ABENGOA MOJAVE SOLAR

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Supplemental Staff Assessment - Part B

CALIFORNIA
ENERGY COMMISSION
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CALIFORNIA
ENERGY COMMISSION
1516 Ninth Street
Sacramento, CA 95814

http://www.energy.ca.gov/sitingcases/abengoa/index.html

Craig Hoffman
Project Manager

Roger Johnson
Siting Office Manager

TERRENCE O'BRIEN
Deputy Director
Siting, Transmission and
Environmental Protection Division

MELISSA JONES
Executive Director

ABENGOA MOJAVE SOLAR (AMS)
(09-AFC-5)
SUPPLEMENTAL STAFF ASSESSMENT
PART B

EXECUTIVE SUMMARY

Testimony of Craig Hoffman

Energy Commission staff published a Staff Assessment (SA) for the Abengoa Mojave Solar (AMS) project on March 15, 2010. This document included staff's analysis, conclusions, and recommendations for the project. Staff publically noticed the Staff Assessment for a 30-day comment period that lasted from Tuesday March 16, 2010 to Thursday, April 15, 2010.

During this comment period, public workshops were held on Tuesday, April 6, 2010 in Sacramento at the Energy Commission and on Wednesday, April 7, 2010 at the Barstow City Hall to discuss staff's findings, proposed mitigation, and proposed compliance-monitoring requirements. Based on the workshops and written comments, staff has refined its analysis, corrected any errors, and finalized conditions of certification.

This Supplemental Staff Assessment (SSA) has been prepared based upon discussions at the SA workshops and written comments provided by the applicant, agencies and public. This SSA is a limited document representing revisions and additions to various technical sections that were commented upon. This document does not include each technical section. For a complete project description and all the technical sections please see the original SA document with the complete engineering, environmental, public health and safety analysis of the AMS project. The SSA only includes sections that were revised or had public comments.

The AMS SSA will be published in three parts. SSA Part A was published on May 12, 2010 and contained the Energy Commission staff's final environmental and engineering evaluation of the project in the following technical sections: Hazardous Materials, Noise and Vibration, Public Health, Traffic and Transportation, Visual Resources, Waste Management and Worker Safety and will serve as staff's testimony during evidentiary hearings.

SSA Part B contains the Energy Commission staff's final environmental and engineering evaluation of the project in the following technical sections: Air Quality, Biological Resources, Cultural Resources, Land Use, Soils and Water Resources and Transmission System Engineering.

Staff is currently preparing the Transmission System Engineering - Appendix A that is an environmental review of downstream transmission and telecommunication facilities. These are facilities that are past the first point of interconnection, the Lockhart substation, and are required for the AMS project to connect to Southern California Edison Company's (SCE) Kramer-Cool Water 230-kV transmission line. That document will be SSA Part C and will be published on or before June 30, 2010. That document will conclude staff's analysis of the project

Staff's testimony that will be provided at the Energy Commission's Evidentiary Hearings on the AMS project will encompass the SA and revisions to sections included in the SSA Part A, SSA Part B and SSA Part C.

For purposes of the table of contents, the sections have the same numbering as in the previous SA. Sections that are not included in this SSA have strikethrough.

INTRODUCTION

Mojave Solar LLC (Applicant), a wholly owned subsidiary of Abengoa Solar Inc., filed an Application for Certification (AFC) with the California Energy Commission (Energy Commission) on August 10, 2008. On October 21, 2009, the Energy Commission found the project data adequate, thereby deeming the AFC complete for filing purposes and starting the certification process.

On December 8, 2009, staff conducted a publicly noticed Data Response and Issue Resolution workshop at the Energy Commission in Sacramento and discussed the applicant's data responses on the topics of Air Quality, Alternatives, Biology, Land Use, Soils and Water Resources and Waste Management. The purpose of the workshop was to provide members of the community and governmental agencies opportunity to obtain project information, and to offer comments they may have had regarding any aspect of the proposed project.

On December 9, 2009, the Energy Commission Committee assigned to oversee the proceeding conducted a publicly noticed Site Visit, Informational Hearing and Environmental Scoping Meeting at the City of Barstow council chambers. This Scoping Meeting and Informational Hearing provided an opportunity for members of the community in the project vicinity to obtain information and offer comments and concerns about the proposed project as well as identify potential environmental impacts for consideration during the Energy Commission's review of the proposal. The applicant explained plans for developing the project and the related facilities and Energy Commission staff explained the administrative licensing process and Staff's role in reviewing the AFC.

On January 15, 2010, staff conducted a second publicly noticed Data Response and Issue Resolution workshop at the Energy Commission and discussed the topics of Air Quality, Biology, Cultural Resources, Land Use, Soils and Water Resources and Waste Management. This meeting was continued to January 20, 2010 to extend discussions on Air Quality, Soils and Water Resources and Waste Management. The purpose of these workshops was to provide members of the community and governmental agencies the opportunity to obtain project information, and to offer comments they may have had regarding any aspect of the proposed project.

On March 15, 2010 the Energy Commission published the AMS Staff Assessment (SA). The SA examines engineering, environmental and public health and safety aspects of the AMS project. Based on the information provided by the applicant and other sources available at the time the SA was prepared. The SA contains analyses similar to those normally contained in an Environmental Impact Report (EIR) required by the California Environmental Quality Act (CEQA). This document was publically noticed for comments from March 16, 2010 to April 15, 2010.

The Energy Commission held public workshops on the SA on April 6th in the City of Sacramento and April 7th in the City of Barstow. At these workshops, discussions on the project were held, and written comments were provided by the applicant, agencies and the public. This SSA has been prepared to respond to those comments and information and analysis not provided in the SA.

INFORMATION NOT IN THE STAFF ASSESSMENT

Staff acknowledged within the SA that there was additional technical analysis that would need to be included within the SSA. The following information and analysis was not provided within the SA and is included in the SSA Part A, Part B and Part C:

Air Quality - a Final Determination of Compliance from the Mojave Desert Air District has been incorporated into staff's analysis.

Biological Resources – a Section 7 consultation has been initiated between the applicant and US Fish and Wildlife Service. The applicant has provide to the Energy Commission, US Fish and Wildlife Service, and California Department of Fish and Game: a Biological Assessment, a Draft Desert Tortoise Exclusion Fencing Plan, Clearance Survey, and Translocation Plan (Desert Tortoise Plan), a Draft Burrowing Owl Monitoring and Mitigation Plan (Burrowing Owl Plan), Swainson's Hawk Survey Results – Spring 2010 and Golden Eagle Survey Results and related Foraging Habitat Assessment. Staff has updated the analysis based upon new the information.

Soil and Water Resources – the following materials were provided for staff to complete their analysis in the SSA:

- Submittal of the following information was provided to the Lahontan Regional Quality Control Board (RWQCB) and County of San Bernardino for review and comment and to the Energy Commission for approval:
  - Engineering design detail and groundwater monitoring plans for the four proposed wastewater evaporation ponds;
  - Engineering design detail and groundwater monitoring plans for the proposed Heat Transfer Fluid (HTF) fluid bioremediation units;
  - Characterization of the anticipated waste streams proposed to be discharged into the evaporation ponds and bioremediation units;
  - A description of the frequency and chemical analysis of waste and a plan that describes actions that will be taken in case of a detectable release;
  - Engineering design detail for the proposed sanitary waste septic system and leach field;
  - A closure plan for the evaporation ponds and bioremediation units; and
  - Demonstration that the proposed project would be in compliance with RWQCB Order 2009-0009-DWQ Storm Water requirements that go into effect July 1, 2010.
- Submittal of the applicant's storm water surface profile analysis for flows in the main storm water diversion channel to San Bernardino County for review and comment and to the Energy Commission for approval.

Transmission System Engineering – the applicant provided an environmental analysis for the Lockhart Substation Interconnection & Communication facilities for downstream congestion management improvements in order for staff to complete a CEQA analysis on proposed improvements. this information will be included as Transmission System Engineering – Appendix A.

Waste Management – the applicant completed a site characterization and sampling report which was reviewed by staff to verify that no new Waste Management mitigation measures were necessary.

PROJECT'S COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

Staff believes that with the Commission's adoption of staff's proposed mitigation measures and the proposed conditions of certification, the AMS project would comply with all applicable laws, ordinances, regulations, and standards (LORS).

PROJECT'S ENVIRONMENTAL IMPACTS

Within the SA, technical staff was not able to make definitive conclusions about project impacts in; Air Quality, Biological Resources, Soils and Water Resources, Transmission System Engineering and Waste Management. Based upon the information provided to date and the analysis completed to date for each technical section, staff has concluded that with implementation of staff's recommended mitigation measures described in the conditions of certification, all potential environmental impacts will be mitigated to a less than significant level. This analysis does not include Transmission System Engineering Appendix A which will be provided in SSA Part C. The project analysis complies with the requirements of the California Environmental Quality Act (CEQA). For a detailed review of potentially significant impacts and the related mitigation measures, please refer to each chapter of the SSA.

Staff believes that with the Commission's adoption of staff's proposed mitigation measures and the proposed conditions of certification, the AMS project would not cause significant adverse impacts. The conclusions of each technical area are summarized in the following table.

Executive Summary Table 1
Summary of Impacts to Each Technical Area

Technical Area	Complies with LORS	Impacts Mitigated
Air Quality	Yes	Yes
Biological Resources	Yes	Yes
Cultural Resources	Yes	Yes
Land Use	Yes	Yes
Soils and Water Resources	Yes	Yes
Transmission System Engineering	Yes	Yes
Transmission System Engineering - Appendix A	Provided in SSA Part C	

STAFF ASSESSMENT COMMENTS

The following persons and agencies commented on the Staff Assessment. Responses to comments are provided in the technical sections.

County of San Bernardino / C Hyke (TN 56176), Comments on agriculture mitigation consistency with San Bernardino County.

County of San Bernardino / C Hyke (TN 56264), Comments on biological mitigation, impacts to county services and agricultural mitigation.

Defenders of Wildlife / J Aardahl (TN 56245), Commented on water conservation opportunities and impacts on surrounding protected biological resources.

Department of Conservation / D. Otis (TN 56177), Comments on agriculture mitigation.

Department of Conservation / M. Meraz (TN 56512), Comments on agriculture mitigation and LESA model.

Ellison, Schneider and Harris / C. Ellison (TN 56350). Applicant's Comments on Staff Assessment.

Glenn Maclean (TN 56215), Commented on the historical and cultural value of the Lockhart General Store.

Joe Ramirez (TN 56231), Commented on existing road and traffic conditions, change in view and quality of life, illumination of the night sky, the evaporation ponds as a draw for insects and emergency services.

Southern California Edison / H. Arshadi (TN 56289), Commented on the project description and need for environmental review on interconnection facilities.

Transition Habitat Conservancy / J. Bays (TN 56241), Commented on the agricultural mitigation requirement.

PROJECT DESCRIPTION

Craig Hoffman

INTRODUCTION

Mojave Solar LLC (Applicant), a wholly owned subsidiary of Abengoa Solar Inc., filed an Application for Certification (AFC) with the California Energy Commission (Energy Commission) on August 10, 2008, to construct and operate a nominal 250 megawatt (MW) solar thermal power plant, the Abengoa Mojave Solar (AMS) project. On September 23, 2009, the California Energy Commission determined that the AFC was deficient in nine of 23 areas. On September 24, 2009, the applicant provided additional information to supplement the AFC. At a business meeting held on October 21, 2009, the Energy Commission adopted the Executive Director's data adequacy recommendation of data adequate, thereby deeming the AFC complete for filing purposes.

PROJECT LOCATION AND SITE DESCRIPTION

The proposed AMS project is a solar electric generating facility to be located on approximately 1,765 acres. The proposed project site is located approximately nine miles northwest of the town of Hinkley in unincorporated San Bernardino County, approximately halfway between the city of Barstow and Kramer Junction (Highway 395 / Highway 58 junction). Project site access is provided by Harper Lake Road, which is located approximately twenty miles west of Barstow along the Highway 58 corridor. The project site is approximately six miles north of where Harper Lake Road intersects with Highway 58. The existing Solar Electric Generating Stations VIII and IX facilities, now owned by NextEra™ Energy Resources, are located immediately northwest of the project site. See **Project Description Figures 1, 2 and 3.**

The project site is comprised of private property that was historically used as the Lockhart Ranch complex. The property has served as an agricultural and cattle center for over sixty years and, in that capacity, has utilized water from ground wells; farming activities have included flood irrigation and ultimately the pivot system of irrigation of quarter section areas. Currently there are no ranching or residential activities on the property, and there is only one active pivot irrigation field in production on the site. The property is designated Rural Living (RL) by the San Bernardino County General Plan and also zoned RL.

PROJECT PURPOSE AND OBJECTIVES

The project is expected to supply renewable energy to the California energy market. As described in the AFC, the applicant's specific project objectives are as follows:

- To help achieve the State of California renewable energy objectives and to support the state's Renewable Portfolio Standard requirements with providing long term production of renewable electric energy,

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

Based upon the applicant's design objectives, staff concluded the project's objectives also include operation for 30 or more years.

PROJECT FEATURES

SOLAR FIELD, POWER GENERATION EQUIPMENT AND PROCESS

The proposed AMS project is a solar electric generating facility to be located on approximately 1,765 acres. The project would utilize solar parabolic trough technology to activate a heat transfer fluid. The proposed collector fields of parabolic trough solar collectors are modular in nature and comprise many parallel rows of solar collectors, aligned on a north-south axis. Each solar collector has a linear, parabolic-shaped reflector that focuses the sun's radiation on a linear receiver known as a heat collection element located at the focus of the parabola. See **Project Description Figures 4 and 5.**

As heat transfer fluid is circulated through the solar field, light from the sun reflects off the solar collector's parabolic troughs and is concentrated on the heat collection elements located at the focal point of the parabola. This heat transfer fluid provides a high-temperature energy source which is used to generate steam in steam generators. As this steam expands through the steam turbine generators, electrical power is generated.

The project would have a combined nominal electrical output of 250 megawatts (MW) from twin, independently-operable solar fields, each feeding a 125-MW power island. The plant sites, identified as Alpha (the northwest portion of the Project area) and Beta (the southeast portion of the Project area), would be 884 acres and 800 acres, respectively, and joined at an on-site transmission line interconnection substation to form one full-output transmission interconnection. The applicant proposes that an additional 81 acres shared between the plant sites will be utilized for receiving and discharging offsite drainage improvements.

Each power island would have its own warehouse and control/admin building. Solar collector array assembly buildings would be installed in the northeast portion of the Alpha solar field, which would be later converted to warehouses. The total square footage of the various proposed project buildings and pre-engineered enclosures (e.g., control/admin building, warehouse, electrical equipment enclosures, etc.) is approximately 185,000 square feet for the entire project.

The sun would provide 100% of the power supplied to the project through solar-thermal collectors; no supplementary fossil-based energy source (e.g., natural gas) is proposed for electrical power production. However, natural gas for the AMS project's ancillary purposes, such as firing the auxiliary boilers and space heating, would be supplied by an existing natural gas pipeline that runs to the project boundary; no offsite pipeline facilities are proposed as a part of this project. Each power island would also have a diesel powered firewater pump for fire protection and a diesel fired backup generator for power plant essentials.

NATURAL GAS

Natural gas for the project's ancillary purposes, such as the auxiliary boilers and space heating, would be supplied by a Southwest Gas Corporation (SGC) owned pipeline that runs to the project boundary near the Alpha power island. No offsite pipeline facilities are proposed as a part of this project.

WATER DEMAND AND SOURCE OF SUPPLY

The AMS project proposes to use wet cooling towers for power plant cooling and according to the applicant owns adjudicated water rights to the Harper Valley Groundwater Basin. The Mojave Water Agency administers these water rights. According to the AFC's laboratory analysis of groundwater samples collected from the active Ryken well, which is within the project vicinity, the expected groundwater supply appears to be above 1,500 milligrams per liter (mg/L) Total Dissolved Solids which is considered brackish and therefore not suitable for municipal supply or other potable uses without treatment. The solar project proposes to utilize 2,163 acre-feet of water per year, for 30 years. The AMS project through ownership or purchase options has rights to 10,478 acre-feet of groundwater per year from the adjudicated basin, and those rights are subject to the terms of the court adjudication.

Process and cooling water needs of the project would be met by use of groundwater pumped from wells on the plant site. This water would be treated prior to use in power plant operations. Water for domestic use by employees would also be provided by onsite groundwater that would be treated to potable water standards by a packaged treatment unit.

Several former agricultural wells exist on the site and were used to determine water quality and for pumping tests. New water supply wells would need to be installed to provide the reliability needed during plant operations. These wells would draw from the adjudicated water rights owned by the project developer. The remaining agricultural wells may be used to monitor groundwater levels and quality. Those wells located within the solar array footprint will have their pump motors and bowls removed and cut down to near-surface grade elevations and decommissioned in accordance with applicable regulations.

On both the Alpha and Beta plant fields, raw water and service water storage tanks, each having a capacity of 1,930,000 gallons, would provide enough storage capacity to allow for interruption of water supply to the facility of approximately one to two days. A portion (approximately 360,000 gallons) of each service water storage tank will be dedicated to the plant's fire protection water system, for a total of 720,000 gallons for the entire project.

WATER TREATMENT SYSTEMS

The raw water, circulating water, process water and solar collector array (SCA) washing water all require onsite treatment, and this treatment varies according to the quality required for each of these uses. The groundwater would be pumped to the raw water storage tank, and a biocide (sodium hypochlorite) would be used to treat the water. When transferred to the service water tank, the water is again treated with the biocide if needed. This water would be used directly in the cooling tower as make-up water.

To conserve water, the lower total dissolved solids (TDS) reverse osmosis (RO) reject streams would be recycled back to the service water storage tank for reuse in the cooling tower. Additionally, a clear well would be used, and when the discharge exceeds the treatment system demand, the clear well discharge would be released to the cooling tower to further conserve water. In order to reduce overall water consumption and sizing of evaporation ponds, service water will first be used as makeup to the cooling tower and circulating water system.

SOLAR COLLECTOR ARRAY WASHING

To facilitate dust and contaminant removal, partially deionized (demineralized) water would be used to clean the SCAs on a periodic basis, determined by the reflectivity monitoring program and other maintenance considerations. Washing the SCA maintains the mirror surface, the HCE and other components clean and free to operate normally. This operation is generally completed at night and involves a water truck spraying deionized water on the SCAs in a drive-by fashion. Water from the SCA washing operation is expected to evaporate on the SCA with minimal water applied to the ground. No site runoff or recharge is anticipated from this process.

EVAPORATION PONDS

The project would include four – 5-acre evaporation ponds for industrial wastewater. It is expected that each plant field would have two double-lined evaporation ponds with a nominal surface area of five acres each for a total of ten acres per field, or twenty acres for the entire project. The ponds would be designed in accordance with Lahontan Regional Water Quality Control Board (RWQCB) requirements. The applicant plans to use multiple ponds to allow plant operations to continue in the event that a pond needs to be taken out of service for needed maintenance. Each pond would have enough surface area so that the evaporation rate exceeds the cooling tower blowdown rate at maximum design conditions and at annual average conditions. Pond depth would be selected so that the ponds would not need to have residual solids removed during the life of the plant.

The pond liner system is expected to consist of a 60 mil high-density polyethylene (HDPE) inner liner and a 50 mil HDPE outer liner. Between the liners would be a synthetic drainage net that is used as part of the leachate collection and removal system (LCRS). Monitoring of the evaporation ponds would be required to detect the presence of liquid and/or constituents of concern. The LCRS would be monitored and a series of monitoring wells would also be used for the evaporation ponds. Based on the power plant process, chemicals used, and water quality, the applicant expects that the constituents of concern for this monitoring would include chloride, sodium, sulfate, TDS, biphenyl, diphenyl oxide, potassium, selenium, chromium and phosphate. The proposed detection monitoring program for the facility consists of regularly testing the LCRS, lysimeters, and monitoring wells for the presence of liquid and/or constituents of concern.

WASTEWATER

Wastewater streams and the disposition of wastewater (water treatment system effluent) would ultimately be discharged to evaporation ponds. As discussed previously, the cooling tower blowdown will be processed with various processes, including clarification and reverse osmosis, prior to reuse to make SCA washing and steam system makeup water. The reject water would be ultimately discharged to evaporation ponds for final evaporation/dewatering. The residual solids would remain in the pond for the duration of the plant life.

NON-HAZARDOUS SOLID WASTE

Construction, operation and maintenance of the project would generate non-hazardous solid wastes typical of power generation or other industrial facilities. These wastes include scrap metal and plastic, insulation material, paper, glass, empty containers, and other miscellaneous solid wastes. These materials would be disposed of by means of contracted refuse collection and recycling services.

HAZARDOUS WASTE MANAGEMENT

There will be a variety of hazardous materials used and stored during construction and operation of the project. Hazardous materials that would be used during construction include gasoline, diesel fuel, oil, lubricants, and small quantities of solvents and paints. All hazardous materials used during construction and operation would be stored onsite in storage tanks / vessels / containers that are specifically designed for the characteristics of the materials to be stored, as appropriate.

A variety of safety-related plans and programs would be developed and implemented to ensure safe handling, storage and use of hazardous materials. Plant personnel would be supplied with appropriate personal protective equipment and properly trained in the use, handling and cleanup of hazardous materials used at the facility, as well as procedures to be followed in the event of a leak or spill. Adequate supplies of appropriate cleanup materials would be stored onsite.

FIRE PROTECTION

Fire protection systems would be provided to limit personnel injury, property loss and project downtime resulting from a fire. The systems include a fire protection water system and portable fire extinguishers. The project's fire protection water system would be supplied from a dedicated 360,000-gallon portion of the 1,930,000-gallon service water storage tanks located on each plant field. One electric and one diesel-fueled backup firewater pump, each with a capacity of 3,000 gallons per minute, would deliver water to the fire-protection water piping network on each plant site. A smaller electric motor-driven jockey pump would maintain pressure in the piping network.

