit the Construction Waste Management Plan to the CPM for approval no less than 30 days prior to the initiation of construction activities at the site.

The project owner shall also document in each monthly compliance report (MCR) the actual volume of wastes generated and the waste management methods used during the year; provide a comparison of the actual waste generation and management methods used to those proposed in the original Construction Waste Management Plan; and update the Construction Waste Management Plan, as necessary, to address current waste generation and management practices.

WASTE-7 Upon becoming aware of any impending waste management-related enforcement action by any local, state, or federal authority, the project owner shall notify the CPM of any such action taken or proposed to be taken against the project itself, or against any waste hauler or disposal facility or treatment operator with which the owner contracts.

Verification: The project owner shall notify the CPM in writing within 24 hours of becoming aware of an impending enforcement action. The CPM shall notify the project owner of any changes that will be required in the way project-related wastes are managed.

WASTE-8 The project owner shall prepare an Operation Waste Management Plan for all wastes generated during operation of the facility and shall submit the plan to the CPM for review and approval. The plan shall contain, at a minimum, the following:

- a detailed description of all operation and maintenance waste streams, including projections of amounts to be generated, frequency of generation, and waste hazard classifications;
- management methods to be used for each waste stream, including temporary on-site storage, housekeeping, and best management practices to be employed, treatment methods and companies providing treatment

services, waste-testing methods to assure correct classification, methods of transportation, disposal requirements and sites, and recycling and waste minimization/source reduction plans;

- information and summary records of conversations with the local Certified Unified Program Agency and the DTSC regarding any waste management requirements necessary for project activities. Copies of all required waste management permits, notices, and/or authorizations shall be included in the plan and updated as necessary;
- a detailed description of how facility wastes will be managed and any contingency plans to be employed, in the event of an unplanned closure or planned temporary facility closure; and
- a detailed description of how facility wastes will be managed and disposed upon closure of the facility.

Verification: The project owner shall submit the Operation Waste Management Plan to the CPM for approval no less than 30 days prior to the start of project operation. The project owner shall submit any required revisions to the CPM within 20 days of notification from the CPM that revisions are necessary.

The project owner shall also document in each Annual Compliance Report the actual volume of wastes generated and the waste management methods used during the year; provide a comparison of the actual waste generation and management methods used to those proposed in the original Operation Waste Management Plan; and update the Operation Waste Management Plan as necessary to address current waste generation and management practices.

WASTE-9 The project owner shall ensure that all spills or releases of hazardous substances, materials, or waste are reported, cleaned up, and remediated as necessary, in accordance with all applicable federal, state, and local requirements.

Verification: The project owner shall document all unauthorized releases and spills of hazardous substances, materials, or wastes that occur on the project property or related pipeline and transmission corridors. The documentation shall include, at a minimum, the following information: location of release; date and time of release; reason for release; volume released; amount of contaminated soil/material generated; how release was managed and material cleaned up; if the release was reported; to whom the release was reported; release corrective action and cleanup requirements placed by regulating agencies; level of cleanup achieved and actions taken to prevent a similar release or spill; and disposition of any hazardous wastes and/or contaminated soils and materials that may have been generated by the release. Copies of the unauthorized spill documentation shall be provided to the CPM within 30 days of the date the release was discovered.

REFERENCES

Applicant

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CEC 2014t- Alamitos Energy Center (TN 202845) AEC Status Report 1. Submitted July 29, 2014. CEC/Dockets Unit July 29, 2014.

CEC 2014v- Alamitos Energy Center (TN 203038) DATA REQUESTS SET 5 (Nos. 76- 82) Submitted September 5, 2014. CEC/Docket Unit September 5, 2014.

Intervener and Other

Bodek 2014 – Email from Amy Bodek, city of Long Beach, Director of Developmental Services to Ellie Townsend-Hough. August 18, 2014.

CalRecycle 2014a. Solid Waste Information System (SWIS) Database, Los Angeles County. Available online at: http://www.calrecycle.ca.gov/SWFacilities/Directory/Default.htm.August.

CalRecycle 2014b. 2013 Landfill Summary Tonnage Report. Available online at: http://www.calrecycle.ca.gov/SWFacilities/Landfills/Tonnage/. August.

Jamison and Associates – Southern California Edison Draft Closure Plan Alamitos Generating Station Retention Basin Site, Los Angeles, County, California. December 2011.

Johnsen, John – Johnsen, John, Southern California Edison Senior Project Manager, email discussion Alamitos Retention Basins. March 30, 2016

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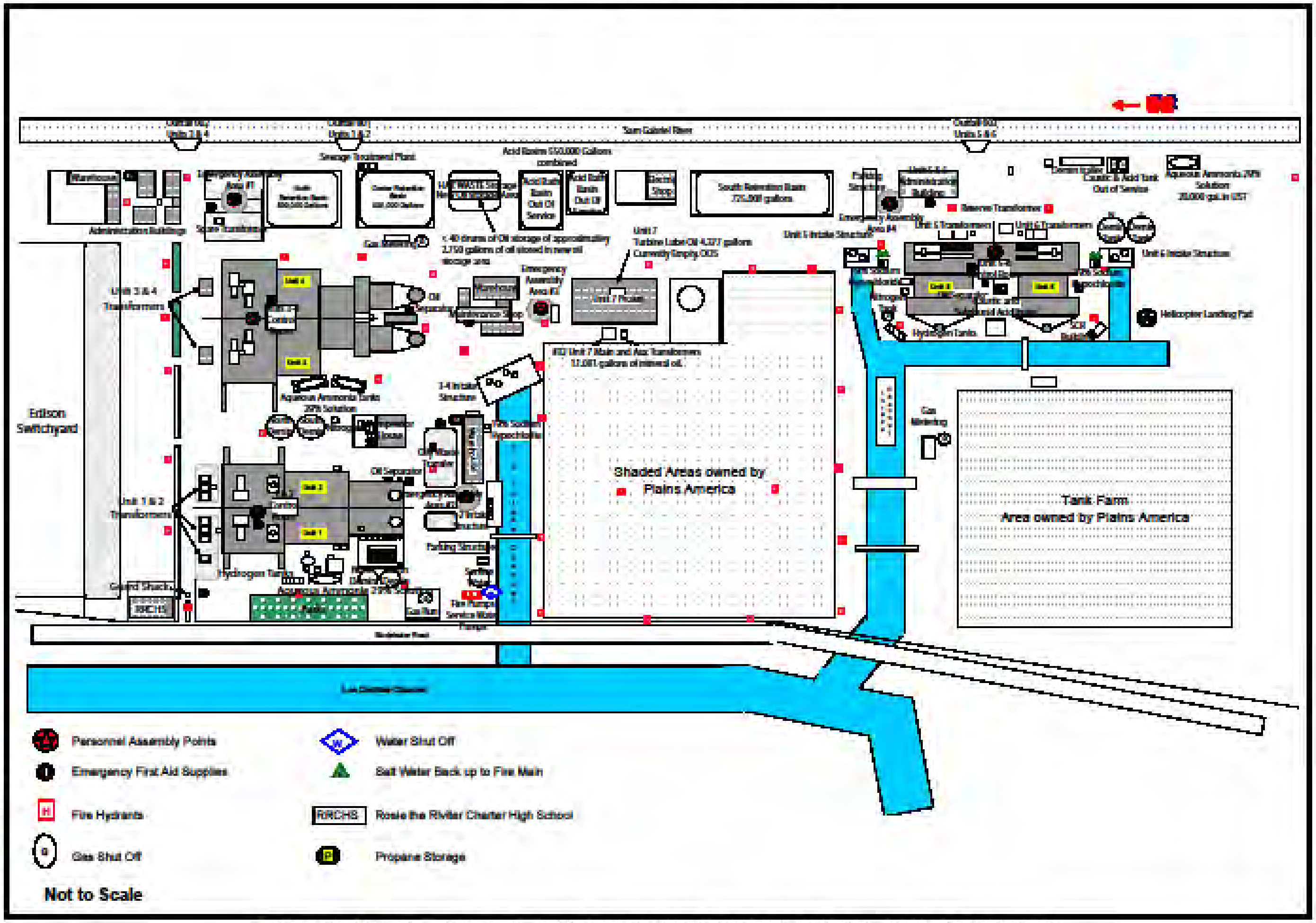
Randy Weidner 2014 – Email from Randy Weidner, CEG, from Southern California Edison to Ellie Townsend-Hough. April 8, 2014.

WASTE MANAGEMENT - FIGURE 1

Alamitos Energy Center - Facility Site Map



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: AEC Appendix 5.14A Phase 1 ESA

WASTE MANAGEMENT - FIGURE 2

Alamitos Energy Center - National Wetland Inventory (within 250 feet)

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Ch2MHill Figure 1.1-3

WASTE MANAGEMENT

WORKER SAFETY AND FIRE PROTECTION

Brett Fooks, PE and Geoff Lesh, PE

SUMMARY OF CONCLUSIONS

Staff concludes that with the implementation of conditions of certification **WORKER SAFETY 1 through 8** there would be adequate levels of worker safety, fire protection and compliance with the applicable laws, ordinances, regulations, and standards (LORS). Staff recommends the project owner provide a Project Construction Safety and Health Program and a Project Operations and Maintenance Safety and Health Program to set forth the procedures to ensure worker safety and fire protection at the Alamitos Energy Center (AEC)

Staff confirmed that the Long Beach Fire Department (LBFD) will have the continued ability to provide emergency response for fires, hazmat spills, rescue and routine code inspections with the construction and operation of the AEC.

INTRODUCTION

Worker safety and fire protection is regulated through laws, ordinances, regulations, and standards (LORS), at the federal, state, and local levels. Industrial workers at the facility operate equipment and handle hazardous materials daily and may face hazards that can result in accidents and serious injury. Protective measures are employed to eliminate or reduce these hazards or to minimize the risk through special training, protective equipment, and procedural controls.

The purpose of this Preliminary Staff Assessment (PSA) is to assess the worker safety and fire protection measures proposed by the AEC and to determine whether the applicant has proposed adequate measures to:

- comply with applicable safety LORS;
- protect the workers during construction and operation of the facility;
- protect against fire; and
- provide adequate emergency response procedures.

LAWS, ORDINANCES, REGULATION, AND STANDARDS

Worker Safety and Fire Protection Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
Title 29 U.S. Code (USC) section 651 et seq (Occupational Safety and Health Act of 1970)	This act mandates safety requirements in the workplace with the purpose of “[assuring] so far as possible every working man and woman in the nation safe and healthful working conditions and to preserve our human resources” (29 USC § 651).
Title 29 Code of Federal Regulation (CFR) sections 1910.1 to 1910.1500 (Occupational Safety and Health Administration Safety and Health Regulations)	These sections define the procedures for promulgating regulations and conducting inspections to implement and enforce safety and health procedures to protect workers, particularly in the industrial sector.
29 CFR sections 1952.170 to 1952.175	These sections provide federal approval of California’s plan for enforcement of its own Safety and Health requirements, in lieu of most of the federal requirements found in 29 CFR sections 1910.1 to 1910.1500.
State	
Title 8, California Code of Regulations (Cal Code Regs.) all applicable sections (Cal/OSHA regulations)	These sections require that all employers follow these regulations as they pertain to the work involved. This includes regulations pertaining to safety matters during construction, commissioning, and operations of power plants, as well as safety around electrical components, fire safety, and hazardous materials use, storage, and handling.
Title 24, Cal Code Regs., section 3, et seq.	This section incorporates the current edition of the International Building Code.
Health and Safety Code section 25500, et seq.	This section presents Risk Management Plan requirements for threshold quantity of listed acutely hazardous materials at a facility.
Health and Safety Code sections 25500 to 25541	These sections require a Hazardous Material Business Plan detailing emergency response plans for hazardous materials emergency at a facility.
Local (or locally enforced)	
City of Long Beach Municipal Code Title 18, Chapter 18.48: Fire Code	The City of Long Beach Fire Department currently enforces the 2013 version of the California Fire Code.
National Fire Protection Association (NFPA) 850	This industry standard of the National Fire Protection Association (NFPA) addresses fire protection at electrical generating stations.
NFPA 56 (adopted 2012)	NFPA 56 is the Standard for Fire and Explosion Prevention During Cleaning and Purging of Flammable Gas Piping Systems.