The piping network would supply: fire hydrants located at intervals throughout the power island; a sprinkler deluge system at each unit transformer, Heat Transfer Fluid (HTF) expansion tank and circulating pump area; and sprinkler systems in the operations and administration buildings. Portable fire extinguishers of appropriate sizes and types would be located throughout the plant site. Fire protection for the solar field would be provided by zoned isolation of the HTF lines in the event of a rupture that results in fire. As vegetation or other combustible materials would not be allowed in the solar field, the HTF would extinguish itself naturally, since the remainder of the field is of nonflammable material (aluminum, steel and glass).

TRANSMISSION SYSTEM INTERCONNECTION AND UPGRADES

The AMS project is proposing to connect to Southern California Edison Company's (SCE) Kramer-Cool Water 230-kV transmission line, which is located adjacent to the southern border of the proposed project site. All AMS project-related transmission facilities would be within the project boundaries except the connection within the existing transmission right-of-way adjacent to the site and downstream telecommunication facilities. **Project Description Figures 6, 7 and 8.**

The AMS project includes the construction of the Lockhart substation and associated facilities to interconnect the 250 MW solar electric generating facility to Southern California Edison's existing Cool Water-Kramer No.1 220 kV transmission line. Major components of the AMS project are summarized as follows:

- Construction a new 220 kV (Lockhart) substation to loop-in the existing Cool Water-Kramer No. 1 220 kV transmission line and to provide two 220 kV lines to tie into new 220 kV generation tie lines (gen-ties) located on the AMS project site.
- Looping of the existing Cool Water-Kramer No. 1 220 kV transmission line into the new Lockhart substation. The transmission loop would require construction of approximately 3,000 feet of new transmission line segments (comprised of two line segments of approximately 1,500 feet each) creating the new Lockhart-Kramer and Cool Water-Lockhart 220 kV transmission lines.
- Connection of the two AMS-built gen-ties into the SCE owned Lockhart substation. This work involves construction of two single spans of conductors between the Lockhart switchrack and the last AMSP-owned tower(s).
- Connection the existing Hutt 12 kV distribution circuit out of the Hutt Poletop Substation replacing one and removing one existing pole approximately 40 feet north of the Lockhart substation. A range of approximately 200-400 feet of

underground conduit would be installed from the replaced pole to the substation to provide a path for one of the two required sources of station light and power. This would provide temporary power for the construction of both the proposed Lockhart substation and the AMS facilities.

- Installation of fiber optic communication cables, associated poles, conduits, and other telecommunication facilities to provide diverse path routing of communications required for the AMS project interconnection, and to provide communications redundancy at the two AMSP power blocks. Facilities would include construction of a telecommunications room at Tortilla Substation. Work would also include installing communication paths between the Victor, Roadway, Kramer, Lockhart, and Tortilla Substations.

The existing transmission line corridor has facilities installed on the north side, the Kramer-Cool Water 230 kV radial line owned and operated by SCE and, on the south side, the Mead-Adelanto 500 kV transmission line operated by the Los Angeles Department of Water and Power (LADWP). A lower voltage transmission line exists between the two. The transmission corridor's northern boundary is adjacent to the project's southern boundary.

The project proposes interconnection to the #1 Kramer-Cool Water line. The project is located approximately 32 transmission-miles west of the Cool Water generating facility and approximately 13 transmission-miles east of the Kramer interconnection substation. To interconnect the project into the existing Kramer-Cool Water No.1 230 kV transmission line, a new substation would be needed. This proposed substation, located at the southwest corner of the Beta solar field and referred to as "Lockhart," is to be located approximately 13 transmission-miles east from the existing Kramer Substation and approximately 32 transmission-miles west of the existing Cool Water Substation.

System impact and facility studies were prepared by the California ISO in coordination with SCE to evaluate the impact of the proposed AMS on the SCE transmission system. These studies found that the addition of the AMS would cause new normal (N-0) and single contingency (N-1) overloads on the Kramer-Lugo No. 1 & No. 2 230 kV lines during 2013 summer peak and light spring system conditions. These studies also proposed mitigation alternatives to reduce system impacts. The AMS applicant has proposed to construct an alternative that includes congestion management and the installation of a new Special Protection System (SPS) to mitigate overloads through curtailment of the AMS generation, and participation in the existing Kramer remedial action scheme.

Based on the current studies, congestion management and SPS are acceptable mitigation for the identified overloads. There is no reason to believe that new downstream transmission line facilities will be required in the future with the construction of the congestion management alternative.

PROJECT CONSTRUCTION AND OPERATION

If approved, the applicant expects that construction of the generating facility, from site preparation and grading to commercial operation, would take place from the third quarter of 2010 to the third quarter of 2012 (24 months total). If approved, the applicant anticipates that the project would be on line and in commercial service by the fourth quarter of 2012.

The construction workforce would consist of laborers, craftsmen, supervisory personnel, support personnel and construction management personnel. The project's predicted peak and average construction employment levels are 1,162 and 830, respectively.

FACILITY CLOSURE

The AMS project would be designed for an operating life of between 30 years to 40 years. Depending on maintenance factors, at an appropriate point beyond the designed operating life, the project would cease operation and close down. At that time, it would be necessary to ensure that the closure occurs in such a way that public health and safety and the environment are protected from adverse impacts.

Although the setting for this project does not appear to present any special or unusual closure problems, it is impossible to foresee what the situation would be in 30 years or more when the project ceases operation. Therefore, provisions must be made which provide the flexibility to deal with the specific situation and project setting at the time of closure. Facility closure would be consistent with laws, ordinances, regulations and standards in effect at the time of closure.

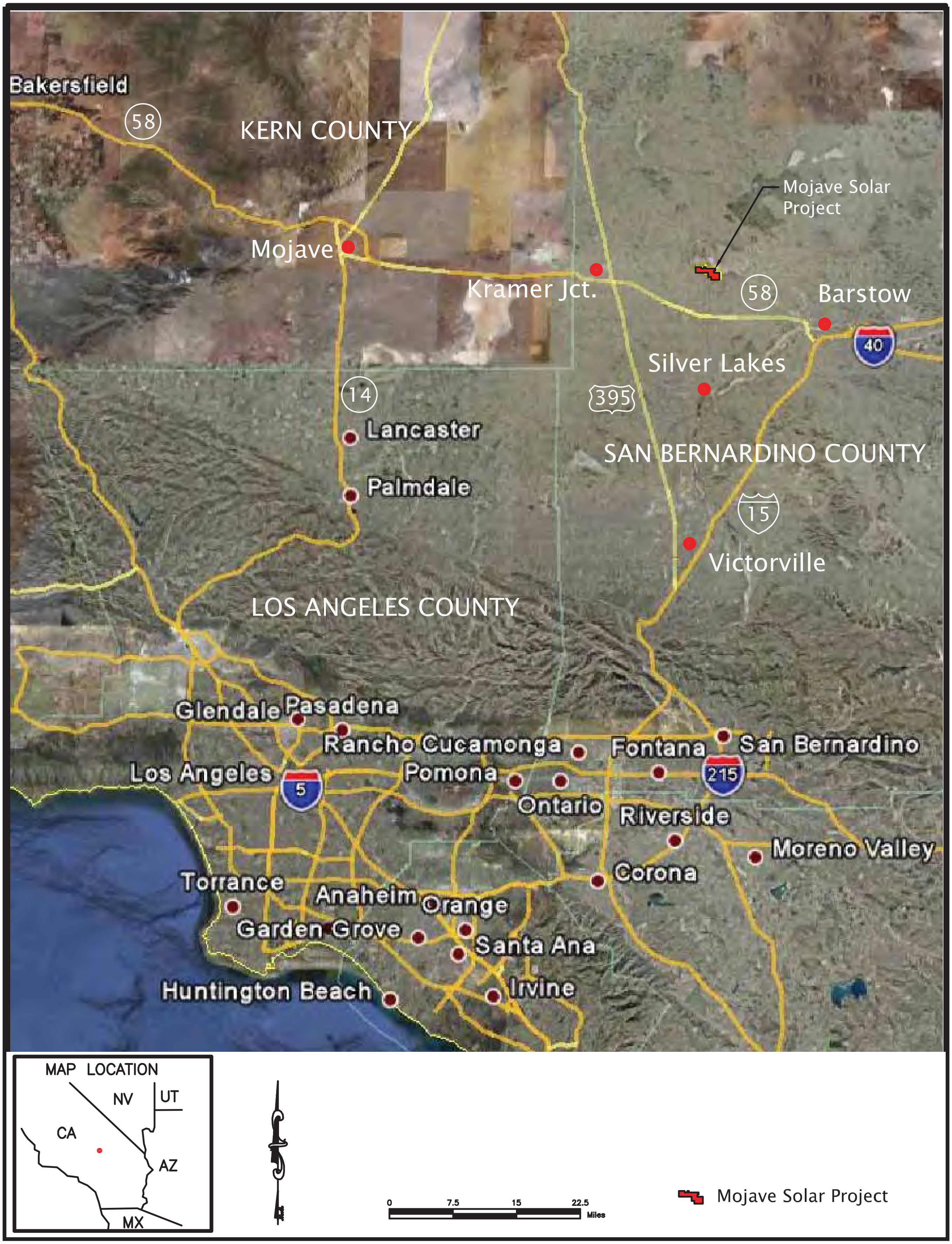
REFERENCES

AS 2009a - Abengoa Solar Inc. / E. Garcia (TN 52813). Application for Certification for Mojave Solar Project (09-AFC-5), dated 7/2009. Submitted to CEC on 8/10/2009.

AS 2009b - Abengoa Solar Inc. / E. Garcia (TN 53375). Data Adequacy Supplement for Mojave Solar Project (09-AFC-5), dated 9/24/2009. Submitted to CEC on 9/24/2009.

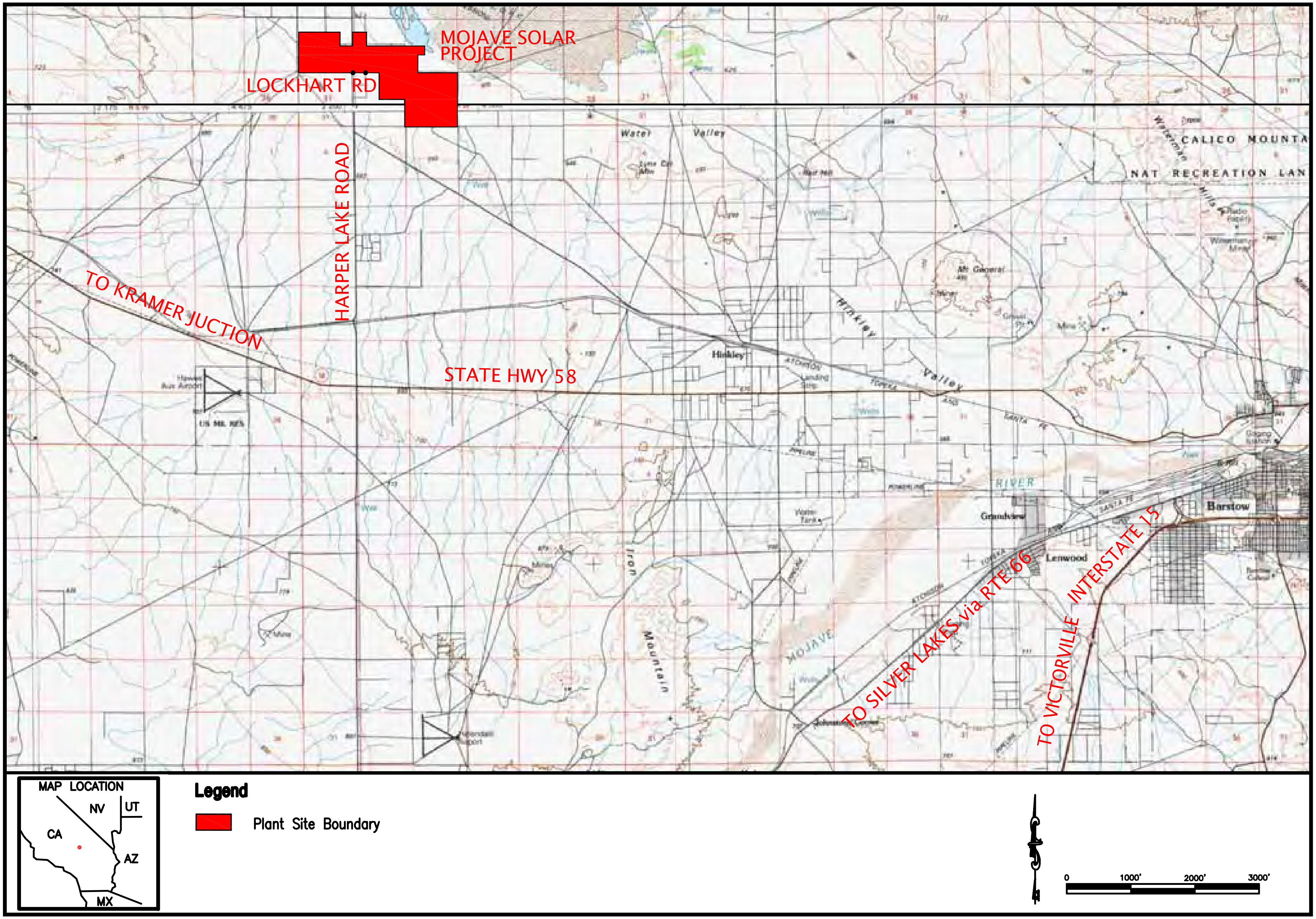
SCE 2010c - Southern California Edison (TN 56703). Southern California Edison Lockhart Substation Project Description for Abengoa Solar Inc., dated 4/15/2010. Submitted to CEC on 5/17/2010.

PROJECT DESCRIPTION - FIGURE 1
Abengoa Mojave Solar 1 Project - Regional Map



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MAY 2010
SOURCE: AFC Figure 1-1

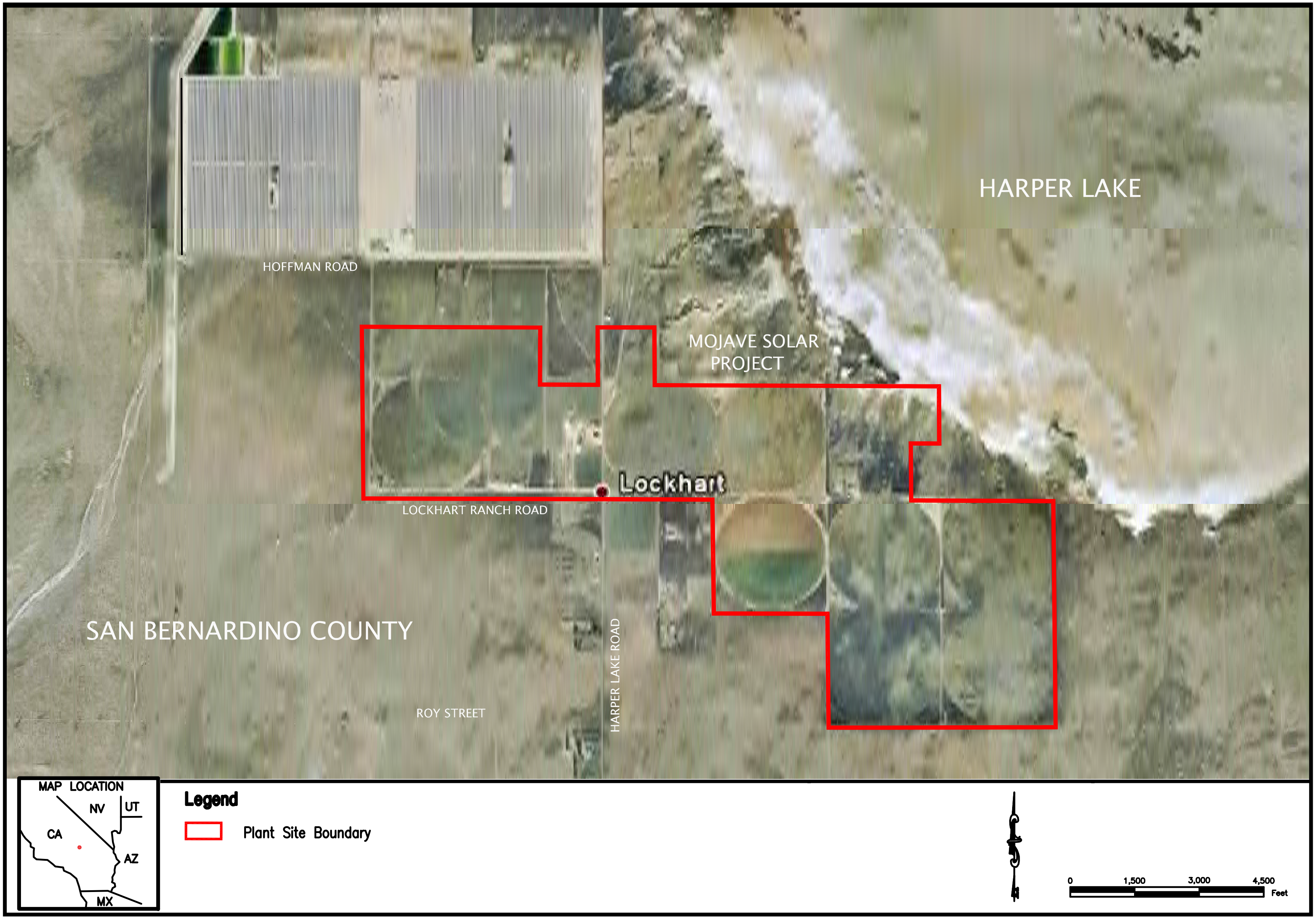
PROJECT DESCRIPTION - FIGURE 2
Abengoa Mojave Solar 1 Project - Vicinity Map



SOURCE: AFC Figure 1-2

PROJECT DESCRIPTION - FIGURE 3

Abengoa Mojave Solar 1 Project - Site Map

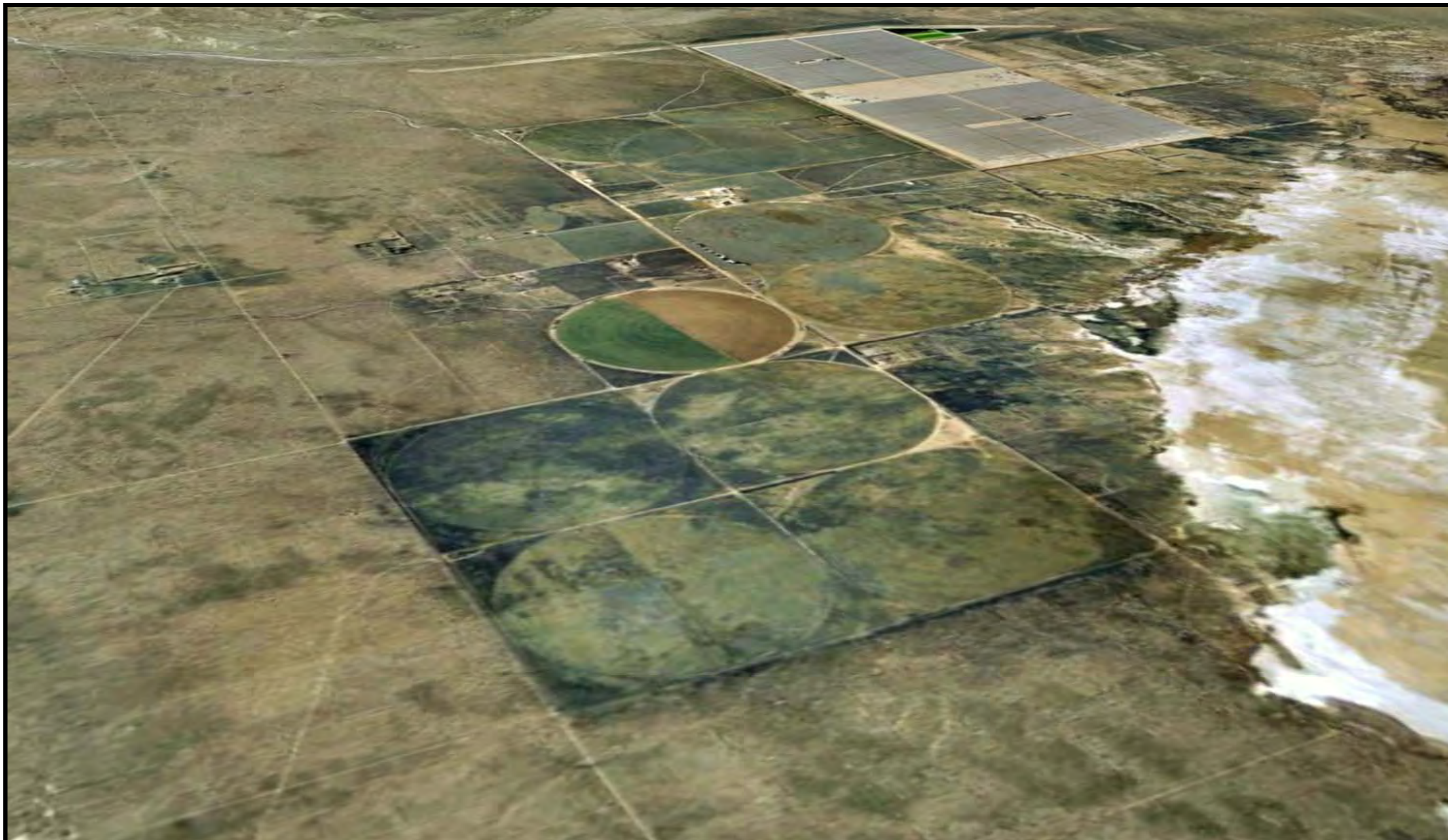


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MAY 2010

SOURCE: AFC Figure 1-3

PROJECT DESCRIPTION - FIGURE 4

Abengoa Mojave Solar 1 Project - Visual Appearance of the Site Prior to Construction



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MAY 2010

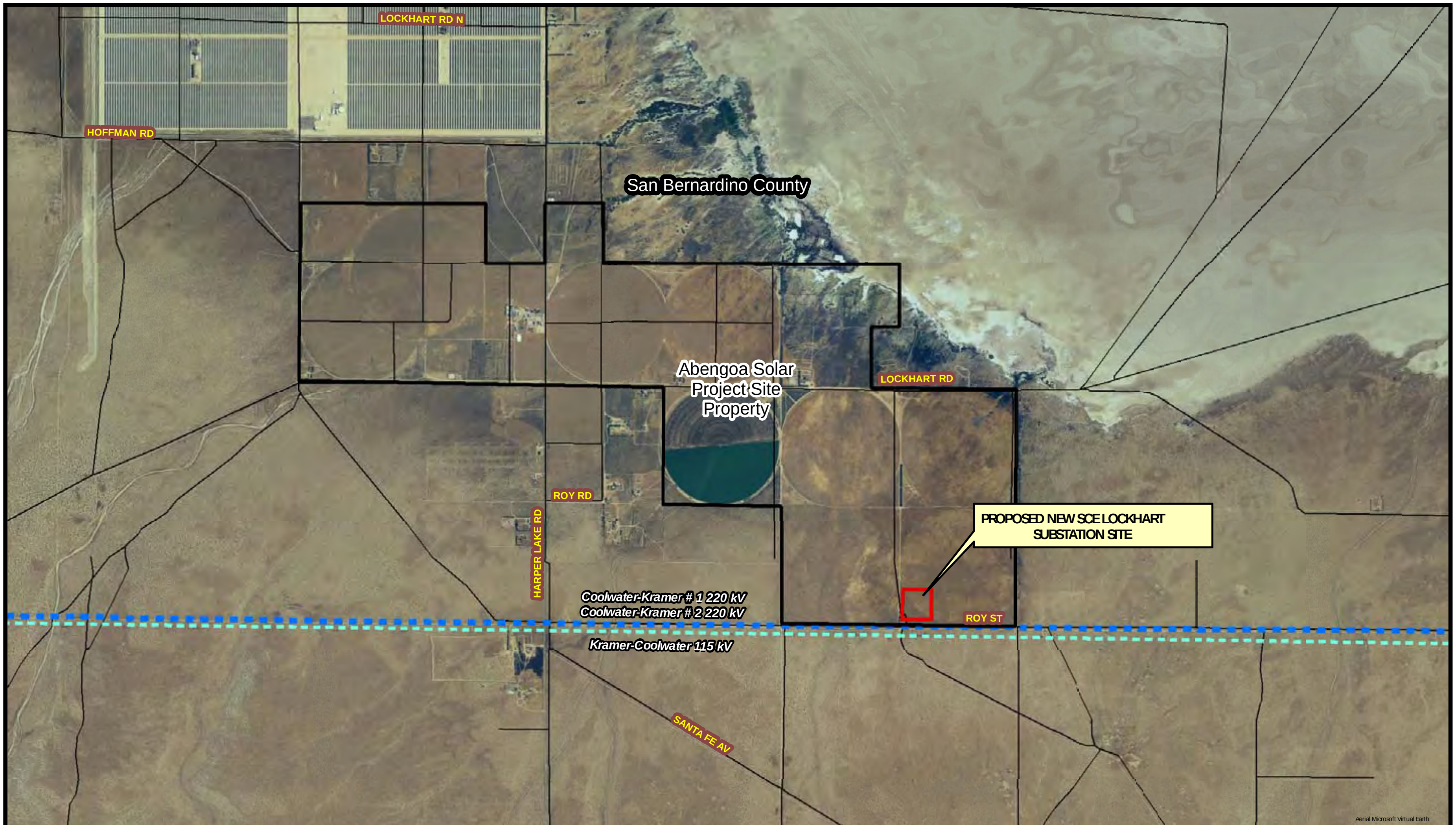
SOURCE: AFC Figure 1-4(a)

PROJECT DESCRIPTION - FIGURE 5
Abengoa Mojave Solar 1 Project - Visual Appearance of the Site After Construction

SOURCE: AFC Figure 1-4(b)

PROJECT DESCRIPTION - FIGURE 6

Abengoa Mojave Solar 1 Project - Proposed New SCE Lockhart Substation Site



N W E S

0 0.25 0.5 1 Miles

Features depicted herein are planning level accuracy, and intended for informational purposes only. Distances and locations may be distorted at this scale. Always consult with the proper legal documents or agencies regarding such features.
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Legend

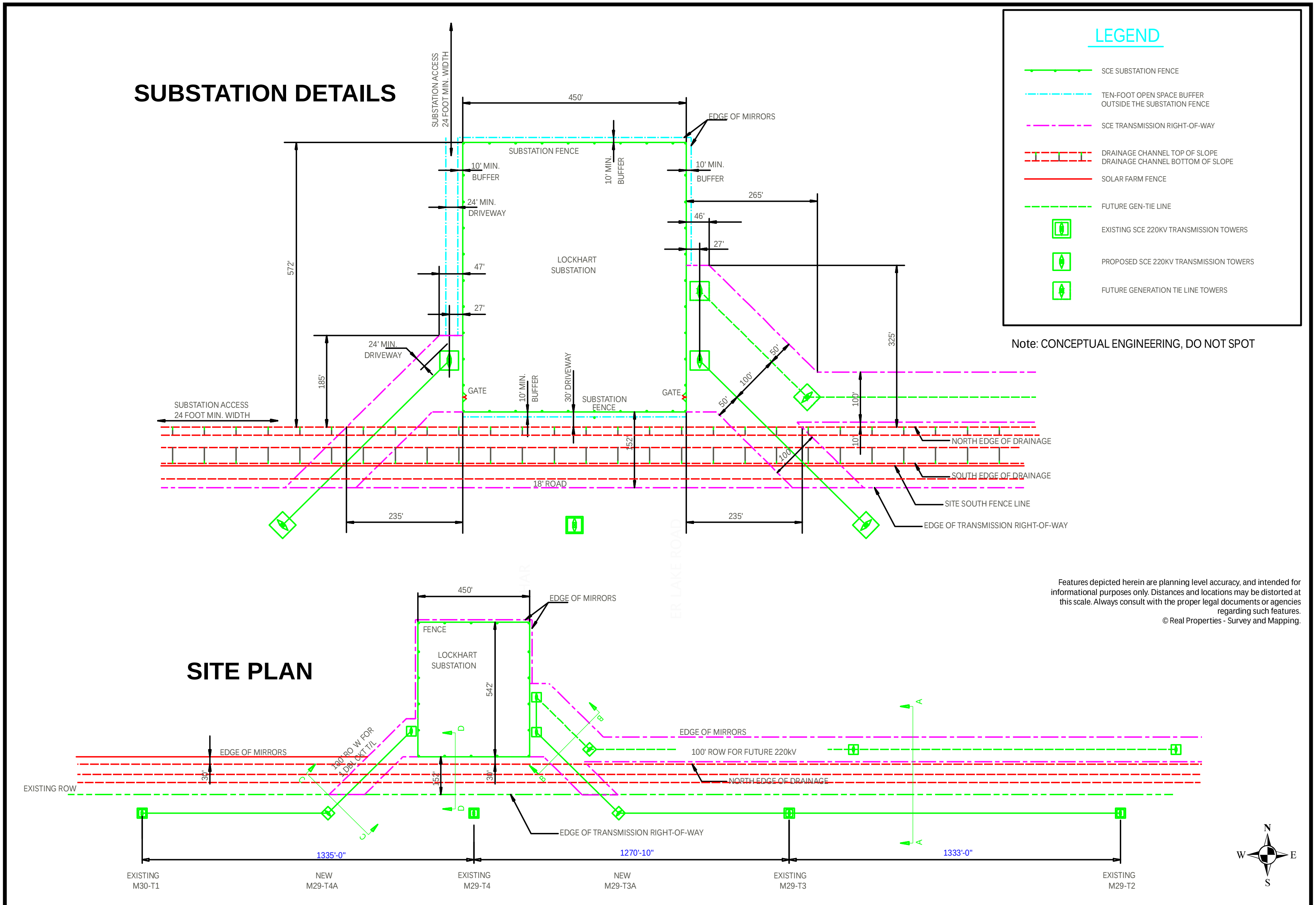
- Proposed New SCE Lockhart Substation Site
- Mohave Solar (Abengoa Solar Inc.) Plant Site
- Existing 220kV Transmission Lines (SCE, 2009)
- Existing 115kV Subtransmission Line (SCE, 2009)
- Minor Roads (TBM, 2008)

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MAY 2010

SOURCE: AFC Figure 1

PROJECT DESCRIPTION - FIGURE 7

Abengoa Mojave Solar 1 Project - Proposed New SCE Lockhart Substation and Associated Electrical Lines

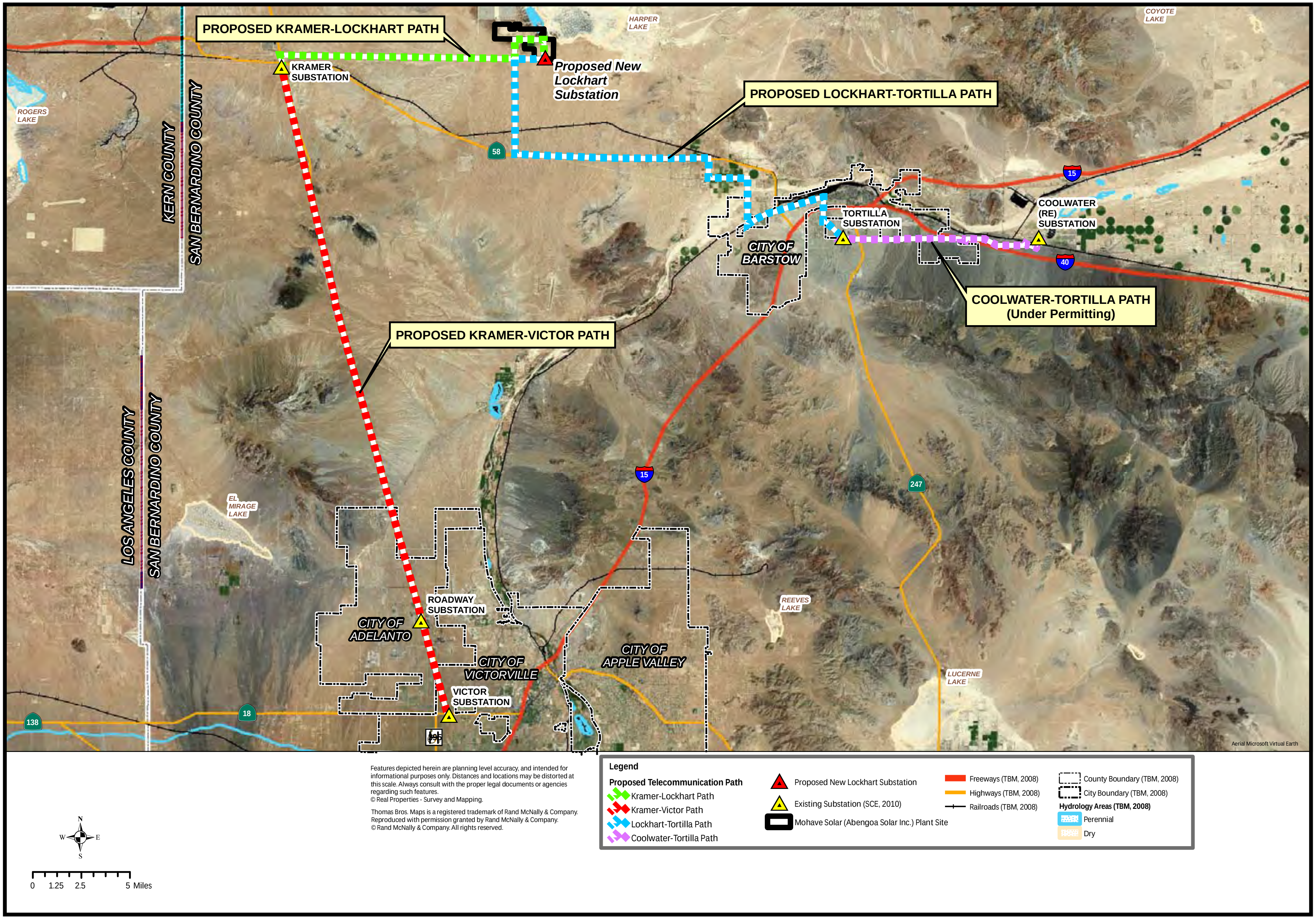


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MAY 2010

SOURCE: AFC Figure 2

PROJECT DESCRIPTION - FIGURE 8

Abengoa Mojave Solar 1 Project - Overview of Proposed New Telecommunication Fiber Optic Cables For The Lockhart Project



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MAY 2010

SOURCE: AFC Figure 3-1

ENVIRONMENTAL ASSESSMENT

AIR QUALITY

Testimony of Tao Jiang and William Walters, P.E.

SUMMARY OF CONCLUSIONS

Staff finds that with the adoption of the attached conditions of certification the proposed Abengoa Mojave Solar Project (AMS or proposed project) would comply with all applicable laws, ordinances, regulations, and standards (LORS) and would not result in any significant air quality-related impacts.

The AMS project would emit substantially lower greenhouse gas[1] emissions per megawatt-hour than fossil fueled generation resources in California. The AMS project, as a renewable energy generation facility, is determined by rule to comply with the Greenhouse Gas Emission Performance Standard requirements of SB 1368 (Chapter 11, Greenhouse Gases Emission Performance Standard, Article 1, Section 2903 [b][1]).

INTRODUCTION

This analysis evaluates the expected air quality impacts from the emissions of criteria air pollutants from both the construction and operation of AMS. Criteria air pollutants are defined as air contaminants for which the state and/or federal governments have established ambient air quality standards to protect public health.

The criteria pollutants analyzed within this section are nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), ozone (O_3), and particulate matter (PM). Lead is not analyzed as a criteria pollutant, but lead and other toxic air pollutant emissions impacts are analyzed in the Public Health Section of this Supplemental Staff Assessment (SSA). Two subsets of particulate matter are inhalable particulate matter (less than 10 microns in diameter, or PM10) and fine particulate matter (less than 2.5 microns in diameter, or PM2.5). Nitrogen oxides (NOx, consisting primarily of nitric oxide [NO] and NO_2) and volatile organic compounds (VOC) emissions readily react in the atmosphere as precursors to ozone and, to a lesser extent, particulate matter. Sulfur oxides (SOx) readily react in the atmosphere to form particulate matter and are major contributors to acid rain. Global climate change and greenhouse gas (GHG) emissions from the proposed project are discussed in an **APPENDIX AIR-1** and analyzed in the context of cumulative impacts.

[1] Greenhouse gas (GHG) emissions are not criteria pollutants, but they affect global climate change. In that context, staff evaluates the GHG emissions from the proposed project (Appendix Air-1), presents information on GHG emissions related to electricity generation, and describes the applicable GHG standards and requirements.

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

- Whether AMS is likely to conform with applicable federal, state, and Mojave Desert Air Quality Management District (MDAQMD) air quality laws, ordinances, regulations and standards (Title 20, California Code of Regulations, section 1744 (b));
- Whether AMS is likely to cause new violations of ambient air quality standards or contribute substantially to existing violations of those standards (Title 20, California Code of Regulations, section 1743); and
- Whether mitigation measures proposed for AMS are adequate to lessen potential impacts under the California Environmental Quality Act (CEQA) to a level of insignificance (Title 20, California Code of Regulations, section 1742 (b)).

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

The federal, state, and local laws and policies applicable to the control of criteria pollutant emissions and mitigation of air quality impacts for the AMS are summarized in **Air Quality Table 1**. Staff's analysis examines the proposed project's compliance with these requirements.

Air Quality Table 1
Laws, Ordinances, Regulations, and Standards

Applicable LORS	Description
Federal	
40 Code of Federal Regulations (CFR) Part 52	Nonattainment New Source Review (NSR) requires a permit and requires Best Available Control Technology (BACT) and Offsets. Permitting and enforcement delegated to MDAQMD. Prevention of Significant Deterioration (PSD) requires major sources or major modifications to major sources to obtain permits for attainment pollutants. AMS is a new source that does not have a rule listed emission source thus the PSD trigger levels are 250 tons per year for NOx, VOC, SO_2, PM2.5 and CO.
40 CFR Part 60	New Source Performance Standards (NSPS), Subpart Dc Standards of Performance for Small Industrial-Commercial-Institutional Steam Generation Units. Establishes recordkeeping and reporting requirements for natural gas fired steam generating units. Subpart IIII Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. Establishes emission standards for compressions ignition internal combustion engines, including emergency generator and fire water pump engines.
40 CFR Part 93 General Conformity	Requires determination of conformity with State Implementation Plan for Projects requiring federal approvals if project annual emissions are above specified levels.

Applicable LORS	Description
State	
Health and Safety Code (HSC) Section 40910-40930	Permitting of source needs to be consistent with Air Resource Board (ARB) approved Clean Air Plans.
HSC Section 41700	Restricts emissions that would cause nuisance or injury.
California Code of Regulations (CCR) Section 93115	Airborne Toxics Control Measure for Stationary Compression Ignition Engines. Limits the types of fuels allowed, established maximum emission rates, establishes recordkeeping requirements on stationary compression ignition engines, including emergency generator and fire water pump engines.
Local (Mojave Desert Air Quality Management District)	
Rule 201 and 203 Permits Required	Requires a Permit to Construct before construction of an emission source occurs. Prohibits operation of any equipment that emits or controls air pollutant without first obtaining a permit to operate.
Rules 401, 402, and 403 Nuisance, Visible Emissions, Fugitive Dust	Limits the visible, nuisance, and fugitive dust emissions and would be applicable to the construction period of the project.
Rule 403.2 Fugitive Dust Control for the Mojave Desert Planning Area	Limits fugitive dust emissions within the Mojave Desert Planning Area. Rule 403.2 supersedes Rule 403 if there are any conflicting requirements. This rule would be applicable to the construction period of the project.
Rule 404 Particulate Matter - Concentration	Limits the particulate matter concentration from stationary source exhausts.
Rule 406 Specific Contaminants	The rule prohibits sulfur compound emissions in excess of 500 ppmv.
Rule 407 Liquid and Gaseous Air Contaminants	The rule prohibits carbon monoxide emissions in excess of 2,000 ppmv.
Rule 409 Combustion Contaminants	Limits the emissions from fossil fuel combustion.
Rule 431 Sulfur Content of Fuels	Limits the sulfur content of liquid fuels to no more than 0.5% by weight.
Rule 461 Gasoline Transfer and Dispensing	This rule specifies the vapor recovery requirement for gasoline tank filling (Phase I) and vehicle refueling (Phase II) for gasoline storage and refueling facilities.
Rule 900 Standard of Performance for New Stationary Source	Incorporates the Federal NSPS (40 CFR 60) rules by reference.
Rule 1303 New Source Review	Specifies BACT/Offsets technology and requirements for a new emissions unit that has potential to emit any regulated pollutants.
Rule 1306 Electric Energy Generating Facilities	Describes actions to be taken for permitting of power plants that are within the jurisdiction of the Energy Commission.

SETTING

CLIMATE AND METEOROLOGY

The proposed AMS site located in the Mojave Desert is relatively flat, rising in elevation from the northeast to the west and southwest, with an elevation of approximately 2,070 feet above mean sea level. The Mojave Desert has a typical desert climate, having extreme daily temperature changes, low annual precipitation, strong seasonal winds, and mostly clear skies. The annual highest temperature in the Mojave Desert exceeds 100°F and the average daily temperature variation is approximately 35 degrees in the summer and 30 degrees in the winter. Winter temperatures are more moderate, with mean maximum temperatures in the low 60s and lows in the low or mid 30s. Nearby Barstow has a total average annual precipitation of less than four and a half inches (WC 2009). Over 65% of the annual precipitation occurs in the winter season, between December and March. However, occasional heavy precipitation occurs in the summer due to thunderstorms.

The applicant collected recent (2001 to 2004) meteorological data from the Daggett Airport Automated Surface Observing System (ASOS) station. The average annual wind rose for these three years at this monitoring station shows a prevailing wind from southwest through northwest occurring approximately 60% of the time. Easterly winds are much less frequent. The wind speeds are relatively high, with the annual average wind speed of 4.9 m/s. The wind between 3.6 and 5.7 m/s is the most common, at 30% of the time. Calm conditions occur approximately 7.6% of the time.

SENSITIVE RECEPTORS

The general population includes many sensitive subgroups that may be at greater risk from exposure to emitted pollutants. These sensitive subgroups include the very young, the elderly, and those with existing illnesses. In addition, the location of the population in the area surrounding a project site may have a large bearing on health risk. There are no sensitive receptors within a 3-mile radius of the project site. The nearest sensitive receptor is the Hinkley Elementary School located about 10 miles southeast of the project site. The nearest residence is approximately 60 feet south of the southern boundary and several additional residences are located within 0.6 miles of the project boundaries (AS 2009a, Section 5.6.2.1 and Table C.4-4).