SETTING

The proposed facility would be located in the City of Long Beach within an industrial area that is currently located within the service area of the Long Beach Fire Department (LBFD). There are a total of 23 fire stations within the City of Long Beach. The closest station to the AEC site is Station #22 of the LBFD located at 6340 Atherton Street, approximately 1.5 miles away. The total response time from the moment a call is made to the point of arrival at the site would be approximately 3-5 minutes. The next closest station is Station #14, located at 5200 Eliot Avenue, about 2 miles away, which would respond in approximately 5 minutes.

The first responders to a hazardous materials incident would be from Station #22 of the LBFD. If needed, a full hazardous material response would be provided by the LBFD Hazardous Materials Response Team (LBFD-HMRT) located at LBFD Station #19, located at 3559 Clark Avenue, approximately 5.0 miles away. The LBFD-HMRT is capable of handling any hazardous materials-related incident at the proposed facility and would have a response time of around 10 minutes. The LBFD could also call upon mutual aid agreements with the Los Angeles County Fire Department and the Orange County Fire Authority.

In addition to construction and operations worker safety issues, the potential exists for exposure to contaminated soil during site preparation. The Phase I Environmental Site Assessment conducted for this site in 2015 concluded that the areas beneath existing structures may have environmental conditions that would require remediation and that this should be assessed during the time these structures are removed (AEC 2015i, Section 5.14.1.1). To address the possibility that soil contamination would be encountered during construction of AEC, proposed Conditions of Certification **WASTE-3** and **WASTE-4** require a registered professional engineer or geologist to be available during soil excavation and grading to ensure proper handling and disposal of contaminated soil. If any contaminated soil were identified, then the proper personal protective equipment (PPE) would be provided as needed. See the staff assessment section on **Waste Management** for a more detailed analysis of this topic.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

Two issues are assessed in **Worker Safety and Fire Protection**:

1. The potential for impacts on the safety of workers during demolition, construction, and operations activities, and

2. Availability of and potential impacts on fire prevention/protection, emergency medical response, and hazardous materials spill response services during demolition, construction, and operations of the facility.

Worker safety issues are thoroughly addressed by Cal/OSHA regulations. If all LORS were followed, workers would be adequately protected. Thus, the standard for staff's review and determination of significant impacts on workers is whether or not the applicant has demonstrated adequate knowledge about and dedication to implementing all pertinent and relevant Cal/OSHA requirements.

Regarding fire prevention matters, staff reviews and evaluates the on-site fire-fighting systems proposed by the applicant and the time needed for off-site local fire departments to respond to a fire, medical, or hazardous material emergency at the proposed power plant site. If on-site systems do not follow established codes and industry standards, staff recommends additional measures. Staff reviews and evaluates the local fire department capabilities and response time in each area and interviews the local fire officials to determine if they feel adequately trained, manned, and equipped to respond to the needs of a power plant. Staff then determines if the presence of the power plant would cause a significant impact on the local fire department. If it does, staff will recommend that the applicant mitigate this impact by providing increased resources to the fire department.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Worker Safety

Industrial environments are potentially dangerous during demolition, construction, and operation of facilities. Workers at the proposed AEC would be exposed to loud noises, moving equipment, trenches, and confined space entry and egress problems. The workers may experience falls, trips, burns, lacerations, being struck by objects, and numerous other injuries. They have the potential to be exposed to falling equipment or structures, chemical spills, hazardous waste, fires, explosions, electrical sparks and electrocution. It is important for the project owner to have well-defined policies and procedures, training, and hazard recognition and control at its facility to minimize such hazards and protect workers. If the facility complies with all LORS, workers will be adequately protected from health and safety hazards.

A Safety and Health Program would be prepared by the applicant to minimize worker hazards during construction and operation. Staff uses the phrase "Safety and Health Program" to refer to the measures that would be taken to ensure compliance with the applicable LORS during the construction and operational phases of the project.

Construction Safety and Health Program

Workers at the AEC would be exposed to hazards typical of demolition, construction, and operation of a natural gas-fired electric power generating facility. One set of worker safety policies and procedures would be followed during construction.

Construction Safety Orders are published at Title 8, California Code of Regulations sections 1502, et seq. These requirements are promulgated by Cal/OSHA and would be applicable to the construction phase of the project. The Construction Safety and Health Program would include the following:

- Construction Injury and Illness Prevention Program (Cal Code Regs., tit. 8, § 1509)
- Construction Fire Prevention Plan (Cal Code Regs., tit. 8, § 1920)
- Personal Protective Equipment Program (Cal Code Regs., tit. 8, §§ 1514 — 1522)
- Construction Emergency Action Program and Plan

Additional programs under General Industry Safety Orders (Cal Code Regs., tit. 8, §§ 3200 to 6184), Electrical Safety Orders (Cal Code Regs., tit. 8, §§2299 to 2974) and Unfired Pressure Vessel Safety Orders (Cal Code Regs., tit. 8, §§ 450 to 544) would include:

- Electrical Safety Program
- Motor Vehicle and Heavy Equipment Safety Program
- Forklift Operation Program
- Excavation/Trenching Program
- Fall Protection Program
- Scaffolding/Ladder Safety Program
- Articulating Boom Platforms Program
- Crane and Material Handling Program
- Housekeeping and Material Handling and Storage Program
- Respiratory Protection Program
- Employee Exposure Monitoring Program
- Hand and Portable Power Tool Safety Program
- Hearing Conservation Program
- Back Injury Prevention Program
- Hazard Communication Program
- Heat and Cold Stress Monitoring and Control Program
- Pressure Vessel and Pipeline Safety Program
- Hazardous Waste Program
- Hot Work Safety Program
- Permit-Required Confined Space Entry Program
- Lockout/Tagout Energy Control Program

The Application for Certification (AFC) includes adequate outlines of the above programs (AEC 2015i, Section 5.16.3.3). Prior to the start of construction of AEC, detailed programs and plans would be provided to the California Energy Commission compliance project manager (CPM) and to the LBFD pursuant to the Condition of Certification **WORKER SAFETY-1**.

Operations and Maintenance Safety and Health Program

Prior to the start of operations at AEC, the Operations and Maintenance Safety and Health Program would be prepared. This operational safety program would include the following programs and plans:

- Injury and Illness Prevention Program (Cal Code Regs., tit. 8, § 3203)

- Fire Protection and Prevention Program (Cal Code Regs., tit. 8, § 3221)
- Fire Protection System Impairment Program (2015 NFPA 850 Section 17.4.2 & Chapter 9 California Fire Code (CFC) Section 901.7, 901.7.1-901.7.6)
- Personal Protective Equipment Program (Cal Code Regs., tit. 8, §§ 3401 to 3411)
- Emergency Action Plan (Cal Code Regs., tit. 8, § 3220)

In addition, the requirements under General Industry Safety Orders (Cal Code Regs., tit. 8, §§ 3200 to 6184), Electrical Safety Orders (Cal Code Regs., tit. 8, §§2299 to 2974) and Unfired Pressure Vessel Safety Orders (Cal Code Regs., tit. 8, §§ 450 to 544) would be applicable to the project. The written safety programs developed by the project owner for AEC would ensure compliance with the above-mentioned requirements.

The AFC includes adequate outlines of the Injury and Illness Prevention Program, Emergency Action Plan, Fire Prevention Program, and Personal Protective Equipment Program (AEC 2015i, Section 5.16.3.3). Prior to operation of AEC, all detailed programs and plans would be provided to the CPM and LBFD pursuant to Condition of Certification **WORKER SAFETY-2**.

Safety and Health Program Elements

The applicant provided the proposed outlines for both a Construction Safety and Health Program and an Operations Safety and Health Program. The measures in these plans are derived from applicable sections of state and federal law. Both safety and health programs would comprise seven more specific programs and would require major items detailed in the following paragraphs.

Injury and Illness Prevention Program

The Injury and Illness Prevention Program (IIPP) would include the following components:

- Identifies the person(s) with authority and responsibility for implementing the program;
- provides a system for ensuring that employees utilize safe and healthy work practices;
- provides a system for facilitating employer-employee communications regarding safety;
- provides procedures for identifying and evaluating workplace hazards, including inspections to identify hazards and unsafe conditions;
- establishes methods for correcting unhealthy/unsafe conditions in a timely manner; and
- provides an employee training program.

Fire Prevention Plan

California Code of Regulations requires an Operations Fire Prevention Plan (Cal Code Regs., tit. 8, § 3221). The plan would accomplish the following:

- determine general program requirements;
- determine fire hazard inventory, including ignition sources and mitigation;
- develop good housekeeping practices and proper materials storage;
- establish employee alarm and/or communication system(s);
- provide portable fire extinguishers at appropriate site locations;
- locate fixed fire-fighting equipment in suitable areas;
- specify fire control requirements and procedures;
- establish proper flammable and combustible liquid storage facilities;
- identify the location and use of flammable and combustible liquids;
- provide proper dispensing and determine disposal requirements for flammable liquids;
- establish and determine training and instruction requirements and programs; and
- identify personnel to contact for information on plan contents.

Staff proposes that the applicant submit a final Fire Prevention Plan to the CPM for review and approval and to the LBFD for review and comment to satisfy proposed Conditions of Certification **WORKER SAFETY-1** and **WORKER SAFETY-2**.

Fire Protection System Impairment Program

NFPA 850 and the California Fire Code lay out a prescriptive method that the project owner must follow when the facility's installed fire protection system is impaired. The plan would accomplish the following:

- supervise the safe shutdown of fire protection systems;
- provide notifications to the proper authorities and representatives;
- control potential fire hazards during the impairments through the use of fire watches and/or evacuation of the area effected;
- outline a repair strategy and timeline to get the fire protection system operational; and
- restore the fire protection system to service as soon as possible.

The Fire Protection System Impairment Program would ensure that the project owner follows the prescriptive measures laid out in NFPA 850 and the CFC. Therefore, staff proposes that the applicant submit a final Fire Protection System Impairment Program to the CPM for review and approval and to the LBFD for review and comment to satisfy the proposed Condition of Certification **WORKER SAFETY-2**.

Personal Protective Equipment Program

California regulations require Personal Protective Equipment (PPE) and first aid supplies whenever hazards are present that, due to process, environment, chemicals or mechanical irritants, can cause injury or impair bodily function as a result of absorption, inhalation, or physical contact (Cal Code Regs., tit. 8, §§ 3380 to 3400). The AEC operational environment would require PPE.

All safety equipment must meet National Institute of Safety and Health (NIOSH) or American National Standards Institute (ANSI) standards and would carry markings, numbers, or certificates of approval. Respirators must meet NIOSH and Cal/OSHA standards. Each employee must be provided with the following information pertaining to the protective clothing and equipment:

- proper use, maintenance, and storage;
- when to use the protective clothing and equipment;
- benefits and limitations; and
- when and how to replace the protective clothing and equipment.

The PPE Program ensures that employers comply with the applicable requirements for PPE and provides employees with the information and training necessary to protect them from potential workplace hazards.

Emergency Action Plan

California regulations require an Emergency Action Plan (Cal Code Regs., tit. 8, § 3220). The AFC contains a satisfactory outline for an emergency action plan (AEC 2015i, Section 5.16.3.3).