EXISTING AMBIENT AIR QUALITY

The Federal Clean Air Act and the California Clean Air Act both require the establishment of standards for ambient concentrations of air pollutants, called ambient air quality standards (AAQS). The state AAQS, established by the California Air Resources Board, are typically lower (more protective) than the federal AAQS, which are established by the United States Environmental Protection Agency (USEPA). The state and federal air quality standards are listed in **Air Quality Table 2**. The averaging times for the various air quality standards, the times over which they are measured, range from one-hour to an annual average. The standards are read as a concentration, in parts per million (ppm), or as a weighted mass of material per a volume of air, in milligrams or micrograms of pollutant in a cubic meter of air (mg/m^3 or $\mu g/m^3$, respectively).

In general, an area is designated as attainment if the concentration of a particular air contaminant does not exceed the standard. Likewise, an area is designated as non-attainment for an air contaminant if that contaminant standard is violated. In circumstances where there is not enough ambient data available to support designation as either attainment or non-attainment, the area can be designated as unclassified. The unclassified area is normally treated the same as an attainment area for regulatory purposes. An area could be attainment for one air contaminant while non-attainment for another, or attainment for the federal standard and non-attainment for the state standard for the same air contaminant.

Air Quality Table 2
Federal and State Ambient Air Quality Standards

Pollutant	Averaging Time	Federal Standard	California Standard
Ozone (O_3)	8 Hour	0.075 ppm [a] (147 μg/m^3)	0.070 ppm (137 μg/m^3)
	1 Hour	—	0.09 ppm (180 μg/m^3)
Carbon Monoxide (CO)	8 Hour	9 ppm (10 mg/m^3)	9.0 ppm (10 mg/m^3)
	1 Hour	35 ppm (40 mg/m^3)	20 ppm (23 mg/m^3)
Nitrogen Dioxide (NO_2)	Annual	0.053 ppm (100 μg/m^3)	0.03 ppm (57 μg/m^3)
	1 Hour	0.100 ppm[b]	0.18 ppm (339 μg/m^3)
Sulfur Dioxide (SO_2)	Annual	0.030 ppm (80 μg/m^3)	—
	24 Hour	0.14 ppm (365 μg/m^3)	0.04 ppm (105 μg/m^3)
	3 Hour	0.5 ppm (1300 μg/m^3)	—
	1 Hour	—	0.25 ppm (655 μg/m^3)
Particulate Matter (PM10)	Annual	—	20 μg/m^3
	24 Hour	150 μg/m^3	50 μg/m^3
Fine Particulate Matter (PM2.5)	Annual	15 μg/m^3	12 μg/m^3
	24 Hour	35 μg/m^3	—
Sulfates (SO_4)	24 Hour	—	25 μg/m^3
Lead	30 Day Average	—	1.5 μg/m^3
	Calendar Quarter	1.5 μg/m^3	—
Hydrogen Sulfide (H_2S)	1 Hour	—	0.03 ppm (42 μg/m^3)
Vinyl Chloride (chloroethene)	24 Hour	—	0.01 ppm (26 μg/m^3)
Visibility Reducing Particulates	8 Hour	—	In sufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70%.

Source: ARB 2010a.
Notes:
[a] The 2008 standard is shown above, but as of September 16, 2009 this standard is being reconsidered. The 1997 8-hour standard is 0.08 ppm.
[b] The U.S. EPA is in the process of implementing this new standard, which became effective April 12, 2010. This standard is based on the 3-year average of the 98th percentile of the yearly distribution of 1-hour daily maximum concentrations.

The project site is located in the Mojave Desert Air Basin[2] (MDAB) and is under the jurisdiction of the Mojave Desert Air Quality Management District (MDAQMD). The MDAB in the area of the project site is designated as non-attainment for the federal and state ozone and PM10 standards, and the state PM2.5 standard. This area is designated as attainment or unclassified for the state and federal CO, NOx, and SOx standards, and the federal PM2.5 standards. **Air Quality Table 3** summarizes the area's attainment status for various applicable state and federal standards.

Air Quality Table 3
MDAQMD Federal and State Attainment Status

Pollutant	Attainment Status [a]	
	Federal	**State**
Ozone	Moderate Nonattainment [b]	Moderate Nonattainment
CO	Attainment	Attainment
NO_2	Attainment [c]	Attainment
SO_2	Attainment	Attainment
PM10	Moderate Nonattainment	Nonattainment
PM2.5	Attainment	Nonattainment

Source: ARB 2010b, U.S. EPA 2010a, U.S. EPA 2010b.
Notes:
[a] Attainment = Attainment or Unclassified, where Unclassified is treated the same as Attainment for regulatory purposes.
[b] MDAQMD has asked to be reclassified from moderate to severe-17 nonattainment of the federal 8-hour ozone standard (severe-17 allows 17 years to reach attainment).
[c] Nitrogen dioxide attainment status for the new federal 1-hour NO_2 standard is scheduled to be determined by January 2012.

Ambient air quality monitoring data for ozone, PM10, PM2.5, CO, NO_2, and SO_2, compared to most restrictive applicable standards for the years between 2004 through 2009 (the last year that the complete annual data is currently available) at the most representative monitoring stations for each pollutant are shown in **Air Quality Table 4** and the 1-hour and 8-hour ozone, and 24-hour PM10 and PM2.5 data for the years 2000 through 2009 are shown in **Air Quality Figure 1**. All ozone, NO_2, CO and PM10 data shown are from the Barstow monitoring station. All PM2.5 and SO_2 data are from the Victorville 14306 Park Avenue monitoring station.

[2] The Mojave Desert Air Basin lies inland east of the San Joaquin Valley Air Basin to the west and north and east of the South Coast Air Basin. The desert portions of Kern, San Bernardino, Riverside, and Los Angeles counties are within its boundaries.

Air Quality Table 4
Criteria Pollutant Summary
Maximum Ambient Concentrations (ppm or μg/m^3)

Pollutant	Averaging Period	Units	2004	2005	2006	2007	2008	2009	Limiting AAQS[b]
Ozone	1 hour	ppm	0.1	0.099	0.112	0.099	0.104	0.095	0.09
Ozone	8 hours	ppm	0.083	0.093	0.095	0.088	0.097	0.087	0.07
PM10 [a]	24 hours	μg/m^3	40	78	80	47	50	76	50
PM10	Annual	μg/m^3	21.3	25.4	21.9	29.8	26.1	--	20
PM2.5 [a]	24 hours	μg/m^3	20	19	19	19	--	17	35
PM2.5	Annual	μg/m^3	10.8	--	10.3	9.7	--	9.2	12
CO	1 hour	ppm	1.6	3.3	3.5	1.4	1.4	1.2	20
CO	8 hours	ppm	1.18	1.34	1.19	0.7	1.23	0.89	9.0
NO_2	1 hour	ppm	0.101	0.087	0.082	0.073	0.081	0.06	0.18
NO_2	Annual	ppm	0.023	0.022	0.022	0.02	0.019	0.016	0.03
SO_2	1 hour	ppm	0.011	0.012	0.018	0.009	0.006	0.028	0.25
SO_2	3 hour	ppm	0.007	0.008	0.012	0.006	0.005	0.006	0.5
SO_2	24 hours	ppm	0.003	0.003	0.005	0.005	0.002	0.005	0.04
SO_2	Annual	ppm	0.001	0.001	0.001	0.001	0.001	0.001	0.03

Source: ARB 2010c, U.S.EPA 2010c
Notes:
[a] Exceptional PM concentration events, such as those caused by wind storms were excluded.
[b] The limiting ambient air quality standard (AAQS) is the most stringent of the California AAQS or National AAQS for that pollutant and averaging period.

Ozone

Ozone is not directly emitted from stationary or mobile sources, but is formed as the result of chemical reactions in the atmosphere between directly emitted nitrogen oxides (NOx) and hydrocarbons (Volatile Organic Compounds [VOC]) in the presence of sunlight to form ozone. The MDAB would be in attainment of both NAAQS and CAAQS ozone standards without the influence of transported pollutants from upwind regions, specifically the South Coast Air Basin (Los Angeles Area) and to a lesser extent the San Joaquin Valley Air Basin (MDAQMD 2008).

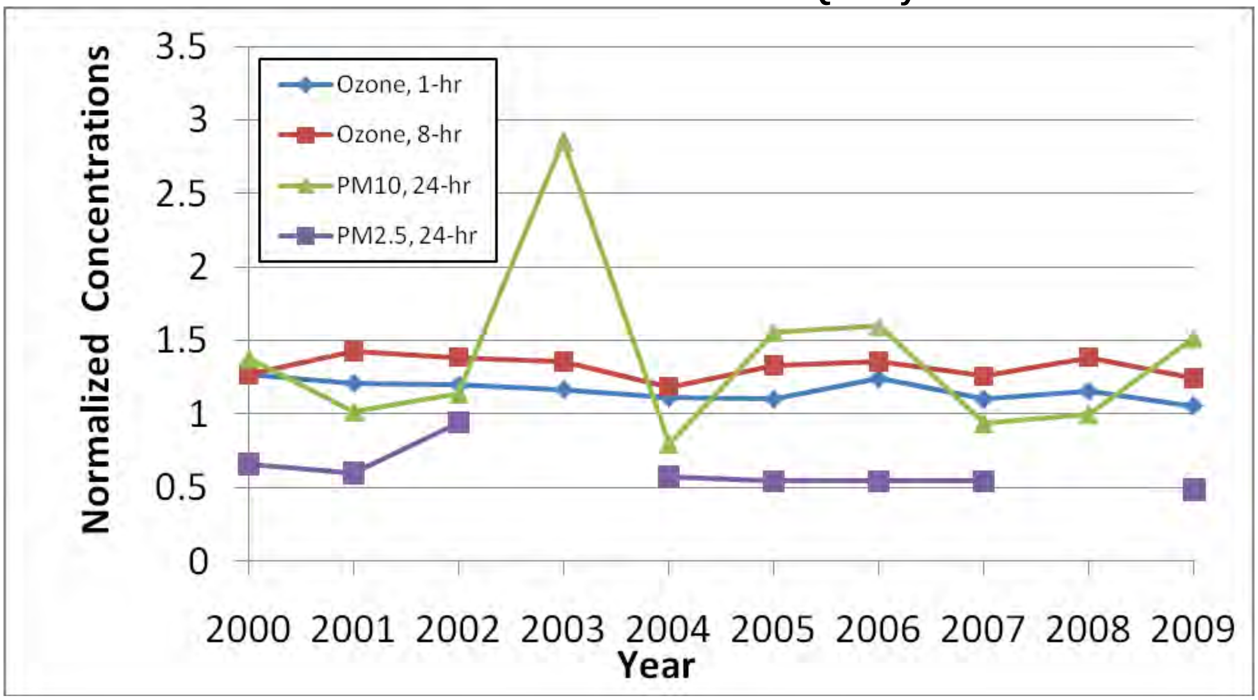
As **Air Quality Table 4** and **Air Quality Figure 1** indicate, the 1-hour and 8-hour ozone concentrations measured, with some annual variability, have been fairly constant over time. The collected air quality data (not shown) indicate that the ozone violations occurred primarily during the sunny and hot periods typical during May through September.

Nitrogen Dioxide

The entire air basin is classified as attainment for the state 1-hour and annual and federal annual NO_2 standards. The nitrogen dioxide attainment standard could change due to the new federal 1-hour standard, although a review of the air basin wide monitoring data suggest this would not occur for the MDAB.

Approximately 90% of the NOx emitted from combustion sources is nitric oxide (NO), while the balance is NO_2. NO is oxidized in the atmosphere to NO_2, but some level of photochemical activity is needed for this conversion. The highest concentrations of NO_2 typically occur during the fall. The winter atmospheric conditions can trap emissions near the ground level, but lacking substantial photochemical activity (sun light), NO_2 levels are relatively low. In the summer the conversion rates of NO to NO_2 are high, but the relatively high temperatures and windy conditions disperse pollutants, preventing the accumulation of NO_2. The NO_2 concentrations in the project area are well below the state and federal ambient air quality standards.

Air Quality Figure 1
2000-2009 Historical Ozone and PM Air Quality Data[a,b,c]



Source: ARB 2010c, U.S.EPA 2010c
Notes:
[a] The highest measured ambient concentrations of various criteria air contaminants were divided by their applicable standard and provided as a graphical point. Any point on the chart that is greater than one means that the measured concentrations of such air contaminant exceed the standard, and any point that is less than one means that the respective standard is not exceeded for that year. For example the 1-hour ozone concentration in 2005 is 0.099 ppm/0.090 ppm standard = 1.10.
[b] All ozone and PM10 data are from the Barstow monitoring station.
[c] All PM2.5 data are from the Victorville monitoring station. The completeness of the 24-hr PM2.5 data is limited where only years 2000 to 2002 and 2004 to 2007 have 98th%ile values for comparison with the federal standard.

Carbon Monoxide

The area is classified as attainment for the state and federal 1-hour and 8-hour CO standards. The highest concentrations of CO occur when low wind speeds and a stable atmosphere trap the pollution emitted at or near ground level. These conditions occur frequently in the wintertime late in the afternoon, persist during the night and may extend one or two hours after sunrise. The project area has a lack of significant mobile source emissions and has CO concentrations that are well below the state and federal ambient air quality standards.

Particulate Matter (PM10) and Fine Particulate Matter (PM2.5)

PM10 can be emitted directly or it can be formed many miles downwind from emission sources when various precursor pollutants interact in the atmosphere.

The area is designated non-attainment for both the federal and the state PM10 standards. As shown in **Air Quality Figure 1**, maximum PM10 concentrations at Barstow were at or above the state 24-hour PM10 standard for eight of the recent ten year history. The peak concentrations from 2003 through 2008 occurred during three of the four seasons, all but winter, and the highest of the peak concentrations are likely to be due in part to high wind events.

Fine particulate matter, or PM2.5, is derived mainly from either the combustion of materials, or from precursor gases (SOx, NOx, and VOC) through complex reactions in the atmosphere. PM2.5 consists mostly of sulfates, nitrates, ammonium, elemental carbon, and a small portion of organic and inorganic compounds.

San Bernardino County in the site area is classified as nonattainment for the state PM2.5 standard, and attainment for the federal PM2.5 standard. This divergence between the federal PM10 and PM2.5 attainment status indicates that a substantial fraction of the ambient particulate matter levels are most likely due to localized fugitive dust sources, such as vehicles travel on unpaved roads, agricultural operations, or wind-blown dust[3].

Sulfur Dioxide

The entire air basin is classified as attainment for the state and federal SO_2 standards. Sulfur dioxide is typically emitted as a result of the combustion of a fuel containing sulfur. Sources of SO_2 emissions within the MDAB come from a wide variety of fuels: gaseous, liquid and solid; however, the total SO_2 emissions within the western MDAB are limited due to the limited number of major stationary sources and California's significant reduction in motor vehicle fuel sulfur content. The project area's SO_2 concentrations are well below the state and federal ambient air quality standards.

Summary

In summary, staff recommends the background ambient air concentrations in **Air Quality Table 5** for use in the modeling and impacts analysis. The recommended background concentrations are based on the maximum criteria pollutant concentrations from the past three years of available data collected at the most representative monitoring stations surrounding the project site (see **Air Quality Table 4**).

[3] Fugitive dust, unlike combustion source particulate and secondary particulate, is composed of a much higher fraction of larger particles on than smaller particles, so the PM2.5 fraction of fugitive dust is much smaller than the PM10 fraction. Therefore, when PM10 ambient concentrations are significantly higher than PM2.5 ambient concentrations this tends to indicate that a large proportion of the PM10 are from fugitive dust emission sources, rather than from combustion particulate or secondary particulate emission sources.

Air Quality Table 5
Staff Recommended Background Concentrations (μg/m³)[4]

Pollutant	Averaging Time	Recommended Background	Limiting Standard	Percent of Standard
NO_2	1 hour	152.6	339	46%
	Annual	38.0	57	67%
PM10	24 hour	76	50	152%
	Annual	29.8	20	149%
PM2.5	24 hour	19	35	54%
	Annual	9.7	12	81%
CO	1 hour	1,610	23,000	7%
	8 hour	1,367	10,000	14%
SO_2	1 hour	23.6	655	4%
	3 hour	15.6	1,300	1%
	24 hour	13.1	105	13%
	Annual	2.7	80	3%

Source: ARB 2010c, U.S.EPA 2010c, and Energy Commission Staff Analysis.

Where possible, staff prefers that the recommended background concentration measurements come from nearby monitoring stations with similar characteristics. For this proposed project the Barstow monitoring station (ozone, NO_2, CO and PM10), at approximately 18 miles east south east of the project site, is the closest monitoring station to the site. The Victorville monitoring station (PM2.5 and SO_2) is located approximately 34 miles south of the project site. In general, the Barstow and Victorville monitoring stations are considered to provide conservative estimates of the worst case background concentrations due to their proximity to higher populations and major traffic routes and for Victorville due to the greater pollutant transport from the South Coast Air Basin (Metropolitan Los Angeles).

The background concentrations for PM10 are above the most restrictive existing ambient air quality standards, while the background concentrations for the other pollutants are all well below the most restrictive existing ambient air quality standards.

The pollutant modeling analysis was limited to the pollutants listed above in **Air Quality Table 5**; therefore, recommended background concentrations were not determined for the other criteria pollutants (ozone, lead, visibility, etc.).

[4] This table has been updated since the publication of the Staff Assessment to use peak values from 2007 to 2009 background data, where 2009 data was not available prior to publication of the Staff Assessment, which shows a general improvement in worst-case background concentrations for the criteria pollutants included in the air dispersion modeling analysis.

PROJECT DESCRIPTION

The proposed AMS project is a solar electric generating facility totaling 250 MW located on approximately 1,765 acres. The project consists of two separate 125 MW power units, identified as Alpha (northwest) and Beta (southwest). The project would utilize a 21.5 million Btu/hr natural gas-fueled auxiliary heat transfer fluid (HTF) heater on each power unit to reduce startup time and to keep the temperature of the HTF above its freezing point (54 °F).

The proposed solar energy facility would use a 6 cell wet cooling tower for power plant cooling on each power unit. Water would be supplied from onsite groundwater wells, and would be treated as necessary for cooling tower and other onsite uses. The project would also have several other operating emission sources including: 1) HTF expansion vessels and HTF overflow tanks at each power unit with vent emission control systems; 2) an HTF piping system for each power unit; 3) two diesel-fueled 346 horsepower firewater pump engines for fire protection; 4) two diesel-fueled 4,160 horsepower emergency generators; 5) a contaminated soil bio-remediation area; 6) on-site mobile equipment needed for site maintenance (mirror washing) and operation; and 7) offsite vehicle emissions associated with truck hauling of raw materials (fuel and water treatment chemicals) and waste water evaporation pond solids, and employee commute trips.

The applicant is currently proposing the use of groundwater from wells to be constructed onsite to supply plant site raw water needs. Therefore, no offsite water pipelines are proposed to be constructed. Additionally process wastewater would be kept onsite in evaporation ponds and sanitary wastewater would be sent to an onsite sanitary waste septic system, so no offsite industrial waste water or sewer pipelines are proposed to be constructed.

The project also proposes an electrical interconnection to Southern California Edison's (SCE's) transmission system. SCE has proposed significant system-wide upgrades to the transmission system. The onsite transmission line construction would include a new 230KV Hinkley substation and transmission gen-tie lines (11,460 feet for Alpha and 4,430 for Beta). Therefore, no offsite transmission line construction is required to interconnect the project.

The project would connect with an existing Southwest Gas Corporation natural gas pipeline that is located adjacent to the Alpha power unit. Therefore, no offsite gas pipeline construction is required for this project.

PROJECT CONSTRUCTION

The total duration of project construction for AMS is estimated to be approximately 26 months. Different areas within the project site and the construction laydown areas would be disturbed at different times over the construction period. Total construction disturbance area would be approximately 1,765 acres. The maximum acreage disturbed on any one day during construction is estimated by the applicant to be 200 acres. Combustion emissions would result from the off-road construction equipment, including diesel construction equipment used for site grading, excavation, and construction of onsite structures, and water and soil binder spray trucks used to control construction dust emissions. Fuel combustion emissions also would result from exhaust from on-road construction vehicles, including heavy duty diesel trucks used to deliver materials, other diesel trucks used during construction, and worker personal vehicles and pickup trucks used to transport workers to and from and around the construction site. Fugitive dust emissions would result from site grading/excavation activities, installation of new onsite transmission lines, water and gas pipelines, construction of power plant facilities, roads, and substations, and vehicle travel on paved/unpaved roads.

The applicant's maximum daily and average annual emission estimates, that include the applicant's fugitive dust mitigation assumptions and fleet average off-road equipment emission factors, are provided below in **Air Quality Tables 6** and **7**.

Air Quality Table 6
AMS Construction - Maximum Daily Emissions [a]

	NOx	SOx	CO	VOC	PM10	PM2.5
Onsite Construction Emissions						
Onsite Construction Equipment	583.1	0.6	310.9	97.3	25.9	25.7
Fugitive dust	--	--	--	--	145.4	30.5
Subtotal of Onsite Emissions	583.1	0.6	310.9	97.3	171.3	56.2
Offsite Construction Emissions						
Paved Road Dust	--	--	--	--	10.2	0.3
Track-out Dust	--	--	--	--	5.9	1.0
Delivery/Hauling Exhaust	97.5	0.1	29.5	7.1	4.4	4.4
Worker Travel Exhaust	54.4	0.5	469.5	39.6	3.8	3.8

Source: AS 2009a, ESH 2009c, ESH 2010e, ESH 2010g
[a] - The maximum daily emissions do not always occur on the same day for each pollutant or occur concurrently for the separate construction activities.

Air Quality Table 7
AMS Construction – Average Annual Emissions (tons/year)

	NOx	SOx	CO	VOC	PM10	PM2.5
Onsite Construction Emissions						
Onsite Construction Equipment	68.9	0.1	34.7	11.0	4.0	4.0
Fugitive dust	--	--	--	--	12.8	2.7
Subtotal of Onsite Emissions	68.9	0.1	34.7	11.0	16.8	6.7
Offsite Emissions						
Paved Road Dust	--	--	--	--	1.2	0.0
Track-out Dust	--	--	--	--	0.7	0.1
Delivery/Hauling Exhaust	12.5	0.0	3.8	0.9	0.57	0.56
Worker Travel Exhaust	7.2	0.1	60.8	5.2	0.46	0.46

Source: AS 2009a, ESH 2009c, ESH 2010e, ESH 2010g

The emissions presented in **Air Quality Table 7** represents annual values averaged over the 26 month construction period and not maximum annual emissions. The applicant submitted revised construction emission estimates on February 2nd. Staff's review of these emission estimates indicated that: 1) the fugitive dust emission estimate procedure was oversimplified and not conservative; 2) trip length estimates were not realistic and did not match other information provided in the AFC; and 3) that dated emission factors were used for both the on-road and off-road equipment. Staff performed a separate corrected emission estimate. The results of staff's corrected emission estimate are provided in **Air Quality Table 8**. The purpose of this revised emission analysis is primarily to confirm that the project does not trigger a General Conformity analysis and for staff to obtain a better understanding of the construction elements and their potential for near-field nuisance impacts to residents located on or near the project fence line.

Air Quality Table 8
AMS Construction – Staff Emission Estimate

	NOx	SOx	CO	VOC	PM10	PM2.5
Maximum Daily Emissions (lb/day) [a]						
Onsite Construction Equipment	598.4	0.6	841.0	240.4	31.2	29.6
Onsite Fugitive dust	---	---	---	---	1,102.0	211.4
Subtotal of Onsite Emissions	**598.4**	**0.6**	**841.0**	**240.4**	**1,133.2**	**240.0**
Offsite Vehicle Emissions	135.9	0.7	475.5	53.3	7.8	6.8
Offsite Fugitive Dust Emissions	---	---	---	---	29.9	0.0
Subtotal of Offsite Emissions	**135.9**	**0.7**	**475.5**	**53.3**	**37.7**	**6.8**
Maximum Daily Total	**734.4**	**1.3**	**1,316.6**	**293.7**	**1,170.9**	**247.8**
Maximum Annual Emissions (tons/year) [b]						
Onsite Construction Equipment	47.5	0.0	61.8	19.2	2.8	2.6
Onsite Fugitive dust	---	---	---	---	78.7	14.9
Subtotal of Onsite Emissions	**47.5**	**0.0**	**61.8**	**19.2**	**81.4**	**17.5**
Offsite Vehicle Emissions	17.2	0.1	75.1	7.7	1.1	0.8
Offsite Fugitive Dust Emissions	---	---	---	---	3.9	0.0
Subtotal of Offsite Emissions	**17.2**	**0.1**	**75.1**	**7.7**	**4.9**	**0.8**
Maximum Daily Total	**64.7**	**0.2**	**136.9**	**26.9**	**86.3**	**18.3**

Source: Staff Analysis (CEC 2010o)
[a] - Maximum daily and monthly emissions for all criteria would occur during Month 6, except PM10 which would have its peak emissions during Month 5.
[b] – Maximum annual emissions (worst-case consecutive twelve month period for onsite and offsite emissions) do not occur during the same periods for all pollutants: for PM10 and PM2.5 the peak occurs during months 1 to 12; for NOx the peak occurs during months 2 through 13; for VOC the peak occurs during months 4 through 15; for CO the peak occurs during months 6 through 17; and for SOx the peak occurs during months 10 through 21 of the 26 month construction schedule.

Staff's construction emission estimate is fairly close to the applicant's emission estimate for certain activities and pollutants. The major divergence is in the particulate emission estimates, where staff believes that the applicant did not use an estimation technique appropriate to the complexity of the construction required for this project. However, staff's major finding from this analysis is that the worst-case annual construction emissions would not trigger a General Conformity analysis for the project. Staff's emission calculations, in Adobe Acrobat File format, have been docketed separately from the Supplemental Staff Assessment (SSA)[5].

PROJECT OPERATION

The AMS facility would be a nominal 250 Megawatt (MW) parabolic solar trough thermal solar electrical generating facility (AS 2009a). The direct air pollutant emissions from power generation are minimal; however, there are required auxiliary equipment and maintenance activities necessary to operate and maintain the facility. The facility includes two 125 MW power blocks with identical stationary operating equipment, with one noted exception, and maintenance activity requirements.

The AMS onsite stationary and mobile emission sources are as follows:

- Two 21.5 MMBtu natural gas-fueled auxiliary HTF heaters, one per power block, used to maintain the temperature of the HTF above freezing during cold months and pre-warming for daily startup year-round;
- Two 6-cell wet-cooling towers, one per power block, each to provide cooling and heat rejection from a single power block process;
- Two 346-hp diesel-fired emergency fire water pump engines, one per power block;
- Two 4,160-hp diesel engine-driven emergency generators, one per power block;
- One 2,000 gallon gasoline tank and one 2,000 gallon diesel tank that would refuel onsite dedicated vehicles for both power blocks;
- Eight HTF expansion vessels and two HTF overflow tanks on each power block, that would be serviced by HTF venting control systems;
- Two separate HTF piping systems for each power block with a total facility component count of 3,247 valves, 8,120 flanges/connectors[6], 24 pump seals, and 16 pressure relief valves.
- Spent HTF waste loadout;
- Two bio-remediation/ land farm units, one per power block, to treat HTF contaminated soils; and
- Onsite diesel and gasoline fueled maintenance vehicles used for mirror washing and other maintenance/operation support activities.

The emissions from the spent HTF waste loadout, bioremediation/land farm units, and diesel tanks are negligible, they do not require permitting by the MDAQMD, and are not included in the VOC emission estimates for the facility or discussed further in this section.

[5] The Excel file format for these calculations can be provided to parties upon request.

[6] Staff increased the number of flanges/connectors to a value of 4,060 per unit to be consistent with the component count ratios of other currently analyzed projects using HTF piping systems. This revision has a very minor effect on the emission estimate for the HTF piping system.

The applicant[7] provided both onsite and offsite emission estimates using the following assumptions to develop the hourly, daily, and annual onsite emissions estimates for AMS operation:

A. Maximum Hourly Emissions

- Both auxiliary HTF heaters, the cooling towers, one emergency generator engine, the HTF vent, and the HTF piping system all operate for the full hour.
- The gasoline tank has a 1,000 gallon loading event.
- The onsite diesel vehicles (SCA cleaning truck, evacuation truck, etc) and gasoline vehicles (stakebed truck, ranger truck, welding truck, etc) hourly emissions are based on the annual emissions divided by 8,760 hours per year.

B. Maximum Daily Emissions

- Both auxiliary HTF heaters operate for 24 hours.
- Both cooling towers operate for 16 hours.
- The emergency generator engines operate for a total of one hour.
- The HTF vent system operates for eight hours.
- The HTF piping system fugitive emissions have been recalculated by staff, consistent with the procedures developed by Kern County Air Pollution Control District that consider the properties of the HTF during the daily operation cycle, where it is assumed that for 16 hours per day the HTF in the piping system is consistent with the properties of a light liquid and for 8 hours per day the HTF in the piping system is consistent with the properties of a heavy liquid. The specific emission factors used are as follows:

<u>Piping Component</u>	**Light Liquid Emission Factor (lb/hr/source)**	**U.S.EPA Reference Table**	**Heavy Liquid Emission Factor (lb/hr/source)**	**U.S.EPA Reference Table**
Valves	5.55E-04	Table 2-9 (100 ppm)	1.90E-05	Table 2-4 (Heavy Oil)
Pump Seals	1.86E-03	Table 2-9 (100 ppm)	5.30E-05	Table 2-12 (Zero Factor)
Flanges/Connectors	1.65E-05	Table 2-12 (Zero Factor)	1.65E-05	Table 2-12 (Zero Factor)
Pressure Relief Valves	9.85E-02	Table 2-5 (<10,000 ppm)	1.90E-05	Table 2-4 (Heavy Oil)

Source: USEPA 1995.
Note: for pressure relief valves the in service emission factors are for gas service, rather than light liquid service.

These emission factors may not assume appropriate control efficiencies for the inspection and maintenance program required by MDAQMD. Staff will update this emission estimate, if necessary, after further consideration of the effectiveness of the inspection and maintenance program.

- The gasoline tank has a 1,000 gallon loading event and 200 gallons of vehicle refueling.

[7] Assumptions regarding the gasoline tank emissions have been updated by staff to reflect both maximum emission events per hour and per day and also reflect that the gasoline tank will be required to have both Phase I and Phase II vapor balance controls.

- The onsite diesel vehicles (SCA cleaning truck, evacuation truck, etc) and gasoline vehicles (stakebed truck, ranger truck, welding truck, etc) hourly emissions are based on the annual emissions divided by 365 days per year.

C. Maximum Annual Emissions

- Both auxiliary HTF heaters operate for 4,380 hours per year.
- Both cooling towers operate for 5,840 hours per year.
- The emergency fire pump engines and emergency generator engines operate for 50 hours per year each[8].
- The HTF vent system operates for 2,920 hours per year.
- The HTF piping system daily fugitive emissions multiplied by 365 days per year.
- The gasoline tank has an annual throughput of 18,000 gallons.
- The diesel vehicles (SCA cleaning truck, evacuation truck, etc) and gasoline vehicles (stakebed truck, ranger truck, welding truck, etc) emissions are based on a total annual vehicle miles traveled (VMT) of 40,000 and 102,040, respectively.

The AMS onsite stationary source and mobile equipment emissions, including fugitive PM10 emissions, for the entire facility are estimated and summarized in **Air Quality Table 9**.

[8] This basis is updated from the applicant's assumption of 52 hours based on a regulatory limit of 50 hours for engine testing and maintenance operation.

Air Quality Table 9
AMS Operation - Maximum Hourly, Daily, and Annual Onsite Emissions

	Maximum Hourly Emissions (lbs/hr)					
Emission Source	**NOx**	**SOx**	**CO**	**VOC**	**PM10**	**PM2.5**
Auxiliary HTF Heaters	0.47	0.03	1.63	0.46	0.32	0.32
Cooling Towers	--	--	--	--	4.48	4.48
Emergency Fire Pump Engines	0.00	0.00	0.00	0.00	0.00	0.00
Emergency Generator Engines	46.61	0.04	3.78	0.92	0.33	0.33
HTF Expansion Tanks/Venting Systems	--	--	--	1.14	--	--
HTF Piping Systems	--	--	--	3.56	--	--
Gasoline Storage Tank	--	--	--	0.42	--	--
Maintenance Vehicles (all types)	0.38	0.00	0.23	0.07	0.03	0.03
Operations Fugitive Dust	--	--	--	--	4.25	0.90
Total Maximum Hourly Emissions	47.46	0.07	5.64	6.57	9.41	6.06
Emission Source	**Maximum Daily Emissions (lbs/day)**					
Auxiliary HTF Heaters	11.36	0.60	39.22	11.08	7.65	7.65
Cooling Towers	--	--	--	--	71.74	71.74
Emergency Fire Pump Engines	0.00	0.00	0.00	0.00	0.00	0.00
Emergency Generator Engines	46.61	0.04	3.78	0.92	0.33	0.33
HTF Expansion Tanks/Venting Systems	--	--	--	9.10	--	--
HTF Piping Systems	--	--	--	58.51	--	--
Gasoline Storage Tank	--	--	--	0.63	--	--
Maintenance Vehicles (all types)	9.21	0.02	5.49	1.65	0.61	0.61
Operations Fugitive Dust	--	--	--	--	102.10	21.70
Total Maximum Daily Emissions	67.18	0.66	48.49	81.89	182.43	102.03
Emission Source	**Annual Emissions (tons/year)**					
Auxiliary HTF Heaters	0.52	0.03	1.79	0.51	0.35	0.35
Cooling Towers	--	--	--	--	13.09	13.09
Emergency Fire Pump Engines	0.11	0.00	0.10	0.01	0.01	0.01
Emergency Generator Engines	2.33	0.00	0.19	0.05	0.02	0.02
HTF Expansion Tanks/Venting Systems	--	--	--	1.66	--	--
HTF Piping Systems	--	--	--	10.68	--	--
Gasoline Storage Tank	--	--	--	0.01	--	--
Maintenance Vehicles (all types)	1.68	0.00	1.00	0.30	0.11	0.11
Operations Fugitive Dust	--	--	--	--	18.63	3.96
Total Annual Emissions	4.64	0.03	3.08	13.22	32.21	17.54

Source: AS 2009a, ESH 2009c, ESH 2010e, ESH 2010g, ESH 2010k, and Staff Analysis.

In addition to the onsite stationary and mobile emission sources there are offsite deliveries (fuel, water treatment chemicals, periodic evaporation pond solids waste haul trips, etc.) and daily employee trips. The following assumptions were used by the applicant to develop daily and annual offsite mobile source emissions estimates for AMS operation:

A. Maximum Daily Emissions

- For delivery vehicles the daily emission were based on the annual emissions divided by 260 (deliveries occur on weekdays).
- For employee commuting the daily emissions were based on the annual emissions divided by 365 days per year (employees work every day).

B. Maximum Annual Emissions

- 12,540 gasoline delivery vehicle VMT (medium duty gasoline vehicles size was assumed).
- 12,540 diesel delivery vehicle VMT (heavy duty diesel trucks were assumed).
- 1,241,000 employee commuting VMT based on an average of 68 commuting employees per day, 365 days per year, with a 50 mile round trip commute distance.

The AMS offsite mobile source emissions estimated by the applicant, including fugitive PM10 emissions, are summarized in **Air Quality Table 10**.

Air Quality Table 10
AMS Operation - Applicant Calculated Maximum Daily and Annual Offsite Emissions

	Maximum Daily Emissions (lbs/day)					
Emission Source	**NOx**	**SOx**	**CO**	**VOC**	**PM10**	**PM2.5**
Diesel Delivery Vehicles	1.65	0.00	0.46	0.12	0.08	0.07
Gasoline Delivery Vehicles	0.1	0.00	0.63	0.05	0.00	0.00
Employee Vehicles	3.77	0.03	37.67	3.13	0.31	0.30
Total Maximum Daily Emissions	5.52	0.03	38.76	3.30	0.39	0.37
Emission Source	**Annual Emissions (tons/year)**					
Diesel Delivery Vehicles	0.21	0.00	0.06	0.02	0.01	0.01
Gasoline Delivery Vehicles	0.01	0.00	0.08	0.01	0.00	0.00
Employee Vehicles	0.69	0.01	6.88	0.57	0.06	0.06
Total Annual Emissions	0.91	0.01	7.02	0.60	0.07	0.07

Source: AS 2009a, ESH 2009c, ESH 2010e, ESH 2010g

Staff does not believe that the applicant's emission estimate assumptions for trip length or daily emissions are reasonable, nor did the applicant include fugitive road dust emissions in the offsite emissions estimate. Therefore, staff provided a revised set of assumptions and emission calculations, using emission factors from a more recent version of the ARB EMFAC model, which have been docketed separately (CEC 2010o). The results of Staff's offsite emission calculations are shown in **Air Quality Table 11**.

Air Quality Table 11
AMS Operation – Staff Calculated Maximum Daily and Annual Offsite Emissions

	Maximum Daily Emissions (lbs/day)					
Emission Source	**NOx**	**SOx**	**CO**	**VOC**	**PM10**	**PM2.5**
Delivery Vehicles	13.71	0.02	4.66	1.13	0.67	0.57
Employee Vehicles	4.16	0.06	41.42	4.35	0.53	0.34
Fugitive Dust	--	--	--	--	5.38	0
Total Maximum Daily Emissions	17.87	0.08	46.08	5.49	6.58	0.91
Emission Source	**Annual Emissions (tons/year)**					
Delivery Vehicles	0.63	0.00	0.21	0.05	0.03	0.03
Employee Vehicles	0.71	0.01	7.04	0.74	0.09	0.06
Fugitive Dust	--	--	--	--	0.86	0
Total Annual Emissions	1.33	0.01	7.25	0.79	0.98	0.08

Source: Staff Analysis (CEC 2010o) of vehicle trip data provided in ESH 2010g

The emissions presented in **Air Quality Table 11** are representative of 2013 fleet average vehicle emission factors. The offsite emissions during operation, with the exception of fugitive dust emissions, will go down over time as employee vehicles and delivery trucks are replaced with newer lower emitting models. Staff's emission calculations, in Adobe Acrobat File format, have been docketed separately from the SSA[9].

PROJECT CONSTRUCTION AND OPERATION OVERLAP

The Alpha and Beta Units may be developed in phases. Although there could be some overlap of construction and commercial operation, staff does not anticipate this overlap to be the maximum worst case scenario. Construction emissions are considerably higher than operating emissions and the maximum construction emissions occur early in the overall construction process (first six months), so any overlap after the maximum construction period is assumed not to create a new maximum emissions scenario. Therefore, staff concludes that the overlapping emissions and impacts during this overlapping period would be no worse than the worst-case construction impacts and has not performed any additional impact assessment of the construction/operation overlapping period.

INITIAL COMMISSIONING AND CLOSURE

Initial commissioning refers to a period prior to beginning commercial operation when the equipment undergoes initial tests. Because of this proposed project's use of a non-fuel fired generating technology, staff does not expect major changes in emissions from the facility commissioning activities compared to that of normal operation.

Closure and decommissioning, as a one-time limited duration event, would have emissions that are similar in type and magnitude, but likely lower than, the construction emissions as discussed above.

[9] The Excel file format for these calculations can be provided to parties upon request.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Energy Commission staff assesses four kinds of primary and secondary[10] impacts: construction, operation, closure and decommissioning, and cumulative. Construction impacts result from the onsite and offsite emissions occurring during site preparation and construction of the proposed project. Operational impacts result from the emissions of the proposed project during operation, which includes all of the onsite auxiliary equipment emissions (HTF heaters, cooling towers, emergency engines, etc.), the onsite maintenance vehicle emissions, and the offsite employee and material delivery trip emissions. Closure and decommissioning impacts occur from the onsite and offsite emissions that would result from dismantling the facility and restoring the site. The 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), 15065(c), 15130, and 15355.)

METHOD AND THRESHOLDS FOR DETERMINING SIGNIFICANCE

CEC staff evaluates potential impacts per Appendix G of the CEQA Guidelines (CCR 2006). A CEQA significant adverse impact is determined to occur if potentially significant CEQA impacts cannot be mitigated through the adoption of Conditions of Certification. Specifically, Energy Commission staff uses health-based ambient air quality standards (AAQS) established by the ARB and the U.S.EPA as a basis for determining whether a project's emissions will cause a significant adverse impact under CEQA. The standards are set at levels that include a margin of safety and are designed to adequately protect the health of all members of the public, including those most sensitive to adverse air quality impacts such as the aged, people with existing illnesses, children, and infants. Staff evaluates the potential for significant adverse air quality impacts by assessing whether the project's emissions of criteria pollutants and their precursors (NOx, VOC, PM10 and SO_2) could create a new AAQS exceedance (emission concentrations above the standard), or substantially contribute to an existing AAQS exceedance.

Staff evaluates both direct and cumulative impacts. Staff will find that a project or activity will create a direct adverse impact when it causes an exceedance of an AAQS. Staff will find that a project's effects are cumulatively considerable when the project emissions in conjunction with ambient background, or in conjunction with reasonably foreseeable future projects, substantially contribute to ongoing exceedances of an AAQS. Factors considered in determining whether contributions to ongoing exceedances are substantial include:

1. The duration of the activity causing adverse air quality impacts;

[10] Primary impacts potentially result from facility emissions of NOx, SOx, CO and PM10/2.5. Secondary impacts result from air contaminants that are not directly emitted by the facility but formed through reactions in the atmosphere that result in ozone, and sulfate and nitrate PM10/PM2.5.

2. The magnitude of the project emissions, and their contribution to the air basin's emission inventory and future emission budgets established to maintain or attain compliance with AAQS;

3. The location of the project site, i.e., whether it is located in an area with generally good air quality where non-attainment of any ambient air quality standard is primarily or solely due to pollutant transport from other air basins;

4. The meteorological conditions and timing of the project impacts, i.e., do the project's maximum modeled pollutant impacts occur when ambient concentrations are high (such as during high wind periods, or seasonally);

5. The modeling methods, and how refined or conservative the impact analysis modeling methods and assumptions were and how that may affect the determined adverse impacts;

6. The project site location and nearest receptor locations; and whether the identified adverse impacts would also occur at the maximum impacted receptor location; and,

7. Potential for future cumulative impacts; and whether appropriate mitigation is being recommended to address the potential for impacts associated with likely future projects.

DIRECT/CUMULATIVE IMPACTS AND MITIGATION

While the emissions are the actual mass of pollutants emitted from the proposed project, the impacts are the concentration of pollutants from the proposed project that reach the ground level. When emissions are expelled at a high temperature and velocity through a relatively tall stack, the pollutants would be greatly diluted by the time they reach ground level. For this proposed project there are no very tall emission stacks, but the construction and maintenance vehicles and emergency engine do have high temperature and velocity exhausts; and the auxiliary HTF heaters also have relatively high exhaust temperatures and velocities. The emissions from the proposed project, both stationary source and onsite mobile source emissions, are analyzed through the use of air dispersion models to determine the probable impacts at ground level.

Air dispersion models provide a means of predicting the location and ground level magnitude of the impacts of a new emissions source. These models consist of several complex series of mathematical equations, which are repeatedly calculated by a computer for many ambient conditions to provide theoretical maximum offsite pollutant concentrations short-term (1-hour, 3-hour, 8-hour, and 24-hour) and annual periods. The model results are generally described as maximum concentrations, often described as a unit of mass per volume of air, such as micrograms per cubic meter ($\mu g/m^3$).