The outline lists the plans to accomplish the following:

- establish emergency escape procedures and emergency escape route for the facility;
- determine procedures to be followed by employees who remain to operate critical plant operations before they evacuate;
- provide procedures to account for all employees and visitors after emergency evacuation of the plant has been completed;
- specify rescue and medical duties for assigned employees;
- identify fire and emergency reporting procedures to regulatory agencies;
- develop alarm and communication system for the facility;
- establish a list of personnel to contact for information on the plan contents;
- provide emergency response procedures for ammonia release; and
- determine and establish training and instruction requirements and programs.

Given the current planning scenarios that show the project site could be inundated by a tsunami (see the **Geology and Paleontology** section of this staff assessment for more details), staff is concerned there may be a threat of impact to worker safety from potential site inundation resulting from tsunamis. Staff concludes that the project owner should be required to prepare and implement a Tsunami Hazard Mitigation Plan (THMP) as set forth in Condition of Certification **GEO-2** (in the **Geology and Paleontology** section) Staff recommends that the THMP would be included in the site Emergency Action Plan.

Written Safety Program

In addition to the specific plans listed above, additional LORS called *safe work practices* apply to the project. Both the Construction and the Operations Safety Programs would address safe work practices under a variety of programs. The components of these programs include, but are not limited to, the programs found under the heading "**CONSTRUCTION SAFETY AND HEALTH PROGRAM**" in this **Worker Safety and Fire Protection** section.

Safety Training Programs

Employees would be trained in the safe work practices described in the above-referenced safety programs.

Additional Mitigation Measures

Protecting construction workers from injury and disease is among the greatest challenges in occupational safety and health. The following facts are reported by NIOSH:

- More than 7 million persons work in the construction industry, representing 6 percent of the labor force. Approximately 1.5 million of these workers are self-employed.
- Of approximately 600,000 construction companies, 90 percent employ fewer than 20 workers. Few have formal safety and health programs.
- From 1980 to 1993, an average of 1,079 construction workers were killed on the job each year—more fatal injuries than in any other industry.
- Falls caused 3,859 construction worker fatalities (25.6 percent) between 1980 and 1993.
- Construction injuries account for 15 percent of workers' compensation costs.
- Assuring safety and health in construction is complex, involving short-term work sites, changing hazards, and multiple operations and crews working in close proximity.
- In 1990, Congress directed NIOSH to undertake research and training to reduce diseases and injuries among construction workers in the United States. Under this mandate, NIOSH funds both intramural and extramural research projects.

The hazards associated with the construction industry are thus well documented. These hazards increase in complexity in the multi-employer worksites typical of large, complex, industrial-type projects such as the construction of gas-fired power plants. In order to reduce and/or eliminate these hazards, it has become standard industry practice to hire a Construction Safety Supervisor to ensure a safe and healthful environment for all personnel. This standard practice has reduced and/or eliminated hazards evident in the audits staff recently conducted of power plants under construction. The federal Occupational Safety and Health Administration (OSHA) has also entered into strategic alliances with several professional and trade organizations to promote and recognize safety professionals trained as Construction Safety Supervisors, Construction Health and Safety Officers, and other professional designations. The goal of these partnerships is to encourage construction subcontractors in four areas:

- to improve their safety and health performance;
- to assist them in striving for the elimination of the four hazards (falls, electrical, caught in/between, and struck-by hazards), which account for the majority of fatalities and injuries in this industry and have been the focus of targeted OSHA inspections;
- to prevent serious accidents in the construction industry through implementation of enhanced safety and health programs and increased employee training; and
- to recognize those subcontractors with exemplary safety and health programs.

To date, there are no OSHA or Cal/OSHA requirements that an employer hire or provide for a Construction Safety Officer. OSHA and Cal/OSHA regulations do, however, require that safety be provided by an employer and the term *Competent Person* is used in many OSHA and Cal/OSHA standards, documents, and directives. A Competent Person is usually defined by OSHA as an individual who, by way of training and/or experience, is knowledgeable of standards, is capable of identifying workplace hazards relating to the specific operations, is designated by the employer, and has authority to take appropriate action. Therefore, in order to meet the intent of the OSHA standard to provide for a safe workplace during power plant construction, staff proposes Condition of Certification **WORKER SAFETY-3,** which would require the project owner to designate and provide a site Construction Safety Supervisor.

Accidents, fires, and a worker death have occurred at Energy Commission-certified power plants in the past due to the failure to recognize and control safety hazards and the inability to adequately supervise compliance with occupational safety and health regulations. Safety problems have been documented by Energy Commission staff in safety audits conducted in 2005 at several power plants under construction. The findings of the audit staff include, but are not limited to, such safety oversights as:

- lack of posted confined space warning placards/signs;
- confusing and/or inadequate electrical and machinery lockout/tagout permitting and procedures;
- confusing and/or inappropriate procedures for handing over lockout/tagout and confined space permits from the construction team to commissioning team and then to operations;
- dangerous placement of hydraulic elevated platforms under each other;
- inappropriate placement of fire extinguishers near hot work;

- dangerous placement of numerous power cords in standing water on the site, thus increasing the risk of electrocution;
- construction of an unsafe aqueous ammonia unloading pad;
- inappropriate and unsecure placement of above-ground natural gas pipelines inside the facility, but too close to the perimeter fence; and
- lack of adequate employee- or contractor-written training programs addressing proper procedures to follow in the event of finding suspicious packages or objects either on or off site.

In order to reduce and/or eliminate these hazards, it is necessary for the Energy Commission to have a professional Safety Monitor on site to track compliance with Cal/OSHA regulations and periodically audit safety compliance during construction, commissioning, and the hand-over to operational status. These requirements are outlined in Condition of Certification **WORKER SAFETY-4**. A Safety Monitor, hired by the project owner, yet reporting to the Delegate Chief Building Official (DCBO) and CPM, will provide additional safety expertise and worksite awareness to ensure that safety procedures and practices are fully implemented at all power plants certified by the Energy Commission. During the audits conducted by staff, most site safety professionals welcomed the audit team and actively engaged it in questions about the team's findings and recommendations. These safety professionals recognized that safety requires continuous vigilance and that the presence of an independent audit team provided a fresh perspective of the site.

Fire Hazards

During construction and operation of the proposed AEC, there is the potential for both small fires and major structural fires. Electrical sparks, combustion of fuel oil, natural gas, hydraulic fluid, mineral oil, insulating fluid at the power plant switchyard or flammable liquids, explosions, and over-heated equipment, may cause small fires. Major structural fires in areas without automatic fire detection and suppression systems are unlikely to develop at power plants. Fires and explosions of natural gas or other flammable gasses or liquids are rare. Compliance with all LORS would be adequate to assure protection from all fire hazards.

Staff reviewed the information provided in the AFC and applicant's response to staff's data requests to determine if LBFD's available fire protection services and equipment would be adequate to protect workers, and to determine the project's impact on fire protection services in the area. The project will rely on both on-site fire protection systems and local fire protection services. The on-site fire protection system provides the first line of defense for small fires. In the event of a major fire, fire support services, including trained firefighters and equipment for a sustained response, would be provided by the LBFD (AEC 2015i, Sections 2.1.15 & 5.16.3.4).

Construction

During construction, portable fire extinguishers would be placed throughout the site at appropriate intervals and periodically maintained, and safety procedures and training would be implemented according to the guidelines of the Construction Fire Protection and Prevention Program (AEC 2015i, Section 5.16.3.3). In addition, the AEC proposed site is within the boundary of the existing Alamitos Generating Station, which has an existing hydrant system that could provide extra protection during construction.

Operation

The information in the AFC indicates that the project intends to meet the fire protection and suppression requirements of the 2013 California Fire Code, all applicable recommended NFPA standards (including Standard 850 addressing fire protection at electric generating plants), and all Cal/OSHA requirements. However, staff would like to clarify the enforceability of fire protection best practices document NFPA 850: Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations.

The applicant stated in the AFC that AEC would be built to the NFPA 850 standard and staff concurs with this assessment. For power plants permitted by the California Energy Commission, the Delegate Chief Building Official (DCBO) is instructed through the Energy Commission’s Delegate Chief Building Official manual to apply NFPA 850 during the construction process of the project. This measure has ensured that past projects have been built to the NFPA standard. However, staff believes that because NFPA 850 is written as a set of “recommended” practices rather than “required” ones, the potential for confusion exists about whether conformance to NFPA 850 is indeed required. Staff therefore proposes Condition of Certification **WORKER SAFETY-7** which would require the project’s compliance with NFPA 850, giving NFPA 850 the effectiveness and clear enforceability of a building code in its application to AEC. In any situations where both NFPA 850 and other state or local LORS have application, the more restrictive shall apply. This proposed condition of certification would clarify for all stakeholders the responsibilities of the project owner as they relate to NFPA 850.

Fire suppression elements in the proposed plant would include both fixed and portable fire extinguishing systems. The fire protection water system would comprise of the existing fire loop and the extension to cover the new AEC structures. Any new fire hydrants connected to the new loop would be installed per NFPA requirements. The fire water would be supplied from two sources. The primary source would be supplied from the existing Long Beach Water Department (LBWD) pipeline interconnection that enters the site along Studebaker Road. The secondary source would be supplied from a new 600,000 gallon onsite fire/service water tank. Two new electric pumps would be installed to serve the AEC (CEC 2016j). Each fire pump would be connected to an independent electrical supply, with one to be used as the main fire pump, and the other for backup purposes. There would be a transition period where the two existing fire pumps at AGS would serve extended fire loop until the new AEC pumps are installed, tested, and functional. (AEC2015i, Section 2.1.15).

Fixed water fire suppression systems would be installed in areas of risk including the combustion turbine areas and turbine lube-oil systems. A carbon dioxide or dry chemical fire protection system would be provided for the combustion turbine generators and accessory equipment compartments (AEC 2015i, Section 2.4.3.1).

The fire protection system would have fire detection sensors and monitoring equipment that would trigger alarms and automatically actuate the suppression systems. In addition to the fixed fire protection system, appropriate class of service portable extinguishers and fire hydrants/hose stations would be located throughout the facility at code-approved intervals (AEC 2015i, Section 2.4.3.1). These systems are standard requirements of NFPA and the California Fire Code, and staff has determined that they will ensure adequate fire protection.

The AFC failed to identify a secondary emergency access point to the facility. Staff consulted with LBFD who requested that a secondary emergency access be provided to allow for fire department vehicles and personnel to access the site should the main gate be blocked for any reason.

In response to staff's questions about the emergency access, the project owner showed staff the location of the existing emergency secondary access. The existing emergency secondary access does not currently meet local ordinances for an emergency access road. The project owner stated that the emergency road would be widened and upgraded during construction of the AEC to meet local fire code requirements (CEC 2016). Therefore, in order to ensure the adequate emergency access to the site by the fire department, staff proposes Condition of Certification **WORKER SAFETY-6** that would require the project owner to identify, provide, and maintain for the lifetime of the project, a secondary access to the site that meets the requirements of the Long Beach Municipal Code for emergency response vehicles.

Natural Gas Compressor Enclosure Fire Protection Systems

The proposed natural gas compressors for the AEC CCGT and SCGT would be enclosed to mitigate for noise. The two natural gas enclosures would be located at the east of the facility (AEC 2015i, Figure 2.1.2). There exists the potential for explosion if leakage of natural gas were to occur inside the enclosures. The accumulation of natural gas in the enclosure can create a flammable and potentially explosive mixture of fuel and air.

The potentially applicable codes with regard to appropriate fire protection measures for compressor enclosures within power plants can be found in NFPA 850. Instead of treating the enclosure as an occupied building with an occupancy class requiring a water deluge system – a method that is ineffective to prevent conditions that potentially can lead to a fire fueled by a gas that is leaking outside of the enclosure, i.e. flare type fire - NFPA 850 treats the enclosure as an industrial enclosure. Yet, NFPA 850 does not identify specific fire/explosion suppression requirements. Staff believes NFPA 850 provides the proper designation because a gas compressor industrial enclosure would be neither normally occupied nor near occupied buildings, but NFPA 850 does not adequately address fire protection measures. Staff has therefore proposed **WORKER SAFTY-8** to address this oversight if the enclosed-building design option were chosen by the project owner. This proposed Condition of Certification treats the compressor enclosure as an industrial enclosure and requires compliance with 40 CFR 192 Sections 163 through 173 which describe fire protection measures. 40 CFR 192 normally would not be applicable, as these provisions normally apply only to compressor enclosures along a natural gas transmission pipeline.

However, staff recommends the provisions and protection afforded by compliance to 40 CFR 192. These requirements mandate a system of continuous measurement of natural gas levels in the enclosure with a mechanism for automatic ventilation if the concentrations of natural gas approach a small fraction of the combustible limit. 40 CFR 192 requirements also mandate the ability to shut off the supply of natural gas from the transmission pipeline through double block and bleed valves in the event of a larger release of fuel. This requirement provides a means of controlling a release of fuel that exceeds the capability of the forced draft protections to control for combustible conditions. Staff believes that this approach provides the most effective fire and explosion mitigation and provides the most effective protection of both workers and the public if the building option were chosen.

Emergency Medical Services Response

Staff conducted a statewide survey to determine the frequency of Emergency Medical Services (EMS) response and off-site fire-fighter response for natural gas-fired power plants in California. The purpose of the analysis was to determine what impact, if any, power plants may have on local emergency services. Staff has concluded that incidents at power plants that require fire or EMS response are infrequent and represent an insignificant impact on the local fire departments, except for rare instances where a rural fire department has mostly volunteer fire-fighting staff. However, staff has determined that the potential for both work-related and non-work-related heart attacks exists at power plants. In fact, staff's research on the frequency of EMS response to gas-fired power plants shows that many of the responses for cardiac emergencies involved non-work-related incidences, including those involving visitors. The need for prompt response within a few minutes is well documented in medical literature. Staff believes that the quickest medical intervention can only be achieved with the use of an on-site automatic external defibrillator (AED); the response from an off-site provider would take longer regardless of the provider location. This fact is also well documented and serves as the basis for many private and public locations (e.g., airports, factories, government buildings) maintaining on-site cardiac defibrillation devices. Therefore, staff concludes that, with the advent of modern cost-effective cardiac defibrillation devices, it is proper in a power plant environment to maintain such a device on site in order to treat cardiac arrhythmias resulting from industrial accidents or other non-work related causes.

Staff proposes Condition of Certification **WORKER SAFETY-5,** which would require that this portable AED be located on site, that all power plant employees on site during operations be trained in its use, and that a representative number of workers on site during construction and commissioning also be trained in its use.

CUMULATIVE IMPACTS AND MITIGATION

Staff reviewed the potential for the construction and operation of the AEC combined with existing industrial facilities and expected new facilities to result in impacts on the fire and emergency service capabilities of the LBFD and found that there was no significant potential for cumulative impacts to occur.

Based upon staff's experience with power plants around the state, staff concludes that while it is *possible* that during a major earthquake (or other major event) response to the power plant could impact on the LBFD, the *likelihood* of that happening is less than significant. Therefore, this project would not have a significant incremental or cumulative impact on the department's ability to respond to a fire or other emergency and no mitigation is required.

The LBFD has stated that its ability to respond to emergency calls will not be affected by the construction and operation of the AEC. Therefore, staff agrees with the applicant that mitigation is not required.

COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Staff concludes that construction and operation of AEC would be in compliance with all applicable laws, ordinances, regulations, and standards (LORS) regarding long-term and short-term project impacts in the area of worker safety and fire protection.

CONCLUSIONS

Staff concludes that if the applicant for the proposed AEC provides a Project Construction Safety and Health Program and a Project Operations and Maintenance Safety and Health Program as required by Conditions of Certification **WORKER SAFETY-1**, and **-2** and fulfills the requirements of Condition of Certification **WORKER SAFETY-3** through **-8**, the project would incorporate sufficient measures to ensure adequate levels of industrial safety and comply with applicable LORS. Staff also concludes that the operation of this power plant would not present a significant impact on the local fire department.

PROPOSED CONDITIONS OF CERTIFICATION

WORKER SAFETY-1 The project owner shall submit to the compliance project manager (CPM) a copy of the Project Construction Health and Safety Program containing the following:

- a Construction Personal Protective Equipment Program;
- a Construction Exposure Monitoring Program;
- a Construction Injury and Illness Prevention Program;
- a Construction Emergency Action Plan; and
- a Construction Fire Prevention Plan.

The Personal Protective Equipment Program, the Exposure Monitoring Program, and the Injury and Illness Prevention Program shall be submitted to the CPM for review and approval concerning compliance of the program with all applicable safety orders. The Construction Emergency Action Plan and the Fire Prevention Plan shall be submitted to the Long Beach Fire Department for review and comment prior to submittal to the CPM for approval.

Verification: At least 30 days prior to the start of construction, the project owner shall submit to the CPM for review and approval a copy of the Project Construction and Safety and Health Program. The project owner shall provide to the CPM a copy of a letter from the Long Beach Fire Department stating the fire department's comments on the Construction Fire Prevention Plan and Emergency Action Plan have been addressed.

WORKER SAFETY-2 The project owner shall submit to the CPM a copy of the Project Operations and Maintenance Safety and Health Program containing the following:

- an Operation Injury and Illness Prevention Plan;
- an Emergency Action Plan;
- Hazardous Materials Management Program;
- Fire Prevention Plan (Cal Code Regs., tit. 8, § 3221);
- Fire Protection System Impairment Program; and
- Personal Protective Equipment Program (Cal Code Regs, tit.8, §§ 3401—3411).

The Operation Injury and Illness Prevention Plan, Hazardous Materials Management Program, Emergency Action Plan, Fire Prevention Plan, Fire Protection System Impairment Program, and Personal Protective Equipment Program shall be submitted to the CPM for review and approval concerning compliance of the programs with all applicable safety orders. The Fire Prevention Plan, Fire Protection System Impairment Program, and the Emergency Action Plan shall also be submitted to the Long Beach Fire Department for review and comment.

Verification: At least 30 days prior to the start of first-fire or commissioning, the project owner shall submit to the CPM for approval a copy of the Project Operations and Maintenance Safety and Health Program. The project owner shall provide a copy to the CPM of a letter from the Long Beach Fire Department stating the fire department's timely comments have been addressed on the Operations Fire Prevention Plan, Fire Protection System Impairment Program, and Emergency Action Plan.

WORKER SAFETY-3 The project owner shall provide a site Construction Safety Supervisor (CSS) who, by way of training and/or experience, is knowledgeable of power plant construction activities and relevant laws, ordinances, regulations, and standards; is capable of identifying workplace hazards relating to the construction activities; and has authority to take appropriate action to assure compliance and mitigate hazards. The CSS shall:

- have overall authority for coordination and implementation of all occupational safety and health practices, policies, and programs;
- assure that the safety program for the project complies with Cal/OSHA and federal regulations related to power plant projects;
- assure that all construction and commissioning workers and supervisors receive adequate safety training;

- complete accident and safety-related incident investigations and emergency response reports for injuries and inform the CPM of safety-related incidents; and
- assure that all the plans identified in Conditions of Certification **WORKER SAFETY**-1 and -2 are implemented.

Verification: At least 30 days prior to the start of site mobilization, the project owner shall submit to the CPM the name and contact information for the Construction/Demolition Safety Supervisor (CSS). The contact information of any replacement CSS shall be submitted to the CPM within one business day.

The project owner shall ensure that the CSS submits in the Monthly Compliance Report a monthly safety inspection report to include:

- record of all employees trained for that month (all records shall be kept on site for the duration of the project);
- summary report of safety management actions and safety-related incidents that occurred during the month;
- report of any continuing or unresolved situations and incidents that may pose danger to life or health including near misses;
- report any visits from Cal/OSHA and/or any complaints from workers to Cal/OSHA; and
- report of accidents, near misses, and injuries that occurred during the month.

WORKER SAFETY-4 The project owner shall make payments to the Delegate Chief Building Official (DCBO) for the services of a Safety Monitor, who shall be an independent third party, based upon a reasonable fee scheduled to be negotiated between the project owner and the DCBO. Those services shall be in addition to other work performed by the DCBO. The Safety Monitor shall be selected by the DCBO and approved by the CPM. The Safety Monitor will report directly to the DCBO and CPM and will be responsible for verifying that the Construction Safety Supervisor, as required in Condition of Certification **WORKER SAFETY-3**, implements 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.

WORKER SAFETY-5 The project owner shall ensure that a portable automatic external defibrillator (AED) is located on site during construction and operations and shall implement a program to ensure that workers are properly trained in its use and that the equipment is properly maintained and functioning at all times. During construction and commissioning, the following persons shall be trained in its use and shall be on site whenever the workers that they supervise are on site: the Construction Project Manager or delegate, the Construction Safety Supervisor or delegate, and all shift foremen. During operations, all power plant employees shall be trained in its use. The training program shall be submitted to 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 a copy of the AED training and maintenance program for review and approval. At the start of construction, the project owner shall submit a list of signatures of all the people who have been trained in the use of the portable AED to the CPM. In addition, the project owner shall proof that a portable AED is available on site.

WORKER SAFETY-6 The project owner shall prepare and submit to the CPM for review and approval, an Emergency Access Plan that shows a secondary emergency access to the AEC site where the specifications of the roadway will comply with the Long Beach Municipal Code and the 2013 (or latest edition) California Fire Code. A secondary access must be maintained to the standards listed above for the life of the project.

Verification: At least 60 days prior to the start of construction, or within a time frame approved by the CPM, the project owner shall submit the Emergency Access Plan showing the secondary emergency access to the Long Beach Fire Department for review and timely comment, and to the CPM for review and approval.

WORKER SAFETY-7 The project owner shall adhere to all applicable provisions of the latest version of NFPA 850: Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations as the minimum level of fire protection. The project owner shall interpret and adhere to all applicable NFPA 850 recommended provisions and actions stating “should” as “shall.” In any situations where both NFPA 850 and the state or local LORS have application, the more restrictive shall apply. All fire protection system specifications and drawings shall be submitted to the CPM for review and approval.

Verification: The project owner shall ensure that the project adheres to all applicable provisions of NFPA 850. At least 60 days prior to the start of construction of the fire protection system, the project owner shall provide all fire protection system specifications and drawings to the Long Beach Fire Department for review and comment, to the CPM for review and approval, and to the DCBO for plan check and construction inspection.

WORKER SAFETY-8 The project owner shall ensure that the natural gas compressor buildings at the Alamitos Energy Center shall comply with NFPA requirements for compressor enclosures and that it shall also comply with the requirements set forth in 40 CFR 192 Sections 163 through 173 regarding fire and explosion protection systems. All documentation of plans for the compressor enclosure shall be submitted to the CPM for review and approval.

Verification: At least 60 days prior to the start of construction of the natural gas compressor building the project owner shall submit to the LBFD for review and comment, and to the CPM for review and approval, documentation of plans for the compressor enclosure at the Alamitos Energy Center demonstrating compliance with the condition described above.

REFERENCES

AEC 2015i - Alamitos Energy Center Supplemental AFC (TN 206428-1). Submitted on October 26, 2015. CEC/ Docket on October 26, 2015.

CEC 2016j - California Energy Commission. Report of Conversation: Alamitos Siting-related Visit for Hazardous Materials/Worker Safety (TN212030). Docketed on 06/30/2016.