The applicant used the U.S.EPA guideline ARMS/EPA Regulatory Model (AERMOD) model to estimate ambient impacts from project construction and operation. The construction emission sources for the site were grouped into two categories: equipment (off-road equipment); and vehicles (on-road equipment), where the exhaust and fugitive dust emissions for each type were calculated for particulate matter modeling. Emissions from onsite equipment engines during construction were modeled as point sources and fugitive emission sources were modeled as area sources. For operation the stationary sources were modeled as point sources and the maintenance vehicle emissions, tailpipe and fugitive dust emissions, were modeled as area sources.

The inputs for the air dispersion models include stack information (exhaust flow rate, temperature, and stack dimensions), specific fire pump engine, emergency generator, auxiliary HTF heater, cooling tower, and vehicle emission data; and meteorological data, such as wind speed, atmospheric conditions, and site elevation. For this project, the meteorological data used as inputs to the model included hourly wind speeds and directions measured at the Daggett Airport meteorological site during 2001 through 2004, which is the closest complete meteorological data source to the project site. Concurrent upper air data from Desert Rock and Nevada was also used. This meteorological data was approved for use by the MDAQMD.

NOx emissions from internal combustion sources, such as diesel engines, are primarily in the form of nitric oxide (NO) rather than NO_2. Nitric oxide converts into NO_2 in the atmosphere, primarily through the reaction with ambient ozone. The applicant used the U.S.EPA ambient ratio method (ARM) default multiplier of 0.75 as the worst-case downwind annual NO_2/NOx ratio for the determination of the annual NO_2 concentration for construction and operation. However, in their modeling analysis for the state 1-hour standard the applicant did not use any modeling procedures to consider the short-term near-field NO_2/NOx ratios for construction or operation[11]. Therefore, the modeling method is very conservative and over predicts actual worst-case 1-hour NO_2 concentrations.

The applicant has also provided a modeling analysis to show compliance with the new federal 1-hour NO_2 standard (AD 2010a). This modeling analysis, also using the AERMOD dispersion model, includes the use of the NOx_OLM modeling option and used a post-processor developed by the applicant's consultant to also add in the actual hourly NO_2 background data and determine the 98th percentile of daily maximums (eighth highest) for each modeled receptor location. The NOx_OLM option considers that the emissions of NOx are initially primarily in the form of NO that over time oxidizes, primarily through a reaction with ozone, to NO_2. The initial NO_2/NOx ratio was set at the default value of 0.1 and the conversion of the rest of the NOx to NO_2 is assumed to be limited by the hourly ambient ozone concentration. For this modeling analysis the applicant obtained hourly monitored ozone and NO_2 concentration data, concurrent with the 2001 to 2004 meteorological data, from the Barstow monitoring station and filled missing data by linear interpolation or using available Victorville monitoring station data. The use of the older ambient ozone and NO_2 background data is conservative as the ambient concentrations for both have dropping since 2001 to 2004.

[11] The modeling analysis performed to show compliance with the state 1-hour standard was performed before the analysis to show compliance with the federal 1-hour standard, and a less refined modeling analysis that conservatively assumed that all NOx was NO_2 was able to show compliance with the state standard. A more rigorous modeling analysis that did consider the fraction of NOx that is actually NO_2 was needed to show compliance with the federal standard.

Staff reviewed the background concentrations provided by the applicant, replacing them where appropriate[12] with the available highest ambient background concentrations from the last three years at the most representative monitoring stations as show in Air Quality Table 5. Staff added the modeled impacts to these background concentrations, and then compared the results with the ambient air quality standards for each respective air contaminant to determine whether the proposed project's emission impacts would cause a new exceedance of an ambient air quality standard or would contribute to an existing exceedance.

The following sections discuss the proposed project's short-term direct construction and operation ambient air quality impacts, as estimated by the applicant, and describe appropriate mitigation measures.

Construction Impacts and Mitigation

The following section discusses the project's direct and cumulative ambient air quality impacts during construction, as estimated by the applicant, and evaluated by staff. Additionally, this section discusses the recommended mitigation measures.

Construction Modeling Analysis

Using estimated peak onsite hourly, daily and annual construction equipment exhaust emissions, the applicant modeled the proposed project's construction emissions to determine impacts (ESH 2010g). To determine the construction impacts on ambient standards (i.e. 1-hour through annual) it was assumed that the emissions would occur during a daily construction schedule of 10 hour days (7 am to 5 pm). The predicted proposed project concentration levels were added to a conservatively estimated background of existing emission concentration levels (**Air Quality Table 5**) to determine the cumulative effect. The results of the applicant's modeling analysis are presented in **Air Quality Table 12**. The construction modeling analysis includes both the onsite fugitive dust and vehicle tailpipe emission sources estimated by the applicant (with applicant-proposed control measures) and summarized in **Air Quality Tables 6** and **7**.

[12] This does not include the background for the federal 1-hour NO2 standard since the applicant's modeling analysis uses actual monitored NO_2 concentrations to determine the combined project plus background average 98th percentile 1-hour NO_2 impacts.

Air Quality Table 12
Maximum Project Construction Impacts

Pollutants	Avg. Period	Impacts ($\mu g/m^3$)	Background [a] ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	Standard ($\mu g/m^3$)	Percent of Standard
NO_2	1-hr	177	152.6	329.6	339	97%
	Annual	1.8	38.0	39.8	57	70%
PM10	24-hr	72	76	148	50	296%
	Annual	1.8	29.8	31.6	20	158%
PM2.5	24-hr	15	19	34	35	97%
	Annual	0.45	9.7	10.2	12	85%
CO	1-hr	94	1,610	1,704	23,000	7%
	8-hr	31	1,367	1,398	10,000	14%
SO_2	1-hr	0.18	23.6	23,8	665	4%
	3-hr	0.08	15.6	15.7	1300	1%
	24-hr	0.03	13.1	13.1	105	13%
	Annual	0.003	2.7	2.7	80	3%

Source: AS 2009a, ESH 2009c, ESH 2010e, ESH 2010g
Note:
[a] Background values have been adjusted per staff recommended background concentrations shown in **Air Quality Table 5**.

This modeling analysis indicates, with the exception of 24-hour and annual PM10 impacts, that the proposed project would not create new exceedances or contribute to existing exceedances for any of the modeled air pollutants. As shown in **Air Quality Table 8**, staff's construction emissions estimate, the applicant's construction emissions estimate may not be conservative, specifically for particulate emissions. The emissions for other modeled pollutants are generally similar between the applicant's and staff's estimates (NOx and SOx), or in the case of CO the difference would not impact the findings of the modeling analysis. The applicant's air dispersion modeling procedures for particulate emissions were very conservative and would significantly over predict emission impacts at the fence line. Specifically, the use of area sources for the fugitive dust emissions will over predict impacts. As noted previously staff's construction emission estimate was completed primarily to confirm that the project does not trigger a General Conformity analysis and for staff to obtain a better understanding of the construction elements and their potential for near-field nuisance impacts to residents located on or near the project fence line. Staff did not have the time to perform a revised dispersion modeling analysis but believes that a more refined modeling analysis for the fugtive dust emissions would provide results similar in magnitude to those shown above in **Air Quality Table 12**.

Also, the conditions that would create worst-case project modeled impacts (low wind speeds) are not the same conditions when worst-case background is expected for PM10. Additionally, the worst-case predicted PM10 impacts occur at the fence line and drop off quickly with distance from the fence line. However, there are a few residences located adjacent to or nearby the proposed project fence line, and due to the fact that the emission estimate is likely underestimated, particularly during the early earthmoving/grading phase of construction, staff concludes that there would be a potential for nuisance dust conditions to occur within one quarter mile of the earthmoving activities. Therefore, staff is recommending that the applicant, at the residents request, pay for equivalent lodging for these residents during the initial grading phase of construction when the maximum particulate impacts from the proposed project's construction could occur at each of the residential locations located within one quarter mile of the project fence line. Therefore, staff concludes that the construction impacts, when considering staff's recommended mitigation measures, would not contribute substantially to exceedances of the PM10 CAAQS.

Construction Mitigation

Applicant's Proposed Mitigation

To mitigate the impacts due to construction of the facility, the applicant has proposed the following mitigation measures (AES 2009a):

- The Applicant will have an on-site construction mitigation manager who will be responsible for the implementation and compliance of the construction mitigation program. The documentation of the ongoing implementation and compliance with the proposed construction mitigations will be provided on a periodic basis.
- All unpaved roads and disturbed areas in the Project and laydown construction sites will be watered as frequently as necessary to control fugitive dust. The frequency of watering will be on a minimum schedule of every two hours during the daily construction activity period. Watering may be reduced or eliminated during periods of precipitation.
- On-site vehicle speeds will be limited to five mph on unpaved areas within the Project construction site.
- The construction site entrance(s) will be posted with visible speed limit signs.
- All construction equipment vehicle tires will be inspected and cleaned as necessary to be free of dirt prior to leaving the construction site via paved roadways.
- Gravel ramps will be provided at the tire cleaning area.
- All unpaved exits from the construction site will be graveled or treated to reduce track-out to public roadways.
- All construction vehicles will enter the construction site through the treated entrance roadways, unless an alternative route has been provided.
- Construction areas adjacent to any paved roadway will be provided with sandbags or other similar measures as specified in the construction SWPPP to prevent runoff to roadways.
- All paved roads within the construction site will be cleaned on a periodic basis (or less during periods of precipitation), to prevent the accumulation of dirt and debris.
- The first 500 feet of any public roadway exiting the construction site will be cleaned on a periodic basis (or less during periods of precipitation), using wet sweepers or air-filtered dry vacuum sweepers, when construction activity occurs or on any day when dirt or runoff from the construction site is visible on the public roadways.

- Any soil storage piles and/or disturbed areas that remain inactive for longer than 10 days will be covered, or shall be treated with appropriate dust suppressant compounds.
- All vehicles that are used to transport solid bulk material on public roadways and that have the potential to cause visible emissions will be covered, or the materials shall be sufficiently wetted and loaded onto the trucks in a manner to minimize fugitive dust emissions. A minimum freeboard height of two feet will be required on all bulk materials transport.
- Wind erosion control techniques (such as windbreaks, water, chemical dust suppressants, and/or vegetation) will be used on all construction areas that may be disturbed. Any windbreaks installed to comply with this condition will remain in place until the soil is stabilized or permanently covered with vegetation.
- Disturbed areas will be re-vegetated or covered with gravel or other dust suppressant material as soon as practical.

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

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

Adequacy of Proposed Mitigation

Staff generally concurs with the applicant'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, that is considered necessary to reduce the very high fugitive dust emission potential for large solar projects, such as AMS. Staff also believes that the off-road equipment mitigation measures need to be updated to meet current staff recommendations.

Staff Proposed Mitigation

Staff recommends construction PM10 and NOx emission mitigation measures as articulated in Conditions of Certification **AQ-SC1** through **AQ-SC5** that include modified versions of similar mitigation measures proposed by the applicant in the AFC. In particular, staff proposes modifications to the unpaved road fugitive dust controls necessary to control the higher fugitive dust emission potential for this type of project, and modifications to the off-road equipment mitigation measure to update it to current staff standards that consider the high unmitigated emission potential for the construction of this project.

Staff recommends **AQ-SC1** to require the applicant to have an on-site construction mitigation manager who would be responsible for the implementation and compliance of the construction mitigation program. The documentation of the ongoing implementation and compliance with the construction mitigation program would be provided in the monthly construction compliance report that is required in staff's recommended Condition of Certification **AQ-SC2**.

Recommended Condition of Certification **AQ-SC3** formalizes the fugitive dust control requirements. These requirements include paving of the main access road to the main power block before construction begins on that part of the site, that durable non-toxic soil stabilizers be used on the onsite unpaved plant roads as soon as they are constructed, and many other activity-specific control measures be applied to reduce fugitive dust emissions during construction.

Recommended Condition of Certification **AQ-SC4** would limit the potential offsite impacts from visible dust emissions, by responding to situations when the control measures required by **AQ-SC3** are not working effectively to control fugitive dust from leaving the construction site area.

Staff recommends Condition of Certification **AQ-SC5** to mitigate the PM and NOx emissions from the large diesel-fueled construction equipment. Implementation of this mitigation measure would provide additional primary and secondary PM mitigation to supplement the recommended fugitive dust mitigation measures. This condition requires the use of EPA/ARB Tier 3 engine compliant equipment for equipment over 50 and under 750 horsepower (hp) where available based on a good faith effort to find and use available EPA/ARB Tier 3 engines, and requires that all engines over 750 hp comply with Tier 2 emission standards. In the event that the desired Tier 2 and 3 engines cannot be found there are provision for allowing equivalent tailpipe controls on older engines and limited exemptions for specialty and short-term equipment use. This condition also includes equipment idle time restrictions and engine maintenance provisions. The Tier 2 standards include engine emission standards for NOx plus non-methane hydrocarbons, CO, and PM emissions; while the Tier 3 standards (for engines between 50 and 750 hp) further reduce the NOx plus non-methane hydrocarbons emissions. The Tier 2 and Tier 3 standards became effective for engine/equipment model years 2001 to 2004 and models years 2006 to 2008, respectively, for engines between 50 and 750 hp.

Staff is also recommending in **AQ-SC9** that the applicant be responsible for paying for offsite lodging, if requested, during initial site grading for residents located within one quarter mile of the proposed project's site fence line. This recommended condition is considered necessary to mitigate the potential particulate nuisance conditions that could exist near the proposed project's site fence line during the initial grading activities. This condition of certification is being recommended considering the specific conditions and construction requirements for AMS. These specific conditions and construction requirements include the following:

- Several residences are located adjacent to or within one quarter mile of the site fence line.
- The site grading/preparation phase of construction includes up to 5 million cubic yards of earthmoving, including the creation of a large earthen drainage channel near residences.

- The project site is in an area that is windy and dry, which creates additional dust control challenges for a large project site.

Based on the relatively short-term nature of the worst-case construction impacts, and staff's recommended construction emissions mitigation measures, staff believes that the construction air quality impacts would be less than significant with the implementation of its recommended Conditions of Certification.

Operation Impacts and Mitigation

The following section discusses the project's direct and cumulative ambient air quality impacts, as estimated by the applicant, and evaluated by staff. Additionally, this section discusses the recommended mitigation measures.

Operation Modeling Analysis

Using estimated peak onsite hourly, daily and annual operating emissions, the applicant modeled the proposed project's operation emissions to determine impacts (ESH 2010e). The predicted proposed project concentration levels were added to a conservatively estimated background of existing emission concentration levels (**Air Quality Table 5**) to determine the cumulative effect. **Air Quality Table 13** presents the results of the applicant's modeling analysis. Staff notes that the applicant's determined maximum 1-hour NO_2 concentration was not based on the ozone limiting method (OLM) calculation, or any other method to determine the NO_2/NOx ratio, and so assumes that all NOx emission are NO_2 which overstates the maximum NO_2 impacts. The operation modeling analysis includes emissions from the stationary sources and the onsite fugitive dust and vehicle tailpipe emission sources estimated by the applicant, which all include the applicant's proposed control measures, and that are summarized in **Air Quality Table 9**. Staff's revised operating emission estimates provided for HTF piping components (VOC emissions), shown in **Air Quality Table 9**, and provided for the offsite on-road vehicle emissions, shown in **Air Quality Table 11**, due not affect the onsite emissions modeling analysis performed by the applicant and summarized below in **Air Quality Table 13**.

Air Quality Table 13
Maximum Project Operation Emission Impacts

Pollutants	Avg. Period	Impacts ($\mu g/m^3$)	Background [a] ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	Standard ($\mu g/m^3$)	Percent of Standard
NO_2	1-hr	130	152.6	282.6	339	83%
	1-hr Fed	--	--	184.3[b]	188	98%
	Annual	0.18	38.0	38.2	57	67%
PM10	24-hr	8.8	76	84.8	50	170%
	Annual	2.3	29.8	32.1	20	161%
PM2.5	24-hr	4.4	19	23.4	35	67%
	Annual	0.7	9.7	10.4	12	87%
CO	1-hr	76	1,610	1,686	23,000	7%
	8-hr	7.8	1,367	1,375	10,000	14%
SO_2	1-hr	0.25	23.6	23.9	665	4%
	3-hr	0.18	15.6	15.8	1300	1%
	24-hr	0.07	13.1	13.2	105	13%
	Annual	0.003	2.7	2.7	80	3%

Source: AS 2009a, ESH 2009c, ESH 2010e, ESH 2010g, AD 2010a
Note:
[a] Background values have been adjusted per staff recommended background concentrations shown in **Air Quality Table 5**.
[b] The applicant's modeling results for this new federal standard includes actual hourly background so only the total maximum impact determined as the maximum three-year average of the 98th percentile of daily maximums is presented.

This modeling analysis indicates, with the exception of 24-hour and annual PM10 impacts, that the proposed project would not create new exceedances or contribute to existing exceedances for any of the modeled air pollutants. The conditions that would create worst-case project modeled impacts (low wind speeds) are not the same conditions that would exist when worst-case background is expected for PM10. Additionally, the worst-case PM10 impacts occur at the fence line and drop off quickly with distance from the fence line. Therefore, staff concludes that the operation impacts, when considering staff's recommended mitigation measures, would not contribute substantially to exceedances of the PM10 CAAQS.

Operations Mitigation

Applicant's Proposed Mitigation

Emission Controls

As discussed in the air quality section of the AFC (AS 2009a) and data responses (ESH 2009c, 2010e, and 2010g), the applicant proposes the following emission controls on the stationary equipment associated with AMS operation:

Auxiliary HTF Heaters

The applicant's proposed Best Available Control Technology (BACT) for the two 21.5 MMBtu/hr auxiliary HTF heaters would include the use of natural gas (clean fuel) and the use of ultra-low NOx burners (for NOx). The AFC (AS 2009a) provides the following BACT concentration limit and hourly emission limits, each for the two heaters:

- NOx: 9.0 ppmvd at 3% O_2 – 0.24 lbs/hour
- CO: 50 ppmvd at 3% O_2 – 0.82 lbs/hour
- VOC: 0.23 lbs/hour,
- PM10/PM2.5: 0.16 lbs/hour
- SO_2: 0.01 lbs/hour

Emergency Generator Engines

The applicant's proposed Best Available Control Technology (BACT) for the 4,190 brake horsepower (bhp) emergency generator engines is compliance with the New Source Performance Standards, Subpart IIII Standards of Performance for Stationary Compression Ignition Internal Combustion Engines, specifically NSPS compliant engines. To meet this requirement the applicant is proposing Tier 2 compliant engines with the following emission limits:

- NOx: 5.05 grams/bhp – 46.61 lbs/hour
- CO: 0.41 grams/bhp - 3.78 lbs/hour
- VOC: 0.1 grams/bhp – 0.92 lbs/hour
- PM10/PM2.5: 0.036 grams/bhp – 0.33 lbs/hour
- SO_2: Fuel ≤ 15 ppmw S – 0.04 lbs/hour

Fire Water Pump Engine

The applicant's proposed Best Available Control Technology (BACT) for the 346 bhp fire pump engines is compliance with the New Source Performance Standards, Subpart IIII Standards of Performance for Stationary Compression Ignition Internal Combustion Engines, specifically NSPS compliant engines. To meet this requirement the applicant is proposing Tier 3 compliant engines with the following emission limits:

- NOx: 2.8 grams/bhp – 2.13 lbs/hour
- CO: 2.6 grams/bhp - 1.98 lbs/hour
- VOC: 0.2 grams/bhp – 0.15 lbs/hour
- PM10/PM2.5: 0.15 grams/bhp – 0.11 lbs/hour
- SO_2: Fuel ≤ 15 ppmw S – 0.002 lbs/hour

Cooling Tower

The applicant's proposed Best Available Control Technology (BACT) for the cooling tower is the use of a high efficiency drift eliminator with a guaranteed drift efficiency of 0.0005%. The applicant would also limit the recirculating water TDS content to 9,968 ppm.

HTF System Emissions

The applicant's proposed Best Available Control Technology (BACT) for the HTF Tank Venting System Emissions consists of the following, which would control total HTF related potential organic compound emissions by 99.9%:

- Nitrogen blankets on the HTF storage tanks.
- Distillation/condensation of the HTF expansion system, the high boilers, and the low boilers (primarily benzene and phenol)[13].

Additional assumed mitigation measures to reduce emissions from the HTF piping system and waste load out include the following:

- Daily inspections of the tanks and distribution system for the presence of leaks in the areas of valves, flanges, and pump seals.
- Continuous maintenance of the system.
- Proper handling of HTF during delivery, transfer to the system, and waste disposal.

Maintenance Vehicles

The applicant has not proposed any specific emission controls for this emission source.

Fugitive Dust

The applicant has proposed to control fugitive dust emissions during operation through the use of wind erosion operational practices such as windbreaks, water, and dust suppressants in areas disturbed by vehicles or wind and by limiting vehicle speeds (AS 2009b).

Adequacy of Proposed Mitigation

Staff concurs with the District's determination that the project's stationary source proposed emission controls/emission levels for criteria pollutants meets BACT requirements and that the proposed stationary source emission levels are reduced to the lowest technically feasible levels. The applicant has not proposed mitigation to reduce the maintenance vehicle emissions, and has proposed limited and not well defined fugitive dust emission controls. Staff believes that mitigation for these non-stationary emission sources is necessary to adequately mitigate the proposed project's operating emissions.

[13] High boilers are large molecular weight molecules from product degradation including solid sludge that would boil at very high temperatures and low boilers are smaller molecular weight breakdown product molecules, such as benzene, that are much more volatile and boil and much lower temperatures.