ALAMITOS ENERGY CENTER (13-AFC-01)

COMPLIANCE CONDITIONS AND COMPLIANCE MONITORING PLAN

SHAWN PITTARD

INTRODUCTION

The Alamitos Energy Center (AEC) Compliance Conditions of Certification, including a Compliance Monitoring Plan (Compliance Plan), are established as required by Public Resources Code section 25532. The Compliance Plan provides a means for assuring that the facility is constructed, operated, and closed in compliance with public health and safety and environmental law; all other applicable laws, ordinances, regulations, and standards (LORS); and the conditions adopted by the California Energy Commission (Energy Commission) and specified in the Energy Commission's written Decision on the project's Application for Certification (AFC).

The Compliance Plan is composed of elements that:

- set forth the duties and responsibilities of the compliance project manager (CPM), the project owner or operator (project owner), delegate agencies, and others;
- set forth the requirements for handling confidential records and maintaining the compliance record;
- state procedures for settling disputes and making post-certification changes;
- state the requirements for periodic compliance reports and other administrative procedures that are necessary to verify the compliance status for all Energy Commission-approved conditions of certification;
- establish contingency planning, facility non-operation protocols, and closure requirements; and
- establish a tracking method for the technical area conditions of certification that contain measures required to mitigate potentially adverse project impacts associated with construction, operation, and closure below a level of significance; each technical condition of certification also includes one or more verification provisions that describe the means of assuring that the condition has been satisfied.

KEY PROJECT EVENT DEFINITIONS

The following terms and definitions help determine when various conditions of certification are implemented.

PROJECT CERTIFICATION

Project certification occurs on the day the Energy Commission files its decision after adopting it at a publically noticed Business Meeting or hearing. At that time, all Energy Commission conditions of certification become binding on the project owner and the facility. Also at that time, the project enters the compliance phase. It retains the same docket number it had during its siting review, but the letter "C" is added at the end (for example, 02-AFC-1C) to differentiate the compliance phase activities from those of the certification proceeding.

SITE ASSESSMENT AND PRE-CONSTRUCTION ACTIVITIES

The below-listed site assessment and pre-construction activities may be initiated or completed prior to the start of construction, subject to the CPM's approval of the specific site assessment or pre-construction activities. Site assessment and pre-construction activities include the following, but only to the extent the activities are minimally disruptive to soil and vegetation and will not affect listed or special-status species or other sensitive resources:

1. the installation of environmental monitoring equipment;
2. a minimally invasive soil or geological investigation;
3. a topographical survey;
4. any other study or investigation to determine the environmental acceptability or feasibility of the use of the site for any particular facility; and
5. any minimally invasive work to provide safe access to the site for any of the purposes specified in 1 through 4, above.

SITE MOBILIZATION AND CONSTRUCTION

When a condition of certification requires the project owner to take an action or obtain CPM approval prior to the start of construction, or within a period of time relative to the start of construction, that action must be taken, or approval must be obtained, prior to any site mobilization or construction activities, as defined below.

Site mobilization and construction activities are those necessary to provide site access for construction mobilization and facility installation, including both temporary and permanent equipment and structures, as determined by the CPM.

Site mobilization and construction activities include, but are not limited to:

1. ground disturbance activities like grading, boring, trenching, leveling, mechanical clearing, grubbing, and scraping;
2. site preparation activities, such as access roads, temporary fencing, trailer and utility installation, construction equipment installation and storage, equipment and supply laydown areas, borrow and fill sites, temporary parking facilities, chemical spraying, controlled burns; and
3. permanent installation activities for all facility and linear structures, including access roads, fencing, utilities, parking facilities, equipment storage, mitigation and landscaping activities, and other installations, as applicable.

COMMISSIONING

Commissioning activities test the functionality of the installed components and systems to ensure the facility operates safely and reliably. Commissioning provides a multistage, integrated, and disciplined approach to testing, calibrating, and proving all of the project’s systems, software, and networks. For compliance monitoring purposes, examples of commissioning activities include interface connection and utility pre-testing, “cold” and “hot” electrical testing, system pressurization and optimization tests, grid synchronization, and combustion turbine “first fire” and tuning.

START OF COMMERCIAL OPERATION

For compliance monitoring purposes, “commercial operation” or “operation” begins once commissioning activities are complete, the final or temporary certificate of occupancy has been issued, and the power plant has reached reliable steady-state electrical production. At the start of commercial operation, plant control is usually transferred from the construction manager to the plant operations manager. Operation activities can include a steady state of electrical production, or, for “peaker plants,” a seasonal or on-demand operational regime to meet peak load demands.

NON-OPERATION AND CLOSURE

Non-operation is time-limited and can encompass part or all of a facility. Non-operation can be a planned event, usually for equipment maintenance or repair, or unplanned, usually the result of unanticipated events or emergencies.

Closure is a facility shutdown with either no intent to restart operation or may result from unsuccessful efforts to re-start over a lengthy period of non-operation. Facility closures can occur due to a variety of factors, including, but not limited to, irreparable damage and/or functional or economic obsolescence.

ROLES AND RESPONSIBILITIES

Provided below is a generalized description of the compliance roles and responsibilities for Energy Commission staff (staff) and the project owner for the construction and operation of the AEC project.

COMPLIANCE PROJECT MANAGER RESPONSIBILITIES

The CPM’s compliance monitoring and project oversight responsibilities include:

1. ensuring that the design, construction, operation, and closure of the project facilities are in compliance with the terms and conditions of the Decision;
2. resolving complaints;
3. processing post-certification project amendments for changes to the project description, conditions of certification, ownership or operational control, and requests for extension of the deadline for the start of construction (see **COM-10** for instructions on filing a Petition to Amend or to extend a construction start date);
4. documenting and tracking compliance filings; and
5. ensuring that the compliance files are maintained and accessible.

The CPM is the central contact person for the Energy Commission during project pre-construction, construction, operation, emergency response, and closure. The CPM will consult with the appropriate responsible parties when handling compliance issues, disputes, complaints and amendments.

All project compliance submittals are submitted to the CPM for processing. Where a submittal requires CPM approval, the approval will involve all appropriate Energy Commission technical staff and management. All submittals must include searchable electronic versions (.pdf, MS Word, or equivalent files).

Pre-Construction and Pre-Operation Compliance Meeting

The CPM usually schedules pre-construction and pre-operation compliance meetings prior to the projected start-dates of construction, plant operation, or both. These meetings are used to assist the Energy Commission and the project owner's technical staff in the status review of all required pre-construction or pre-operation conditions of certification, and facilitate staff taking proper action if outstanding conditions remain. In addition, these meetings shall ensure, to the extent possible, that the Energy Commission's conditions of certification do not delay the construction and operation of the plant due to last minute, unforeseen issues or a compliance oversight. Pre-construction meetings held during the certification process must be publicly noticed unless they are confined to administrative issues and processes.

Energy Commission Record

The Energy Commission maintains the following documents and information as public record, in either the Compliance file or Dockets Unit files, for the life of the project (or other period as specified):

- all documents demonstrating compliance with any legal requirements relating to the construction, operation, and closure of the facility;
- all Monthly and Annual Compliance Reports (MCRs, ACRs) and other required periodic compliance reports (PCRs) filed by the project owner;
- all project-related requests for investigation of alleged noncompliance filed with the Energy Commission; and
- all petitions for project or condition of certification changes and the resulting staff or Energy Commission action.

Chief Building Official Delegation and Agency Cooperation

Under the California Building Code standards, while monitoring project construction and operation, staff acts as, and has the authority of, the Chief Building Official (CBO). Staff may delegate some CBO responsibility to either an independent third-party contractor or a local building official. However, staff retains CBO authority when selecting a delegate CBO (DCBO), including the interpretation and enforcement of state and local codes, and the use of discretion, as necessary, in implementing the various codes and standards.

The DCBO will be responsible for facilitating compliance with all environmental conditions of certification, including cultural resources, and for the implementation of all appropriate codes, standards, and Energy Commission requirements. The DCBO will conduct on-site (including linear facilities) reviews and inspections at intervals necessary to fulfill these responsibilities. The project owner will pay all DCBO fees necessary to cover the costs of these reviews and inspections.

PROJECT OWNER RESPONSIBILITIES

The project owner is responsible for ensuring that all conditions of certification and applicable LORS in its license are satisfied. The project owner will submit all compliance submittals to the CPM for processing unless the conditions specify another recipient. The Compliance Conditions regarding post-certification changes specify measures that the project owner must take when modifying the project's design, operation, or performance requirements, or to transfer ownership or operational control. Failure to comply with any of the conditions of certification or applicable LORS may result in a non-compliance report, an administrative fine, certification revocation, or any combination thereof, as appropriate. A summary of the Compliance Conditions of Certification are included as **Compliance Table 1** at the end of this Compliance Plan.

COMPLIANCE ENFORCEMENT

The Energy Commission's legal authority to enforce the terms and conditions of its Decision are specified in Public Resources Code sections 25534 and 25900. The Energy Commission may amend or revoke a project certification and may impose a civil penalty for any significant failure to comply with the terms or conditions of the Decision. The Energy Commission's actions and fine assessments would take into account the specific circumstances of the incident(s).

PERIODIC COMPLIANCE REPORTING

Many of the conditions of certification require submittals in the MCRs and ACRs. All compliance submittals assist the CPM in tracking project activities and monitoring compliance with the terms and conditions of the Energy Commission's Decision. During construction, the project owner or an authorized agent will submit compliance reports on a monthly basis. During operation, compliance reports are submitted annually; though reports regarding compliance with various technical area conditions of certification may be required more often (e.g. AIR QUALITY) and if the project is operating with a temporary permit to occupy. Further detail regarding the MCR/ACR content and the requirements for an accompanying compliance matrix are described below.

INVESTIGATION REQUESTS AND COMPLAINT PROCEDURES

Any person may file a Request for Investigation alleging noncompliance with the conditions of certification, Energy Commission regulations or orders. Such a request shall be filed with, and reviewed by, the Executive Director. The provisions setting forth the Request for Investigation process can be found in Title 20, California Code of Regulations, sections 1230 through 1232.5. The Request for Investigation may result in the Executive Director bringing a complaint against the alleged violator under section 1233 and seeking administrative penalties.

While this formal process exists, it is anticipated that in many instances, issues can be resolved by working with the CPM using a more informal process of contacting the CPM and discussing potential noncompliance. This process is available for both the public to bring forth concerns and the project owner to bring up potential issues with the facility.[1]

Informal Resolution Process

Issues related to the construction or operation of a licensed facility should be directed to the CPM who will act as the point person in working with the public and project owner to resolve these concerns. The CPM can initiate meetings with stakeholders, investigate the facts surrounding the issues, obtain information from the facility owner, work with staff to review documents and information, issue reports and facilitate solutions to issues related to the construction and operation of the facility.

Contacting the CPM seeking an informal resolution may precede the formal Request for Investigation procedure specified in Title 20, California Code of Regulations, section 1231, but is not intended to be a prerequisite or requirement to utilizing the Request for Investigation process. The informal resolution process encourages all parties to openly discuss the conflict and reach a mutually agreeable solution.

Request for Informal Investigation

Any person or agency may request that the CPM conduct an informal investigation of alleged noncompliance with the Energy Commission's conditions of certification. Upon receipt of an informal investigation request, the CPM will promptly provide both verbal and written notification to the project owner of the allegation(s), along with all known and relevant information of the alleged noncompliance. The CPM will evaluate the request and, if the CPM determines that further investigation is necessary, will ask the project owner to promptly conduct an inquiry into the matter and provide a written report of the investigation results within seven (7) days, along with corrective measures proposed or undertaken. Depending on the urgency of the matter, the CPM may conduct a site visit and/or request that the project owner provide an initial verbal report within 48 hours.

Emergencies Requiring Immediate Action

If the CPM determines there is a situation that constitutes an emergency requiring immediate action to protect the public health, welfare, or safety, the CPM will request that the Project Owner take appropriate action, which may entail shutting down the facility. If the Project Owner fails to act as requested, the CPM may initiate the formal process for seeking injunctive relief as set forth in Public Resources Code 25900.