Staff Proposed Mitigation

Staff concludes that the proposed project's direct stationary source ozone precursor and PM10 emissions are minimal, but when combined with the maintenance vehicles emissions could be significant. Additionally, staff believes that a solar renewable project, which would have a 30-year life in a setting likely to continue to be impacted by both local and upwind emission sources, should address its contribution to the potentially ongoing nonattainment of the PM10 and ozone standards. Staff recommends that mitigation measures be required to reduce the non-stationary emissions from the proposed project. Therefore, staff recommends the project owner be required to purchase new on-road and off-road vehicles that meet California emissions standards (**AQ-SC6**) and that the project owner be required to apply fugitive dust controls that are equivalent to those recommended for construction (**AQ-SC7**) to adequately mitigate the proposed project's operation emissions.

Staff is also proposing Condition of Certification **AQ-SC8** to ensure that the Energy Commission license is amended, as necessary, to incorporate changes to the air quality permits.

Staff concludes that with the proposed District- and staff-recommended conditions of certification the proposed project's operating emissions would be less than significant.

Staff has considered the minority population surrounding the site (see **Socioeconomics Figure 1**). Since the project's direct air quality impacts have been reduced to less than significant, there is no environmental justice issue for air quality.

Indirect Pollutant and Secondary Pollutant Impacts

The proposed project would have direct emissions of chemically reactive pollutants (NOx, SOx, and VOC), but would also have indirect emission reductions associated with the reduction of fossil-fuel fired power plant emissions due to the proposed project displacing the need for their operation, since solar renewable energy facilities would operate on a must-take basis[14]. The exact nature and location of such reductions is not known, so the discussion below focuses on the direct emissions from the proposed project within the northwestern San Bernardino County portion of the Mojave Desert Air Basin.

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 model to determine ozone impacts. There are no regulatory agency models approved for assessing single source ozone impacts. However, because of the known relationship of NOx and VOC emissions to ozone formation, it can be said that the emissions of NOx and VOC from AMS do have the potential (if left unmitigated) to

[14] This refers to the fact that the contract between the owner of this solar power facility and the utility will require that the utility take all generation from this facility with little or no provisions for the utility to direct turn down of generation from the facility.

contribute to higher ozone levels in the region. These impacts would be cumulatively significant under CEQA because they would contribute to ongoing violations of the state ozone ambient air quality standards.

PM2.5 Impacts

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

The San Bernardino County portion of the Mojave Desert Air Basin has not undergone the rigorous secondary particulate studies that have been performed in other areas of California, such as the San Joaquin Valley, that have more serious fine particulate pollution problems. However, the available chemical characterization data shows that the ammonium nitrate and ammonium sulfate fine particulate concentrations in China Lake, Edwards Air Force Base, and Mojave in 2000 were 40% of the to the PM2.5 on an annual average (ARB 2005). Because of the known relationship of NOx and SOx emissions to PM2.5 formation it can be said that the emissions of NOx and SOx from AMS do have the potential (if left unmitigated) to contribute to higher PM2.5 levels in the region.

Impact Summary

The applicant is proposing to mitigate the proposed project's stationary source NOx, VOC, SO_2, and PM10/PM2.5 emissions through the use of Best Available Control Technology (BACT). Staff has recommended augmenting the applicant's proposed stationary source mitigation with mitigation requirements for project maintenance vehicles (**AQ-SC6**) to further reduce VOC and NOx emissions. With the applicant's stipulated stationary source mitigation, as enforced by District conditions and staff's recommended vehicle mitigation, staff concludes that the proposed project would not cause significant secondary pollutant impacts.

CUMULATIVE IMPACTS

Cumulative impacts are defined by CEQA as "two or more individual effects which, when considered together, are considerable or . . . compound or increase other environmental impacts.” (CEQA Guidelines, § 15355.) A cumulative impact consists of an impact that is created as a result of a combination of the project evaluated in the EIR together with other projects causing related impacts.” (CEQA Guidelines, § 15130(a)(1).) Such impacts may be relatively minor and incremental, yet still be significant because of the existing environmental background, particularly when one considers other closely related past, present, and reasonably foreseeable future projects.

This analysis is concerned with criteria air pollutants. Such pollutants have impacts that are usually (though not always) cumulative by nature. Rarely would a project by itself cause a violation of a federal or state criteria pollutant standard. However, a new source of pollution may contribute to violations of criteria pollutant standards because of the existing background sources or foreseeable future projects. Air districts attempt to attain the criteria pollutant standards by adopting attainment plans, which comprise a multi-faceted programmatic approach to such attainment. Depending on the air district, these plans typically include requirements for air offsets and the use of Best Available Control Technology (BACT) for new sources of emissions, and restrictions of emissions from existing sources of air pollution.

Thus, much of the preceding discussion is concerned with cumulative impacts. The “Existing Ambient Air Quality” subsection describes the air quality background in the northwestern San Bernardino County portion of the Mojave Desert Air Basin, including a discussion of historical ambient levels for each of the significant criteria pollutants. The “Construction Impacts and Mitigation” subsection discusses the proposed project’s contribution to the local existing background caused by project construction. The “Operation Impacts and Mitigation” subsection discusses the proposed project’s contribution to the local existing background caused by project operation. The following subsection includes two additional analyses:

- A summary of projections for criteria pollutants by the air district and the air district’s programmatic efforts to abate such pollution; and
- An analysis of the proposed project’s *localized cumulative impacts*, the proposed project’s direct operating emissions combined with other local major emission sources.

Summary of Projections

The project site area within the MDAB is designated as non-attainment for both federal (8-hour) and State (1-hour) ozone and PM10 standards, as well as state PM2.5 standard. All other criteria pollutants (NO_2, and SO_2, and CO) are considered to be in attainment by the State, and in attainment and/or unclassified under federal standards, including PM2.5.

Ozone

Since the San Bernardino County portion of Mojave Desert is currently classified as non-attainment for the federal 8-hour ozone standard, the District is required to prepare and adopt an ozone attainment plan for submittal to the U.S.EPA describing how it will attain the federal 8-hour standard. The MDAQMD has adopted State and Federal attainment plans for the region within its jurisdiction. The MDAQMD adopted the

MDAQMD 2004 Ozone Attainment Plan (approved by U.S.EPA), and has updated it with the MDAQMD Federal 8-hour Ozone Attainment Plan 2008 to demonstrate that the MDAQMD will meet the required Federal ozone planning milestones and attain the 8-hour ozone NAAQS by June 2021. There are no additional control measures for direct ozone precursor reductions required as part of the update. However, the MDAQMD is committed to have all applicable Federal Reasonably Available Control Technology (RACT) rules as proposed in their 8-hour Reasonably Available Control Technology – State Implementation Plan Analysis (RACT SIP Analysis) adopted in 2006. In addition, the MDAQMD updated and indentified new measures in 2007, which will be adopted through 2014, as the State of California mandates including all feasible ozone precursor control measures. The enhanced vapor recovery for fuel storage tanks measure would be applicable to the proposed project's gasoline tank.

Particulate Matter

The District is currently classified as nonattainment for the state and the federal 24-hour PM10 air quality standard. The District first adopted a Federal Particulate Matter (PM10) Attainment Plan (PMAP) in July 31, 1995. However, some experts are critical of the federal standards as not being sufficiently health protective. California has adopted far more stringent standards for PM10. Currently, the vast majority of air districts in the state are designated nonattainment of the state PM10 standard. There is no legal requirement for air districts to provide plans to attain the state PM10 standard, so air districts have not developed such plans.

In 1997 the federal government adopted PM2.5 standards, as did the state in 2003. The EPA has determined that the area is unclassified, or attainment for both the annual and the 24-hour federal PM2.5 standard. However, the ARB classifies the area as nonattainment of the annual state PM2.5 air quality standard.

The PMAP states that "(t)he air quality of the MDAQMD is impacted by both fugitive dust from local sources and occasionally by region-wide wind blown dust during moderate to high wind episodes. This region-wide or “regional” event includes contributions from both local and distant dust sources which frequently result in violations of the NAAQS that are multi-district and interstate in scope." It also states that "(i)t is not feasible to implement control measures to reduce dust from regional wind events." Therefore, the District would have put considerable effort to reduce the emissions from "…unpaved road travel, construction, and local disturbed areas in the populated areas, and certain stationary sources operating in the rural Lucerne Valley."

As a solar power generation facility, the direct air pollutant emissions from power generation are negligible and the emission source would be limited to auxiliary equipment and maintenance activities. The emissions from the proposed project would be minimal compared to the other power generation facilities, and it is unlikely that the proposed project would measurably contribute to ongoing air basin PM10 nonattainment exceedance events.

Summary of Conformance with Applicable Air Quality Plans

The applicable air quality plans do not outline any new control measures applicable to the proposed project's operating emission sources. Therefore, compliance with existing District rules and regulations would ensure compliance with those air quality plans.

Localized Cumulative Impacts

The proposed project's contributions to localized cumulative impacts can be reasonably estimated through air dispersion modeling (see the "Operation Modeling Analysis" subsection). To represent *past* and, to an extent, *present projects* that contribute to ambient air quality conditions, the Energy Commission staff recommends the use of ambient air quality monitoring data (see the "Existing Ambient Air Quality" subsection), referred to as the *background*. The staff takes the following steps to estimate what are additional appropriate "present projects" that are not represented in the background and "reasonably foreseeable projects":

- First, the Energy Commission staff (or the applicant) works with the air district to identify all projects that have submitted, within the last year of monitoring data, new applications for an authority to construct (ATC) or permit to operate (PTO) and applications to modify an existing PTO within six miles of the project site. Based on staff's modeling experience, beyond six miles there is no statistically significant concentration overlap for non-reactive pollutant concentrations between two stationary emission sources.
- Second, the Energy Commission staff (or the applicant) works with the air district and local counties to identify any new area sources within six miles of the project site. As opposed to point sources, area sources include sources like agricultural fields, residential developments or other such sources that do not have a distinct point of emission. New area sources are typically identified through draft or final Environmental Impact Reports (EIRs) that are prepared for those sources. The initiation of the EIR process is a reasonable basis on which to determine what is "reasonably foreseeable" for new area sources.
- The data submitted, or generated from the applications with the air district for point sources or initiating the EIR process for area sources, provides enough information to include these new emission sources in air dispersion modeling. Thus, the next step is to review the available EIR(s) and permit application(s), determine what sources must be modeled and how they must be modeled.
- Sources that are not new, but may not be represented in ambient air quality monitoring are also identified and included in the analysis. These sources include existing sources that are co-located with or adjacent to the proposed source (such as an existing power plant). In most cases, the ambient air quality measurements are not recorded close to the proposed project, thus a local major source might not be well represented by the background air monitoring. When these sources are included, it is typically a result of there being an existing source on the project site and the ambient air quality monitoring station being more than two miles away.

- The modeling results must be carefully interpreted so that they are not skewed towards a single source, in high impact areas near that source's fence line. It is not truly a cumulative impact of AMS if the high impact area is the result of high fence line concentrations from another stationary source and AMS is not providing a substantial contribution to the determined high impact area.

Once the modeling results are interpreted, they are added to the background ambient air quality monitoring data and thus the modeling portion of the cumulative assessment is complete. Due to the use of air dispersion modeling programs in staff's cumulative impacts analysis, the applicant must submit a modeling protocol, based on information requirements for an application, prior to beginning the investigation of the sources to be modeled in the cumulative analysis. The modeling protocol is typically reviewed, commented on, and eventually approved in the Data Adequacy phase of the licensing procedure. Staff typically assists the applicant in finding sources (as described above), characterizing those sources, and interpreting the results of the modeling. However, the actual modeling runs are usually left to the applicant to complete. There are several reasons for this: modeling analyses take time to perform and require significant expertise, the applicant has already performed a modeling analysis of the proposed project alone (see the "Operational Modeling Analysis" subsection), and the applicant can act on its own to reduce stipulated emission rates and/or increase emission control requirements as the results warrant. Once the cumulative project emission impacts are determined, the necessity to mitigate the proposed project emissions can be evaluated, and the mitigation itself can be proposed by staff and/or the applicant (see the "Operation Mitigation" subsection).

The applicant, in consultation with the MDAQMD, confirmed that there are no projects within a six miles radius from the AMS project site that are under construction or have received permits to be built or operate in the foreseeable future. Therefore, it has been determined that no stationary sources requiring a cumulative modeling analysis exist within a six mile radius of the proposed project site. However, there are several dozen pending solar, wind, and other projects in the Mojave Desert west of Barstow. These projects include two large thermal solar project (Beacon Solar Energy Project and Ridgecrest Solar Power Project) and two large gas-fired turbine/solar hybrid projects (Palmdale Hybrid Power Plant Project and Victorville 2 Hybrid Power Project) that are in the licensing process or recently approved by the Energy Commission. This potential for significant additional development within the air basin and corresponding increase in air basin emissions is a major part of staff's rationale for recommending Conditions of Certification **AQ-SC6** and **AQ-SC7** that are designed to mitigate the proposed project's cumulative impacts by reducing the dedicated on-site vehicle emissions and fugitive dust emissions during site operation. With these recommended mitigation measures, staff has concluded that the cumulative air quality impacts are less than significant.

Staff has considered the minority population surrounding the site (see **Socioeconomics Figure 1**). Since, with the Commission's adoption of staff recommended Conditions of Certification, the proposed project's cumulative air quality impacts would be mitigated to less than significant, there is no environmental justice issue for air quality.

COMPLIANCE WITH LORS

The Mojave Desert Air Quality Control District issued a Preliminary Determination of Compliance (PDOC) for AMS on March 1, 2010 (MDAQMD 2010a), and a Final Determination of Compliance on May 13, 2010 (MDAQMD 2010b). Compliance with all District rules and regulations was demonstrated to the District's satisfaction in the FDOC. The District's FDOC conditions are presented in the Conditions of Certification (**AQ-1** to **AQ-57**).

Staff provided an official PDOC comment letter to the District on March 8, 2010 (CEC 2010g) that identified issues with the PDOC engineering evaluation and District conditions. Staff is satisfied that the revisions made in the FDOC adequately address staff's issues and staff have integrated the revised District FDOC conditions into this SSA.

FEDERAL

The District is responsible for issuing the federal New Source Review (NSR) permit and has been delegated enforcement of the applicable New Source Performance Standard (Subparts Dc and IIII). However, this proposed project does not require a federal NSR or Title V permit and would not require a PSD permit from U.S.EPA prior to initiating construction.

The proposed project requires the approval of a federal agency, which staff believes will be the U.S. Department of Energy, if it is to receive Recovery Act funding. Therefore, the project is subject to the General Conformity regulations (40 CFR Part 93). The project area is moderate nonattainment of the federal ozone and PM10 ambient air quality standards, and the general conformity emissions applicability thresholds for these nonattainment classifications are 100 tons/year for direct and indirect ozone precursor (NOx and VOC) emissions and for PM10 emissions[15]. The project's maximum annual mitigated direct and indirect construction and operation emissions, as shown in **Air Quality Tables 7**, **8, 9**, and **10** have been determined by the applicant and staff to be below the applicable General Conformity applicability thresholds of 100 tons per year for NOx, VOC, and PM10[16]. Therefore, staff concludes that the project would not be required to complete a conformity analysis and would be in conformance with the State Implementation.

STATE

The applicant will demonstrate that the proposed project will comply with Section 41700 of the California State Health and Safety Code, which restricts emissions that would cause nuisance or injury, with the issuance of the District's Final Determination of Compliance and the Energy Commission's affirmative finding for the project.

[15] The General Conformity regulations specify PM10 and PM10 precursor emissions, where such precursors have been identified as major PM10 contributors in the SIP. The currently applicable PM10 SIP does not identify secondary pollutants (NOx, SOx, and VOC) as major contributors to ambient PM10 concentrations.

[16] As noted previously staff plans to complete a separate construction emissions analysis, but staff believes that the results of this analysis will still indicate that the maximum annual emissions for NOx, VOC, and PM10 are below 100 tons per year.

The emergency generator and fire water pump engines are also subject to the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines. This measure limits the types of fuels allowed, established maximum emission rates, and establishes recordkeeping requirements. The proposed Tier 2 emergency engine and Tier 3 fire water pump engine meet the current emission limit requirements of this measure. This measure would also limit the engines' testing and maintenance operation to no more than 50 hours per year per engine.

LOCAL

The District rules and regulations specify the emissions control and offset requirements for new sources such as AMS. Best Available Control Technology would be implemented, and emission reduction credits (ERCs) are not required to offset the proposed project's emissions by District rules and regulations based on the permitted stationary source emission levels for the proposed project. Compliance with the District's new source review requirements would ensure that the proposed project would be consistent with the strategies and future emissions anticipated under the District's air quality attainment and maintenance plans.

The applicant provided an air quality permit application to the MDAQMD and the District issued a PDOC on March 1, 2010 (MDAQMD 2010a) and an FDOC on May 13, 2010 (MDAQMD 2010b). The FDOC states that the proposed project is expected to comply with all applicable District rules and regulations. The DOC evaluates whether and under what conditions the proposed project would comply with the District's applicable rules and regulations, as described below.

Regulation II – Permits

Rule 201 and 203 – Permit to Construct and Permit to Operate

Rule 201 establishes the emission source requirements that must be met to obtain a Permit to Construct. Rule 203 prohibits use of any equipment, the use of which may emit air contaminants, without obtaining a Permit to Operate. The applicant has complied with this rule by submitting the AFC and District permit applications materials.

Regulation IV – Prohibitions

Rule 401 - Visible Emissions

This rule limits visible emissions from emissions sources, including stationary source exhausts and fugitive dust emission sources. Compliance with this rule is expected. In the FDOC, the District has determined that the facility is expected to comply with this rule.

Rule 402 - Nuisance

This rule restricts discharge of emissions that would cause injury, detriment, annoyance, or public nuisance. The facility is expected to comply with this rule (identical to California Health and Safety Code 41700).

Rule 403 - Fugitive Dust and Rule 403.2 - Fugitive Dust Control for the Mojave Desert Planning Area

These rules limit fugitive emissions from certain bulk storage, earthmoving, construction and demolition, and manmade conditions resulting in wind erosion. With the implementation of recommended staff conditions **AQ-SC3**, **AQ-SC4** and **AQ-SC7,** the facility is expected to comply with this rule.

Rule 404 - Particulate Matter Concentration

The rule limits particulate matter (PM) emissions based on the volume discharge rate. The AMS stationary sources subject to this rule (auxiliary HTF heaters, emergency engines, and cooling towers) would comply with the PM concentration limits of this regulation.

Rule 406 – Specific Contaminants

The rule prohibits sulfur emissions, calculated as SO_2, in excess of 500 ppmv. Compliance with this rule is assured with the required use of pipeline quality natural gas for the auxiliary HTF heaters and California low sulfur diesel fuel for the emergency generator and fire pump engines.

Rule 407 – Liquid and Gaseous Air Contaminants

The rule prohibits carbon monoxide emissions in excess of 2,000 ppmv. The auxiliary heaters and emergency generator and fire pump engines would have CO emissions well below this concentration limit. Compliance with this rule is expected.

Rule 409 - Fuel Burning Equipment - Combustion Contaminants

This rule limits discharge into the atmosphere from fuel burning equipment combustion contaminants exceeding in concentration at the point of discharge, 0.1 grain per cubic foot of gas calculated to 12% of carbon dioxide (CO_2) at standard conditions. The AMS stationary sources would have particulate concentrations below the limit of this rule.

Rule 431 – Sulfur Content of Fuels

The rule prohibits the burning of gaseous fuel with a sulfur content of more than 800 ppm and liquid fuel with a sulfur content of more than 0.5% sulfur by weight. Compliance with this rule is assured with the required use of pipeline quality natural gas and California low sulfur diesel fuel for the emergency engines.

Rule 461 – Gasoline Transfer and Dispensing

This rule is to limit the emissions of volatile organic compounds (VOC) and toxic compounds during the storage, transfer and dispensing of gasoline. The FDOC includes conditions to assure compliance with this rule.

Regulation IX – Standards of Performance for New Stationary Sources

Rule 900 – Standard of Performance for New Stationary Source

This rule incorporates the Federal New Source Performance Standards (NSPS [40 CFR 60]) rules by reference. The proposed boilers are subject to subpart Dc. The District conditions would ensure compliance with the requirements of this rule.

The proposed Tier 2 and Tier 3 engines meet the current emission limit requirements of NSPS Subpart IIII. The exact model and size of the engines are only estimated at this time and it is uncertain exactly when the emergency engines would be purchased and whether Tier 4 engine emission limits may apply at that time. So, staff has added a requirement to the verification of District Condition of Certification (**AQ-40** and **AQ-49**) to require the applicant to provide documentation that demonstrates that the engines purchased meet the appropriate NSPS and ATCM standards for new engines at the time of purchase.

Regulation XIII – New Source Review

Rule 1303 – New Source Review

This rule requires implementation of BACT for any emission source unit which emits or has the potential to emit 25 lbs/day or more and requires offsets if specific annual emission limits are exceeded. The FDOC concluded that the HTF vent controls would meet the District's determined BACT requirements for the control of VOCs (at least 95 percent control), where the HTF vent controls would control 99 percent of the VOC emissions and a daily inspection and maintenance program would meet BACT for the HTF piping system. The cooling tower is also subject to and would comply with BACT requirements through the use of a high efficiency mist eliminator. The other stationary sources did not trigger BACT but would meet BACT requirements based on the applicant's proposed controls. The FDOC concluded that offsets were not required for the proposed project.

Rule 1306 – Electric Energy Generating Facilities

This rule describes actions to be taken for permitting of power plants. Compliance with this rule would be achieved with the completion of the FDOC.

NOTEWORTHY PUBLIC BENEFITS

Renewable energy facilities, such as AMS, are needed to meet California's mandated renewable energy goals. While there are no local area air quality public benefits[17] resulting from the proposed project, it would indirectly reduce criteria pollutant emissions within the Southwestern U.S. by reducing fossil fuel fired generation.