POST-CERTIFICATION CHANGES TO THE ENERGY COMMISSION DECISION

The project owner must petition the Energy Commission pursuant to Title 20, California Code of Regulations, section 1769, to modify the design, operation, or performance requirements of the project and/or the linear facilities, or to transfer ownership or operational control of the facility. It is the responsibility of the project owner to contact

[1] The California Office of Administrative Law provides on-line access to the California Code of Regulations at http://www.oal.ca.gov/.

the CPM to determine if a proposed project change should be considered a project modification pursuant to section 1769. The CPM will determine whether staff approval will be sufficient, or whether Energy Commission approval will be necessary.

A project owner is required to submit a five thousand ($5,000) dollar fee for every Petition to Amend (PTA) a previously certified facility, pursuant to Public Resources Code section 25806(e). If the actual amendment processing costs exceed $5,000.00, the total PTA reimbursement fees owed by a project owner will not exceed the maximum filing fee for an AFC, which is adjusted annually. Current amounts for PTA fees are available at http://www.energy.ca.gov/siting/filing_fees.html. Implementation of a project modification without first securing Energy Commission approval may result in an enforcement action including civil penalties in accordance with Public Resources Code, section 25534.

Below is a summary of the criteria for determining the type of approval process required, reflecting the provisions of Title 20, California Code of Regulations, section 1769, at the time this compliance plan was drafted. If the Energy Commission modifies this regulation, the language in effect at the time of the requested change shall apply. Upon request, the CPM can provide sample formats of these submittals.

AMENDMENT

The project owner shall submit a Petition to Amend the Energy Commission Decision, pursuant to Title 20, California Code of Regulations, section 1769 (a), when proposing modifications to the design, operation, or performance requirements of the project and/or the linear facilities. If a proposed modification results in an added, changed, or deleted condition of certification, or makes changes causing noncompliance with any applicable LORS, the petition will be processed as a formal amendment to the Decision, triggering public notification of the proposal, public review of the Energy Commission staff's analysis, and consideration of approval by the full Energy Commission.

CHANGE OF OWNERSHIP AND/OR OPERATIONAL CONTROL

Change of ownership or operational control also requires that the project owner file a petition pursuant to section 1769 (b). This process requires public notice and approval by the full Energy Commission, but does not require submittal of an amendment processing fee.

STAFF-APPROVED PROJECT MODIFICATION

Modifications that do not result in additions, deletions, or changes to the conditions of certification, that are compliant with the applicable LORS, and that will not have significant environmental impacts, may be authorized by the CPM as a staff-approved project modification pursuant to section 1769 (a)(2). Once the CPM files a Notice of Determination of the proposed project modifications, any person may file an objection to the CPM's determination within 14 days of service on the grounds that the modification does not meet the criteria of section 1769 (a)(2). If there is a valid objection to the CPM's determination, the petition must be processed as a formal amendment to the Decision and must be considered for approval by the full Energy Commission at a publically noticed Business Meeting or hearing. This process requires submittal of an amendment processing fee.

VERIFICATION CHANGE

Pursuant to section 1770(e), a verification may be modified by the CPM, after giving notice to the project owner, if the change does not conflict with any condition of certification.

EMERGENCY RESPONSE CONTINGENCY PLANNING AND INCIDENT REPORTING

To protect public health and safety and environmental quality, the conditions of certification include contingency planning and incident reporting requirements to ensure compliance with necessary health and safety practices. A well-drafted contingency plan avoids or limits potential hazards and impacts resulting from serious incidents involving personal injury, hazardous spills, flood, fire, explosions or other catastrophic events and ensures a comprehensive timely response. All such incidents must be reported immediately to the CPM and documented. These requirements are designed to build from “lessons learned,” limit the hazards and impacts, anticipate and prevent recurrence, and provide for the safe and secure shutdown and re-start of the facility.

FACILITY CLOSURE

The Energy Commission cannot reasonably foresee all potential circumstances in existence when a facility permanently closes. Therefore, the closure conditions provided herein strive for the flexibility to address circumstances that may exist at some future time. Most importantly, facility closure must be consistent with all applicable Energy Commission conditions of certification and the LORS in effect at that time.

Prior to submittal of the facility’s Final Closure Plan to the Energy Commission, the project owner and the CPM will hold a meeting to discuss the specific contents of the plan. In the event that significant issues are associated with the plan's approval, the CPM will hold one or more workshops and/or the Energy Commission may hold public hearings as part of its approval procedure.

With the exception of measures to eliminate any immediate threats to public health and safety or to the environment, facility closure activities cannot be initiated until the Energy Commission approves the Final Closure Plan and Cost Estimate, and the project owner complies with any requirements the Energy Commission may incorporate as conditions of approval of the Final Closure Plan.

COMPLIANCE CONDITIONS OF CERTIFICATION

For the AEC project, staff proposes the **Compliance** Conditions of Certification below.

COM-1 **Unrestricted Access.** The project owner shall take all steps necessary to ensure that the CPM, responsible Energy Commission staff, and delegate agencies or consultants have unrestricted access to the facility site, related facilities, project-related staff, and the records maintained on-site for the purpose of conducting audits, surveys, inspections, or general or closure-related site visits. Although the CPM will normally schedule site visits on dates and times agreeable to the project owner, the CPM reserves the right to make unannounced visits at any time, whether such visits are by the CPM in person or through representatives from Energy Commission staff, delegated agencies, or consultants.

COM-2 **Compliance Record**. The project owner shall maintain electronic copies of all project files and submittals on-site, or at an alternative site approved by the CPM, for the operational life and closure of the project. The files shall also have at least one hard copy of:

1. the facility's Application for Certification;
2. all amendment petitions and Energy Commission orders;
3. all site-related environmental impact and survey documentation;
4. all appraisals, assessments, and studies for the project;
5. all finalized original and amended structural plans and "as-built" drawings for the entire project;
6. all citations, warnings, violations, or corrective actions applicable to the project, and
7. the most current versions of any plans, manuals, and training documentation required by the conditions of certification or applicable LORS.

Energy Commission staff and delegate agencies shall, upon request to the project owner, be given unrestricted access to the files maintained pursuant to this condition.

COM-3 **Compliance Verification Submittals**. Verification lead times associated with the start of construction may require the project owner to file submittals during the amendment process, particularly if construction is planned to commence shortly after certification. The verification procedures, unlike the conditions, may be modified as necessary by the CPM after notice to the project owner.

A cover letter from the project owner or an authorized agent is required for all compliance submittals and correspondence pertaining to compliance matters. The cover letter subject line shall identify the project by AFC number, cite the appropriate condition of certification number(s), and give a brief description of the subject of the submittal. When submitting supplementary or corrected information, the project owner shall reference the date of the previous submittal and the condition(s) of certification applicable.

All reports and plans required by the project's conditions of certification shall be submitted in a searchable electronic format (.pdf, MS Word or Excel, etc.) and include standard formatting elements such as a table of contents identifying by title and page number each section, table, graphic, exhibit, or addendum. All report and/or plan graphics and maps shall be adequately scaled and shall include a key with descriptive labels, directional headings, a bar scale, and the most recent revision date.

The project owner is responsible for the content and delivery of all verification submittals to the CPM, and that the actions required by the verification were satisfied by the project owner or an agent of the project owner. All submittals shall be accompanied by an electronic copy on an electronic storage medium, or by e-mail, as agreed upon by the CPM. If hard copy submittals are required, please address as follows:

Compliance Project Manager
ALAMITOS ENERGY CENTER (13-AFC-01C)
California Energy Commission
1516 Ninth Street (MS-2000)
Sacramento, CA 95814

COM-4 Pre-Construction Matrix and Tasks Prior to Start of Construction. Prior to commencing construction, the project owner shall submit to the CPM a compliance matrix including those conditions that must be fulfilled before the start of construction The matrix shall be included with the project owner's first compliance submittal or prior to the first pre-construction meeting, whichever comes first, and shall be submitted in a format similar to the description below.

Site mobilization and construction activities shall not start until the following have occurred:

1. The project owner has submitted the pre-construction matrix and all compliance verifications pertaining to pre-construction conditions of certification; and

2. The CPM has issued an authorization-to-construct letter to the project owner.

The deadlines for submitting various compliance verifications to the CPM allow staff sufficient time to review and comment on, and, if necessary, also allow the project owner to revise the submittal in a timely manner. These procedures help ensure that project construction proceeds according to schedule. Failure to submit required compliance documents by the specified deadlines may result in delayed authorizations to commence various stages of the project.

If the project owner anticipates site mobilization immediately following project certification, it may be necessary for the project owner to file compliance submittals prior to project certification. In these instances, compliance verifications can be submitted in advance of the required deadlines and the anticipated authorizations to start construction. The project owner must understand that submitting compliance verifications prior to these authorizations is at the owner's own risk. Any approval by Energy Commission staff prior to project certification is subject to change based upon the Commission Decision, or amendment thereto, and early staff compliance approvals do not imply that the Energy Commission will certify the project for actual construction and operation.

COM-5 **Compliance Matrix**. The project owner shall submit a compliance matrix to the CPM with each MCR and ACR which shall identify:

1. the technical area (e.g., biological resources, facility design, etc.);
2. the condition number;
3. a brief description of the verification action or submittal required by the condition;
4. the date the submittal is required (e.g., 60 days prior to construction, after final inspection, etc.);
5. the expected or actual submittal date;
6. the date a submittal or action was approved by the Chief Building Official (CBO), CPM, or delegate agency, if applicable;
7. the compliance status of each condition (e.g., "not started," "in progress" or "completed" (include the date); and
8. if the condition was amended, the updated language and the date the amendment was proposed or approved.

The CPM can provide a template for the compliance matrix upon request.

COM-6 **Monthly Compliance Report**. The first MCR is due one month following the docketing of the project's Decision unless otherwise agreed to by the CPM. The first MCR shall include the AFC number and an initial list of dates for each of the events identified on the Key Events List. (The Key Events List form is found at the end of this Compliance Conditions and Compliance Monitoring Plan section.)

During pre-construction, construction, or closure, the project owner or authorized agent shall submit an electronic searchable version of the MCR to the CPM within ten (10) business days after the end of each reporting month. MCRs shall be submitted each month until construction is complete and the final certificate of occupancy is issued by the DCBO. MCRs shall be clearly identified for the month being reported. The MCR shall contain, at a minimum:

1. a summary of the current project construction status, a revised/updated schedule if there are significant delays, and an explanation of any significant changes to the schedule;
2. documents required by specific conditions to be submitted along with the MCR. Each of these items shall be identified in the transmittal letter, as well as the conditions they satisfy, and submitted as attachments to the MCR;
3. an initial, and thereafter updated, compliance matrix showing the status of all conditions of certification;
4. a list of conditions that have been satisfied during the reporting period, and a description or reference to the actions that satisfied the condition;
5. a list of any submittal deadlines that were missed, accompanied by an explanation and an estimate of when the information will be provided;
6. a cumulative listing of any approved changes to conditions of certification;
7. a listing of any filings submitted to, and permits issued by, other governmental agencies during the month;
8. a projection of project compliance activities scheduled during the next (2) two months; the project owner shall notify the CPM as soon as any changes are made to the project construction schedule that would affect compliance with conditions of certification;
9. a listing of the month's additions to the on-site compliance file; and
10. a listing of incidents, complaints, notices of violation, official warnings, or citations received during the month; a list of any incidents that occurred during the month, a description of the actions taken to date to resolve the issues; and the status of any unresolved actions noted in the previous MCRs.

COM-7 **Periodic and Annual Compliance Reports**. After construction is complete, the project owner must submit searchable electronic ACRs to the CPM, as well as other periodic compliance reports (PCRs) required by the various technical disciplines. ACRs shall be completed for each year of commercial operation and are due each year on a date agreed to by the CPM. Other PCRs (e.g. quarterly reports or decommissioning reports to monitor closure compliance), may be specified by the CPM. The searchable electronic copies may be filed on an electronic storage medium or by e-mail, subject to CPM approval. Each ACR must include the AFC number, identify the reporting period, and contain the following:

1. an updated compliance matrix which shows the status of all conditions of certification (fully satisfied conditions do not need to be included in the matrix after they have been reported as completed);
2. a summary of the current project operating status and an explanation of any significant changes to facility operations during the year;
3. documents required by specific conditions to be submitted along with the ACR; each of these items shall be identified in the transmittal letter with the conditions it satisfies and submitted as an attachment to the ACR;
4. a cumulative list of all post-certification changes approved by the Energy Commission or the CPM;
5. an explanation for any submittal deadlines that were missed, accompanied by an estimate of when the information will be provided;
6. a listing of filings submitted to, or permits issued by, other governmental agencies during the year;
7. a projection of project compliance activities scheduled during the next year;
8. a listing of the year's additions to the on-site compliance file;
9. an evaluation of the Site Contingency Plan, including amendments and plan updates; and
10. a listing of complaints, incidents, notices of violation, official warnings, and citations received during the year, a description of how the issues were resolved, and the status of any unresolved complaints.

COM-8 **Confidential Information.** Any information that the project owner considers confidential shall be submitted to the Energy Commission's Executive Director with an application for confidentiality, pursuant to Title 20, California Code of Regulations, section 2505(a). Any information deemed confidential pursuant to the regulations will remain undisclosed, as provided in Title 20, California Code of Regulations, sections 2501-2507.

COM-9 **Annual Energy Facility Compliance Fee**. Pursuant to the provisions of section 25806 (b) of the Public Resources Code, the project owner is required to pay an annually adjusted compliance fee. Current compliance fee information is available on the Energy Commission's website at http://www.energy.ca.gov/siting/filing_fees.html. The project owner may also contact the CPM for the current fee information. The initial payment is due on the date the Energy Commission dockets its final Decision. All subsequent payments are due by July 1 of each year in which the facility retains its certification.

COM-10 **Amendments, Staff-Approved Project Modifications, Ownership Changes, and Verification Changes.** The project owner shall petition the Energy Commission, pursuant to Title 20, California Code of Regulations, section 1769, to modify the design, operation, or performance requirements of the project or linear facilities, or to transfer ownership or operational control of the facility. The CPM will determine whether staff approval will be sufficient, or whether Commission approval will be necessary. It is the project owner's responsibility to contact the CPM to determine if a proposed project change triggers the requirements of section 1769. Section 1769 details the required contents for a Petition to Amend an Energy Commission Decision. The only change that can be requested by means of a letter to the CPM is a request to change the verification method of a condition of certification.

A project owner is required to submit a five thousand ($5,000) dollar fee for every Petition to Amend a previously certified facility, pursuant to Public Resources Code section 25806(e). If the actual amendment processing costs exceed $5,000.00, the total Petition to Amend reimbursement fees owed by a project owner will not exceed seven hundred fifty thousand dollars ($750,000), adjusted annually. Current amendment fee information is available on the Energy Commission's website at http://www.energy.ca.gov/siting/filing_fees.html.

COM-11 **Reporting of Complaints, Notices, and Citations**. Prior to the start of construction or closure, the project owner shall send a letter to property owners within one (1) mile of the project, notifying them of a telephone number to contact project representatives with questions, complaints or concerns. If the telephone is not staffed 24 hours per day, it must include automatic answering with date and time stamp recording.

The project owner shall respond to all recorded complaints within 24 hours or the next business day. The project site shall post the telephone number on-site and make it easily visible to passersby during construction, operation, and closure. The project owner shall provide the contact information to the CPM and promptly report any disruption to the contact system or telephone number change to the CPM, who will provide it to any persons contacting him or her with a complaint.

Within five (5) days of receipt, the project owner shall report and provide copies to the CPM of all complaints (including, but not limited to, noise and lighting complaints, notices of violation, notices of fines, official warnings, and citations). Complaints shall be logged and numbered. Noise complaints shall be recorded on the form provided in the Noise and Vibration conditions of certification. All other complaints shall be recorded on the complaint form (Attachment A) at the end of this section. Additionally, the project owner must include in the next subsequent MCR, ACR, or PCR, copies of all complaints, notices, warnings, citations and fines, a description of how the issues were resolved, and the status of any unresolved or ongoing matters.

COM-12 **Emergency Response Site Contingency Plan.** No less than 60 days prior to the start of construction (or other CPM-approved date), the project owner shall submit for CPM review and approval, an Emergency Response Site Contingency Plan (Contingency Plan). Subsequently, no less than 60 days prior to the start of commercial operation, the project owner shall update (as necessary) and resubmit the Contingency Plan for CPM review and approval. The Contingency Plan shall evidence a facility's coordinated emergency response and recovery preparedness for a series of reasonably foreseeable emergency events. The CPM may require Contingency Plan updating over the life of the facility. Contingency Plan elements include, but are not limited to:

1. A site-specific list and direct contact information for persons, agencies, and responders to be notified for an unanticipated event;
2. A detailed and labeled facility map, including all fences and gates, the windsock location (if applicable), the on- and off-site assembly areas, and the main roads and highways near the site;
3. A detailed and labeled map of population centers, sensitive receptors, and the nearest emergency response facilities;
4. A description of the on-site, first response and backup emergency alert and communication systems, site-specific emergency response protocols, procedures for maintaining the facility's contingency response capabilities, including a detailed map of interior and exterior evacuation routes, and the planned location(s) of all permanent safety equipment;
5. An organizational chart including the name, contact information, and first aid/emergency response certification(s) and renewal date(s) for all personnel regularly on-site;
6. A brief description of reasonably foreseeable, site-specific incidents and accident sequences (on- and off-site), including response procedures and protocols and site security measures to maintain twenty-four-hour site security;
7. Procedures for maintaining contingency response capabilities; and
8. The procedures and implementation sequence for the safe and secure shutdown of all non-critical equipment and removal of hazardous materials and waste (see also specific conditions of certification for the technical areas of Public Health, Waste Management, Hazardous Materials Management, and Worker Safety).

COM-13 **Incident-Reporting Requirements.** The project owner shall notify the CPM or Compliance Office Manager, by telephone and e-mail, within one (1) hour after it is safe and feasible, upon identification of any incident at the power plant or appurtenant facilities that results or could result in any of the following:

1. a reduction in the maximum output capability of a generating unit of at least ten (10) MW or five (5) percent, whichever is greater, that lasts for fifteen (15) minutes or longer (or such values as trigger CAISO no prior notice outage reporting requirements under any subsequent

modifications to CAISO tariff 9.3.10.3.1); facility's ability to respond to dispatch (excluding forced outages cause by protective equipment or other typically encountered shutdown events);

2. potential health impacts to the surrounding population or any release that could result in an off-site odor issue; and/or

3. notification to or response by any off-site emergency response, federal, state or local agency regarding a fire, hazardous materials release, on-site injury, or any physical or cyber security incident.

The notice shall describe the circumstances, status, and expected duration of the incident. If warranted, as soon as it is safe and feasible, the project owner shall implement the safe shutdown of any non-critical equipment and removal of any hazardous materials and waste that pose a threat to public health and safety and to environmental quality (also, see specific conditions of certification for the technical areas of Hazardous Materials Management and Waste Management).

Within one (1) week of the incident, the project owner shall submit to the CPM a detailed incident report, which includes, as appropriate, the following information:

4. a brief description of the incident, including its date, time, and location;

5. a description of the cause of the incident, or likely causes if it is still under investigation;

6. the location of any off-site impacts;

7. description of any resultant impacts;

8. a description of emergency response actions associated with the incident;

9. identification of responding agencies;

10. identification of emergency notifications made to federal, state, and/or local agencies;

11. identification of any hazardous materials released and an estimate of the quantity released;

12. a description of any injuries, fatalities, or property damage that occurred as a result of the incident;

13. fines or violations assessed or being processed by other agencies;

14. name, phone number, and e-mail address of the appropriate facility contact person having knowledge of the event; and

15. corrective actions to prevent a recurrence of the incident.

The project owner shall maintain all incident report records for the life of the project, including closure. After the submittal of the initial report for any incident, the project owner shall submit to the CPM copies of incident reports within 24 hours of a request.

COM-14 Non-Operation and Repair/Restoration Plans. If the facility ceases operation temporarily (excluding planned maintenance), for longer than one (1) week (or other CPM-approved date), but less than three (3) months (or other CPM-approved date), the project owner shall notify the CPM, interested agencies, and nearby property owners. Notice of planned non-operation shall be given at least two (2) weeks prior to the scheduled date. Notice of unplanned non-operation shall be provided no later than one (1) week after non-operation begins.

For any non-operation, a Repair/Restoration Plan for conducting the activities necessary to restore the facility to availability and reliable and/or improved performance shall be submitted to the CPM within one (1) week after notice of non-operation is given. If non-operation is due to an unplanned incident, temporary repairs and/or corrective actions may be undertaken before the Repair/Restoration Plan is submitted. The Repair/Restoration Plan shall include:

1. identification of operational and non-operational components of the plant;
2. a detailed description of the repair and inspection or restoration activities;
3. a proposed schedule for completing the repair and inspection or restoration activities;
4. an assessment of whether or not the proposed activities would require changing, adding, and/or deleting any conditions of certification, and/or would cause noncompliance with any applicable LORS; and
5. Planned activities during non-operation, including any measures to ensure continued compliance with all conditions of certification and LORS.
   a. Written monthly updates (or other CPM-approved intervals) to the CPM for non-operational periods, until operation resumes, shall include:
6. Progress relative to the schedule;
7. Developments that delayed or advanced progress or that may delay or advance future progress;
8. Any public, agency, or media comments or complaints; and
9. Projected date for the resumption of operation.

During non-operation, all applicable conditions of certification and reporting requirements remain in effect. If, after one (1) year from the date of the project owner's last report of productive Repair/Restoration Plan work, the facility does not resume operation or does not provide a plan to resume operation, the Executive Director may assign suspended status to the facility and recommend commencement of permanent closure activities. Within 90 days of the Executive Director's determination, the project owner shall do one of the following:

1. If the facility has a closure plan, the project owner shall update it and submit it for Energy Commission review and approval; or

2. If the facility does not have a closure plan, the project owner shall develop one consistent with the requirements in this Compliance Plan and submit it for Energy Commission review and approval.

COM-15: Facility Closure Planning. To ensure that a facility's eventual permanent closure and long-term maintenance do not pose a threat to public health and safety and/or to environmental quality, the project owner shall coordinate with the Energy Commission to plan and prepare for eventual permanent closure.

A. Provisional Closure Plan

To assure satisfactory long-term site maintenance and adequate closure for "the whole of a project," the project owner shall include within the first ACR a Provisional Closure Plan for CPM review and approval. The CPM may require Provisional Closure Plan updates to reflect project modifications approved by the Energy Commission. The Provisional Closure Plan shall consider applicable final closure plan requirements, including interim and long-term maintenance costs and reflect that qualified personnel will carry out permanent closure and long-term maintenance activities.

The Provisional Closure Plan shall reflect the most current regulatory standards, best management practices, and applicable LORS, and provide for a phased closure process and include but not be limited to:

1. comprehensive scope of work;
2. dismantling and demolition;
3. recycling and site clean-up;
4. mitigation and monitoring direct, indirect, and cumulative impacts;
5. site remediation and/or restoration;
6. interim and long-term operation monitoring and maintenance, including long-term equipment replacement costs; and
7. contingencies.

B. Final Closure Plan and Cost Estimate

No less than one (1) year (or other CPM-approved date) prior to initiating a permanent facility closure, the project owner shall submit for Energy Commission review and approval, a Final Closure Plan and Cost Estimate, which includes any long-term, site maintenance and monitoring.

Prior to submittal of the facility's Final Closure Plan to the Energy Commission, the project owner and the CPM will hold a meeting to discuss the specific contents of the plan. In the event that significant issues are associated with the plan's approval, the CPM will hold one or more workshops and/or the Energy Commission may hold public hearings as part of its approval procedure.

Final Closure Plan and Cost Estimate contents include, but are not limited to:

1. a statement of specific Final Closure Plan objectives;
2. a statement of qualifications and resumes of the technical experts proposed to conduct the closure activities, with detailed descriptions of previous power plant closure experience;
3. identification of any facility-related installations or maintenance agreements not part of the Energy Commission certification, designation of who is responsible for these, and an explanation of what will be done with them after closure;
4. a comprehensive scope of work and itemized budget for permanent plant closure and long-term site maintenance activities, with a description and explanation of methods to be used, broken down by phases, including, but not limited to:
    a. dismantling and demolition;
    b. recycling and site clean-up;
    c. impact mitigation and monitoring;
    d. site remediation and/or restoration, including ongoing testing or monitoring protocols,
    e. exterior maintenance, including paint, landscaping and fencing,
    f. site security and lighting, and
    g. any contingencies.
5. a Final Cost Estimate for all closure activities, by phases, including long-term site monitoring and maintenance costs, and long-term equipment replacement;
6. a schedule projecting all phases of closure activities for the power plant site and all appurtenances constructed as part of the Energy Commission-certified project;
7. an electronic submittal package of all relevant plans, drawings, risk assessments, and maintenance schedules and/or reports, including an above- and below-ground infrastructure inventory map and registered engineer's or DCBO's assessment of demolishing the facility; additionally, for any facility that permanently ceased operation prior to submitting a Final Closure Plan and Cost Estimate

and for which only minimal or no maintenance has been done since, a comprehensive condition report focused on identifying potential hazards;

8. all information additionally required by the facility's conditions of certification applicable to plant closure;

9. an equipment disposition plan, including:

    a. recycling and disposal methods for equipment and materials; and

    b. identification and justification for any equipment and materials that will remain on-site after closure;

10. a site disposition plan, including but not limited to:

    a. proposed rehabilitation, restoration, and/or remediation procedures, as required by the conditions of certification and applicable LORS, and long-term site maintenance activities.

11. identification and assessment of all potential direct, indirect, and cumulative impacts and proposal of mitigation measures to reduce significant adverse impacts to a less-than-significant level; potential impacts to be considered shall include, but not be limited to:

    a. traffic;
    b. noise and vibration;
    c. soil erosion;
    d. air quality degradation;
    e. solid waste;
    f. hazardous materials;
    g. waste water discharges, and
    h. contaminated soil.

12. identification of all current conditions of certification, LORS, federal, state, regional, and local planning efforts applicable to the facility, and proposed strategies for achieving and maintaining compliance during closure;

13. updated mailing list and Listserv of all responsible agencies, potentially interested parties, and property owners within one (1) mile of the facility;

14. identification of alternatives to plant closure and assessment of the feasibility and environmental impacts of these; and

15. description of and schedule for security measures and safe shutdown of all non-critical equipment and removal of hazardous materials and waste (see conditions of certification for Public Health,

Waste Management, Hazardous Materials Management, and Worker Safety).

If the Energy Commission-approved Final Closure Plan and Cost Estimate are not initiated within one (1) year of its approval date, it shall be updated and re-submitted to the Energy Commission for supplementary review and approval. If a project owner initiates but then suspends closure activities, and the suspension continues for longer than one (1) year, the Energy Commission may initiate correction actions against the project owner to complete facility closure. The project owner remains liable for all costs of contingency planning and closure.

KEY EVENTS LIST

PROJECT: ______________________________

DOCKET #: ______________________________

COMPLIANCE PROJECT MANAGER: ______________________________

EVENT DESCRIPTION	DATE
Certification Date	
Obtain Site Control	
On-line Date	
POWER PLANT SITE ACTIVITIES	
Start Site Assessment/Pre-construction	
Start Site Mobilization/Construction	
Begin Pouring Major Foundation Concrete	
Begin Installation of Major Equipment	
Completion of Installation of Major Equipment	
First Combustion of Turbine	
Obtain Building Occupation Permit	
Start Commercial Operation	
Complete All Construction	
TRANSMISSION LINE ACTIVITIES	
Start Transmission Line Construction	
Complete Transmission Line Construction	
Synchronization with Grid and Interconnection	
FUEL SUPPLY LINE ACTIVITIES	
Start Gas Pipeline Construction and Interconnection	
Complete Gas Pipeline Construction	
WATER SUPPLY LINE ACTIVITIES	
Start Water Supply Line Construction	
Complete Water Supply Line Construction	
Start Recycled Water Supply Line Construction	
Complete Recycled Water Supply Line Construction	

Compliance Table 1:
Summary of Compliance Conditions of Certification

Condition Number	Subject	Description
COM-1	Unrestricted Access	The project owner shall grant Energy Commission staff and delegate agencies or consultants unrestricted access to the power plant site.
COM-2	Compliance Record	The project owner shall maintain project files on-site. Energy Commission staff and delegate agencies shall be given unrestricted access to the files.
COM-3	Compliance Verification Submittals	The project owner is responsible for the delivery and content of all verification submittals to the CPM, regardless of whether the conditions were satisfied directly by the project owner or by an agent.
COM-4	Pre-construction Matrix and Tasks Prior to Start of Construction	Construction shall not commence until all of the following activities/submittals have been completed: • Project owner has submitted a pre-construction matrix identifying conditions to be fulfilled before the start of construction; • Project owner has completed all pre-construction conditions to the CPM's satisfaction; and • CPM has issued a letter to the project owner authorizing construction.
COM-5	Compliance Matrix	The project owner shall submit a compliance matrix (in a spreadsheet format) with each Monthly and Annual Compliance Report, which includes the current status of all Compliance Conditions of Certification.
COM-6	Monthly Compliance Reports and Key Events List	During construction, the project owner shall submit Monthly Compliance Reports (MCRs) which include specific information. The first MCR is due one (1) month following the docketing of the Energy Commission's Decision on the project and shall include an initial list of dates for each of the events identified on the Key Events List.
COM-7	Periodic and Annual Compliance Reports	After construction ends, and throughout the life of the project, the project owner shall submit Annual Compliance Reports (ACRs) instead of MCRs.
COM-8	Confidential Information	Any information the project owner designates as confidential shall be submitted to the Energy Commission's Executive Director with a request for confidentiality.
COM-9	Annual Fees	Required payment of the Annual Energy Facility Compliance Fee.
COM-10	Amendments, Staff-Approved Project Modifications, Ownership Changes, and Verification Changes	The project owner shall petition the Energy Commission to delete or change a condition of certification, modify the project design or operational requirements, and/or transfer ownership or operational control of the facility. Petitions to Amend require the payment of amendment processing fees.
COM-11	Reporting of Complaints, Notices, and Citations	Prior to the start of construction, the project owner shall provide all property owners within a one-mile radius a telephone number to contact project representatives with questions, complaints, or concerns. The project owner shall respond to all recorded complaints within 24 hours. Within ten days of receipt, the project owner shall report to the CPM all notices, complaints, violations, and citations.

Compliance Table 1:
Summary of Compliance Conditions of Certification

Condition Number	Subject	Description
COM-12	Emergency Response Site Contingency Plan	No less than 60 days prior to the start of commercial operation, the project owner shall submit an on-site Contingency Plan to ensure protection of public health and safety and environmental quality during a response to an emergency.
COM-13	Incident-Reporting Requirements	The project owner shall notify the CPM within one (1) hour of an incident and submit a detailed incident report within (1) one week, maintain records of incident report, and submit public health and safety documents with employee training provisions.
COM-14	Non-Operation	No later than two (2) weeks prior to a facility's planned non-operation, or no later than one (1) week after the start of unplanned non-operation, the project owner shall notify the CPM, interested agencies and nearby property owners of this status. During non-operation, the project owner shall provide written updates to the CPM.
COM-15	Facility Closure Planning	Within the first ACR, the project owner shall submit a Provisional Closure Plan for permanent closure. No less than one (1) year prior to closing, the project owner shall submit a Final Closure Plan and Cost Estimate.

ATTACHMENT A
COMPLAINT REPORT AND RESOLUTION FORM

COMPLAINT LOG NUMBER:______________________________ DOCKET NUMBER:____________

PROJECT AME:____

COMPLAINANT INFORMATION

NAME:____ PHONE NUMBER:___________________________

ADDRESS:____

COMPLAINT

DATE COMPLAINT RECEIVED:______________________ TIME COMPLAINT RECEIVED:__________________

COMPLAINT RECEIVED BY: _________________________ ☐ TELEPHONE ☐ IN WRITING (COPY ATTACHED)

DATE OF FIRST OCCURRENCE:_____________________

DESCRIPTION OF COMPLAINT (INCLUDING DATES, FREQUENCY, AND DURATION):_______________________

____

____

FINDINGS OF INVESTIGATION BY PLANT PERSONNEL:____

____

____

DOES COMPLAINT RELATE TO VIOLATION OF A CEC REQUIREMENT? ☐ YES ☐ NO

DATE COMPLAINANT CONTACTED TO DISCUSS FINDINGS:____

DESCRIPTION OF CORRECTIVE MEASURES TAKEN OR OTHER COMPLAINT RESOLUTION:_________________

____

____

DOES COMPLAINANT AGREE WITH PROPOSED RESOLUTION? ☐ YES ☐ NO

IF NOT, EXPLAIN:____

____

CORRECTIVE ACTION

IF CORRECTIVE ACTION NECESSARY, DATE COMPLETED:____

DATE FIRST LETTER SENT TO COMPLAINANT (COPY ATTACHED):_____________________________________

DATE FINAL LETTER SENT TO COMPLAINANT (COPY ATTACHED):_____________________________________

OTHER RELEVANT INFORMATION:____

____

____

"This information is certified to be correct."

PLANT MANAGER SIGNATURE:_____________________________________ DATE:_______________

(ATTACH ADDITIONAL PAGES AND ALL SUPPORTING PHOTO/DOCUMENTATION, AS REQUIRED)

ALAMITOS ENERGY CENTER (13-AFC-01)
PRELIMINARY STAFF ASSESSMENT
PREPARATION TEAM

Executive Summary .... Keith Winstead
Introduction .... Keith Winstead
Project Description .... Keith Winstead

Environmental Assessment

Air Quality... Nancy Fletcher/Wenjun Qian
Alternatives ....Steve Kerr
Biological Resources...Jennifer Lancaster/Scott D.White
Cultural Resources...............................M.Braun/M.Mourkas/G.Roark/J.Smallwood/V.Smith
Hazardous Materials Management ....Brett Fooks /Geoff Lesh
Land Use..Tatiana Inouye/Negar Vahidi
Noise and Vibration..Joseph Hughes
Public Health...Ann Chu
Socioeconomics...Ellen LeFavre
Soil and Water Resources..Marylou Taylor
Traffic and Transportation...Lisa Worrall
Transmission Line Safety and Nuisance ....Ann Chu
Visual Resources ....John Hope

Engineering Assessment

Facility Design..Shahab Khoshmashrab
Geology and Paleontology ....Garry Maurath
Power Plant Efficiency...Jaque Leyva Record
Power Plant Reliability...Jaque Leyva Record
Transmission System Engineering...Ajoy Guha
Waste Management………………………………………............ ...Ellie Townsend-Hough
Worker Safety and Fire Protection ....Brett Fooks/ Geoff Lesh

Compliance Conditions and Compliance Monitoring Plan..........................ShawnPittard

Project Assistant..Cenne Jackson