[17] Air quality benefits should not be confused with greenhouse gas/climate change benefits, which are discussed in Appendix AIR-1.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

There have been no agency or public comments received on staff's air quality section that were written in a manner that require a technical response. The applicant provided a comment on Staff Condition AQ-SC9 regarding the specific language of the requirements and proposed text modifications, which were accepted with minor modifications by staff.

CONCLUSIONS

Staff has made the following conclusions about the Abengoa Mojave Solar Project:

- The proposed project would comply with applicable District Rules and Regulations, including New Source Review requirements, and staff recommends the inclusion of the Districts FDOC conditions as Conditions of Certification **AQ-1** through **AQ-57.**
- If left unmitigated, the proposed project's construction activities would likely contribution to significant adverse PM10 and ozone impacts. Staff recommends **AQ-SC1** to **AQ-SC5** to mitigate the potential impacts.
- The proposed project's operation would not cause new violations of any NO_2, SO_2, PM2.5 or CO ambient air quality standards, and therefore, the project's direct operational NOx, SOx, PM2.5 and CO emission impacts are not significant.
- The proposed project's direct and indirect, or secondary emissions contributions to existing violations of the ozone and PM10 ambient air quality standards are likely significant if unmitigated. Therefore, staff recommends **AQ-SC6** to mitigate the onsite maintenance vehicle emissions and **AQ-SC7** to mitigate the operating fugitive dust emissions to ensure that the potential ozone and PM10 impacts are mitigated to less than significant over the life of the project.
- The proposed project's construction includes significant earthmoving activities adjacent to or nearby several existing residences. Staff recommends **AQ-SC9** that requires the project owner pay for the temporary relocation of the effected adjacent residents, if requested by those residents, to avoid potential particulate emissions nuisance conditions.
- The proposed project would be consistent with the requirements of SB 1368 and the Emission Performance Standard for greenhouse gases (see **APPENDIX AIR-1**).

PROPOSED CONDITIONS OF CERTIFICATION

STAFF CONDITIONS OF CERTIFICATION

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

<u>Verification:</u> At least 30 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.

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

<u>Verification:</u> At least 30 days prior to the start of any ground disturbance, the project owner shall submit the AQCMP to the CPM for approval. The AQCMP shall include effectiveness and environmental data for the proposed soil stabilizer. The CPM will notify the project owner of any necessary modifications to the plan within 15 days from the date of receipt.

AQ-SC3 Construction Fugitive Dust Control: The AQCMM shall submit documentation to the CPM in each Monthly Compliance Report that demonstrates compliance with the Air Quality Construction Mitigation Plan (AQCMP) mitigation measures for the purposes of minimizing fugitive dust emission creation from construction activities and preventing all fugitive dust plumes that would not comply with the performance standards identified in **AQ-SC4** from leaving the project site. Any deviation from the AQCMP mitigation measures shall require prior CPM notification and approval.

<u>Verification:</u> The AQCMM shall provide the CPM a Monthly Compliance Report to include the following to demonstrate control of fugitive dust emissions:

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

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

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

The following fugitive dust mitigation measures shall be included in the Air Quality Construction Mitigation Plan (AQCMP) required by **AQ-SC2**.

a. The main access roads through the facility to the power block areas will be either paved or stabilized using soil binders, or equivalent methods, to provide a stabilized surface that is similar for the purposes of dust control to paving, that may or may not include a crushed rock (gravel or similar material with fines removed) top layer, prior to initiating construction in the main power block area, and delivery areas for operations materials (chemicals, replacement parts, etc.) will be paved or treated prior to taking initial deliveries.

b. All unpaved construction roads and unpaved operation and maintenance site roads, as they are being constructed, shall be stabilized with a non-toxic soil stabilizer or soil weighting agent that can be determined to be as efficient as or more efficient for fugitive dust control than ARB approved soil stabilizers, and that shall not increase any other environmental impacts, including loss of vegetation to areas beyond where the soil stabilizers are being applied for dust control. All other disturbed areas in the project and linear construction sites shall be watered as frequently as necessary during grading (consistent with **Bio 7**); and after active construction activities shall be stabilized with a non-toxic soil stabilizer or soil weighting agent, or alternative approved soil stabilizing methods, in order to comply with the dust mitigation objectives of Condition of Certification **AQ-SC4**. The frequency of watering can be reduced or eliminated during periods of precipitation.

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

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

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

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

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

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

i. Construction areas adjacent to any paved roadway below the grade of the surrounding construction area or otherwise directly impacted by sediment from site drainage shall be provided with sandbags or other equivalently effective measures to prevent run-off to roadways, or other similar run-off control measures as specified in the Storm Water Pollution Prevention Plan (SWPPP), only when such SWPPP measures are necessary so that this condition does not conflict with the requirements of the SWPPP.

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

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

l. All soil storage piles and disturbed areas that remain inactive for longer than 10 days shall be covered, or shall be treated with appropriate dust suppressant compounds.

m. All vehicles that are used to transport solid bulk material on public roadways and that have potential to cause visible emissions shall be provided with a cover, or the materials shall be sufficiently wetted and loaded onto the trucks in a manner to provide at least one foot of freeboard.

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

AQ-SC4 Dust Plume Response Requirement: The AQCMM or an AQCMM Delegate shall monitor all construction activities for visible dust plumes. Observations of visible dust plumes that have the potential to be transported (A) off the project site and within 400 feet upwind of any regularly occupied structures not owned by the project owner or (B) 200 feet beyond the centerline of the construction of linear facilities indicate that existing mitigation measures are not resulting in effective mitigation. The AQCMP shall include a section detailing the additional mitigation measures described in the verification below and how they will be implemented to meet these fugitive dust control performance standards.

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

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

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

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

The AQCMP shall include the following additional mitigation measure implementation procedures that will be used to ensure that the performance standards of this condition are met:

- The AQCMM or Delegate shall implement the following procedures for additional mitigation measures in the event that visible dust plumes as defined above 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 project owner may appeal to the CPM any directive from the AQCMM or Delegate to shut down an activity, if the shutdown shall go into effect within one hour of the original determination, unless overruled by the CPM before that time.

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

Verification: The AQCMM shall include in the Monthly Compliance Report the following to demonstrate control of diesel construction-related emissions:

A. A summary of all actions taken to control diesel construction related emissions;

B. A list of all heavy equipment used on site during that month, including the owner of that equipment and a letter from each owner indicating that equipment has been properly maintained; and

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

The following off-road diesel construction equipment mitigation measures shall be included in the Air Quality Construction Mitigation Plan (AQCMP) required by **AQ-SC2**.

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 and lower than 750 hp shall meet, at a minimum, the Tier 3 California Emission Standards for Off-Road Compression-Ignition Engines, as specified in California Code of Regulations, Title 13, section 2423(b)(1), unless a good faith effort 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. Engines larger than 750 hp shall meet Tier 2 engine standards. In the event that a Tier 3 engine is not available for any off-road equipment larger than 100 hp and smaller than 750 hp, that equipment shall be equipped with a Tier 2 engine, or an engine that is equipped with retrofit controls to reduce exhaust emissions of nitrogen oxides (NOx) and diesel particulate matter (DPM) to no more than Tier 2 levels unless certified by engine manufacturers or the on-site AQCMM that the use of such devices is not practical for specific engine types. For purposes of this condition, the use of such devices is “not practical” for the following, as well as other, reasons.

1. There is no available retrofit control device that has been verified by either the California Air Resources Board or U.S. Environmental Protection Agency to control the engine in question to Tier 2 equivalent emission levels and the highest level of available control using retrofit or Tier 1 engines is being used for the engine in question; or

2. The construction equipment is intended to be on site for 10 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.

AQ-SC6 The project owner, when obtaining dedicated on-road or off-road vehicles for mirror washing activities and other facility maintenance activities, shall only obtain vehicles that meet California on-road vehicle emission standards or appropriate U.S.EPA/California off-road engine emission standards for the latest model year available when obtained.

<u>Verification:</u> At least 30 days prior to the start commercial operation, the project owner shall submit to the CPM a copy of the plan that identifies the size and type of the on-site vehicle and equipment fleet and the vehicle and equipment purchase orders and contracts and/or purchase schedule. The plan shall be updated every other year and submitted in the Annual Compliance Report .

AQ-SC7 The project owner shall provide a site Operations Dust Control Plan, including all applicable fugitive dust control measures identified in the verification of **AQ-SC3** that would be applicable to minimizing fugitive dust emission creation from operation and maintenance activities and preventing all fugitive dust plumes that would not comply with the performance standards identified in **AQ-SC4** from leaving the project site; that:

A. Describes the active operations and wind erosion control techniques such as windbreaks and chemical dust suppressants, including their ongoing maintenance procedures, that shall be used on areas that could be disturbed by vehicles or wind anywhere within the project boundaries; and

B. Identifies the location of signs throughout the facility that will limit traveling on unpaved portion of roadways to solar equipment maintenance vehicles only. In addition, vehicle speed shall be limited to no more than 10 miles per hour on these unpaved roadways, with the exception that vehicles may travel up to 25 miles per hour on stabilized unpaved roads as long as such speeds do not create visible dust emissions.

The site operations fugitive dust control plan shall include the use of durable non-toxic soil stabilizers on all regularly used unpaved roads and disturbed off-road areas, or alternative methods for stabilizing disturbed off-road areas, within the project boundaries, and shall include the inspection and maintenance procedures that will be undertaken to ensure that the unpaved roads remain stabilized. The soil stabilizer used shall be a non-toxic soil stabilizer or soil weighting agent that can be determined to be as efficient as or more efficient for fugitive dust control than ARB approved soil stabilizers, and that shall not increase any other environmental impacts, including loss of vegetation to areas beyond where the soil stabilizers are being applied for dust control.

The performance and application of the fugitive dust controls shall also be measured against and meet the performance requirements of condition **AQ-SC4**. The measures and performance requirements of **AQ-SC4** shall also be included in the operations dust control plan.

<u>Verification:</u> At least 30 days prior to start of commercial operation, the project owner shall submit to the CPM for review and approval a copy of the site Operations Dust Control Plan that identifies the dust and erosion control procedures, including effectiveness and environmental data for the proposed soil stabilizer, that will be used during operation of the project and that identifies all locations of the speed limit signs. Within 60 days after commercial operation, the project owner shall provide to the CPM a report identifying the locations of all speed limit signs, and a copy of the project employee and contractor training manual that clearly identifies that project employees and contractors are required to comply with the dust and erosion control procedures and on-site speed limits.

AQ-SC8 The project owner shall provide the CPM copies of all District issued Authority-to-Construct (ATC) and Permit-to-Operate (PTO) documents for the facility.

The project owner shall submit to the CPM for review and approval any modification proposed by the project owner to any project air permit. The project owner shall submit to the CPM any modification to any permit proposed by the District or U.S. Environmental Protection Agency (U.S. EPA), and any revised permit issued by the District or U.S. EPA, for the project.

Verification: The project owner shall submit any ATC, PTO, and proposed air permit modifications 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 offer to pay for temporary equivalent lodging to all residents that are located within one quarter mile of the project site fence line during the initial grading/site preparation phase of construction, for those periods of time when the initial grading/site preparation earthmoving activities may occur within one quarter mile of these residential properties. The project owner shall contact and provide this offer of temporary lodging to all residents affected by this condition at least one month prior to the start of initial grading.

Verification: The project owner shall provide to the CPM, prior to the start of initial grading, a statement signed by the project owner's project manager stating that the owner or residents of the properties affected by this condition have been notified and that the residents have been offered by the project owner paid relocation during the affected period of the initial grading/site preparation phase of construction. The statement shall list affected property owners/residents notified and the means of notification. Additionally, in the Monthly Compliance Report the project owner shall provide documentation regarding any requests from the residents to be relocated for longer periods during construction and the project owner's actions to evaluate those requests.

DISTRICT CONDITIONS

District Final Determination of Compliance Conditions (MDAQMD 2010b)

Application No. 00010710 and 00010711 (Two - 21.5 MMBtu/hr Natural Gas Fired Auxiliary Boilers)

EQUIPMENT DESCRIPTION

Two 21.5 MMBtu/hr natural gas fired auxiliary boilers with low-NOx burner systems.

AQ-1 Operation of this equipment shall be conducted in compliance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted below.

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-2 This equipment shall be exclusively fueled with pipeline quality natural gas and shall be operated and maintained in strict accord with the recommendations of its manufacturer or supplier and/or sound engineering principles.

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-3 Emissions from this equipment shall not exceed the following hourly emission limits, verified by fuel use and an initial or annual compliance tests as applicable for each pollutant:

a. NOx as NO_2:

   0.237 lb/hr operating at 100% load (based on 9.0 ppmvd corrected to 3% O2 and averaged over one hour)

b. CO:

   0.817 lb/hr operating at 100% load (based on 50 ppmvd corrected to 3% O2 and averaged over one hour)

c. VOC as CH_4:

   0.231 lb/hr operating at 100% load

d. SOx as SO_2:

   0.0126 lb/hr operating at 100% load

e. PM10/2.5:

   0.159 lb/hr operating at 100% load

Verification: As part of the Annual Compliance Report, the project owner shall include information demonstrating compliance with boiler operating emission rates.

AQ-4 Prior to the expiration date each year, after the completion of construction the project owner shall have this equipment tuned, as specified by Rule 1157(I), Tuning Procedure.

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-5 The project owner shall maintain an operations log for this equipment on-site and current for a minimum of five (5) years, and said log shall be provided to District personnel on request. The operations log shall include the following information at a minimum:

a. Cumulative annual fuel use in cubic feet or operation in hours;

b. Annual tune-up verification;

c. Results of annual compliance testing;

d. Any permanent changes made to the equipment that would affect air pollutant emissions, and indicate when changes were made.

Verification: The project owner shall make the site available for inspection of records and equipment by representatives of the District, ARB, and the Energy Commission.

AQ-6 The project owner shall perform initial compliance tests on this equipment in accordance with the MDAQMD Compliance Test Procedural Manual. The test report shall be submitted to the District within 180 days of initial start up:

a. NOx as NO_2 in ppmvd at 3% oxygen and lb/hr (measured per USEPA Reference Methods 19 and 20).

b. VOC as CH_4 in ppmvd at 3% oxygen and lb/hr (measured per USEPA Reference Methods 25A and 18).

c. CO in ppmvd at 3% oxygen and lb/hr (measured per USEPA Reference Method 10).

d. PM10/2.5 in mg/m^3 at 3% oxygen and lb/hr (measured per USEPA Reference Methods 5 and 202 or CARB Method 5).

e. Flue gas flow rate in dscf per minute.

f. Opacity (measured per USEPA reference Method 9).

Verification: The project owner shall notify the District and the CPM within fifteen (15) working days before the execution of the compliance test required in this condition. The test results shall be submitted to the District and to the CPM within 180 days of initial start up.

AQ-7 The project owner shall perform annual compliance tests on this equipment in accordance with the MDAQMD Compliance Test Procedural Manual. The test report shall be submitted to the District no later than six weeks prior to the expiration date of this permit. The following compliance tests are required:

a. NOx as NO_2 in ppmvd at 3% oxygen and lb/hr (measured per USEPA Reference Methods 19 and 20).

b. CO in ppmvd at 3% oxygen and lb/hr (measured per USEPA Reference Method 10).

Verification: The project owner shall notify the District and the CPM within fifteen (15) working days before the execution of the compliance test required in this condition. The test results shall be submitted to the District and to the CPM within the timeframe required by this condition.

AQ-8 Annual fuel usage shall not exceed 45.9 MMscf verified by annual fuel usage records.

Verification: As part of the Annual Compliance Report, the project owner shall include information demonstrating compliance with boiler annual fuel use limit.

Application No. 00010906 and 00010907 (Two - HTF Ullage Expansion Tank)

EQUIPMENT DESCRIPTION

Two HTF ullage/expansion tanks.

AQ-9 Operation of this equipment shall be conducted in compliance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted below.

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-10 This system shall store only HTF, specifically the condensable fraction of the vapors vented from the ullage system.

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-11 The expansion tanks (5), nitrogen-condensing tank and two vertical HTF storage tanks shall be operated at all times under a nitrogen blanket.

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-12 The ullage/expansion system nitrogen venting shall be carried out only through vents which have vapor condensing coolers which shall be maintained at or below 120 degrees Fahrenheit.

Verification: The project owner shall provide the District and CPM manufacturer design specifications showing compliance with this condition at least 30 days prior to the installation of the ullage/expansion vent system. The project owner shall have active temperature gauges that can be inspected to show compliance with this condition.

AQ-13 The HTF storage tank shall have in place a properly operating liquid HTF air cooler which shall maintain the tank at or below 165 degrees Fahrenheit.

Verification: The project owner shall provide the District and CPM manufacturer design specifications showing compliance with this condition at least 30 days prior to the installation of the HTF storage tanks. The project owner shall have active temperature gauges that can be inspected to show ongoing compliance with this condition.

AQ-14 The nitrogen condensing tanks shall be maintained at or below 176 degrees Fahrenheit.

Verification: The project owner shall provide the District and CPM manufacturer design specifications showing compliance with this condition at least 30 days prior to the installation of the nitrogen condensing tanks. The project owner shall have active temperature gauges that can be inspected to show ongoing compliance with this condition.

AQ-15 Vent release and HTF storage tank temperatures shall be monitored in accordance with a District approved Inspection, Monitoring and Maintenance plan.

Verification: The project owner shall provide the District for review and approval and the CPM for review the required Inspection, Monitoring and Maintenance plan at least 30 days prior to the installation of the HTF storage tanks and vent systems.

AQ-16 The project owner shall establish an inspection and maintenance program to determine, repair, and log leaks in HTF piping network, storage tanks, distillation units and expansion tanks. Inspection and maintenance program and documentation shall be available to District staff upon request.

a. All pumps, compressors and pressure relief devices (pressure relief valves or rupture disks) shall be electronically, audio, or visually inspected once every operating day.

b. All accessible valves, fittings, pressure relief devices (PRDs), hatches, pumps, compressors, etc. shall be inspected quarterly using a leak detection device such as a Foxboro OVA 108 calibrated for methane.

c. VOC leaks greater than 100-ppmv shall be tagged (with date and concentration) and repaired within seven calendar days of detection.

d. VOC leaks greater than 10,000-ppmv shall be tagged and repaired within 24-hours of detection.

e. The project owner shall maintain a log of all VOC leaks exceeding 10,000-ppmv, including location, component type, and repair made.

f. The project owner shall maintain record of the amount of HTF replaced on a monthly basis for a period of five (5) years.

g. The project owner shall maintain record of the amount of HTF degradation products removed from system on a monthly basis for a period of five (5) years

h. Any detected leak exceeding 100-ppmv and not repaired in 7-days and 10,000-ppmv not repaired within 24-hours shall constitute a violation of this Authority to Construct ATC)/Permit to Operate (PTO).

i. The project owner shall place an adequate number of isolation valves in the Heat transfer Fluid (HTF) pipe loops so as to be able to isolate a solar panel collector loop in the event of a leak of fluid. These valves shall be actuated automatically, manually, and remotely, or locally as determined during detailed engineering design. The detailed engineering design drawings showing the number, location, and type of isolation valves shall be provided to the District for review and approval prior to the commencement of the solar array construction.

Verification: The inspection and maintenance plan shall be submitted to the CPM for review and approval at least 30 days before taking delivery of the HTF. As part of the Annual Compliance Report, the project owner shall provide the quantity of used HTF fluid removed from the system and the amount of new HTF fluid added to the system each year. The project owner shall make the site available for inspection of HTF piping Inspection and Maintenance Program records and HTF system equipment by representatives of the District, ARB, and the Energy Commission.

AQ-17 The project owner shall submit to the District a compliance test protocol within sixty (60) days of start-up and shall conduct all required compliance/certification tests in accordance with a District-approved test plan. Thirty (30) days prior to the compliance/certification tests the project owner shall provide a written test plan for District review and approval. Written notice of the compliance/certification test shall be provided to the District ten (10) days prior to the tests so that an observer may be present. A written report with the results of such compliance/certification tests shall be submitted to the District within forty-five (45) days after testing.

Verification: The project owner shall provide a compliance test protocol to the District for approval and CPM for review at least no later than sixty (60) days after start-up and submit a test plan to the District for approval and CPM for review at least thirty (30) days prior to the compliance tests. The project owner shall notify the District and the CPM within ten (10) working days before the execution of the compliance tests required in **AQ-18** and **AQ-19**, and the test results shall be submitted to the District and to the CPM within forty-five (45) days after the tests are conducted.

AQ-18 The project owner shall perform the following initial compliance tests on this equipment in accordance with the MDAQMD Compliance Test Procedural Manual. The test report shall be submitted to the District within 180 days of initial start up. The following compliance tests are required:

a. VOC as CH_4 in ppmvd and lb/hr (measured per USEPA Reference Methods 25A and 18 or equivalent).

b. Benzene in ppmvd at and lb/hr (measured per CARB method 410 or equivalent).

<u>Verification:</u> The project owner shall submit the test results to the District and to the CPM within 180 days after initial start up.

AQ-19 The project owner shall perform the following annual compliance tests on this equipment in accordance with the MDAQMD Compliance Test Procedural Manual. The test report shall be submitted to the District no later than six weeks prior to the expiration date of this permit. The following compliance tests are required:

a. VOC as CH_4 in ppmvd and lb/hr (measured per USEPA Reference Methods 25A and 18 or equivalent).

b. Benzene in ppmvd and lb/hr (measured per CARB method 410 or equivalent).

Additionally, records of all compliance tests shall be maintained on site for a period of five (5) years and presented to District personnel upon request.

<u>Verification:</u> As part of the Annual Compliance Report, the project owner shall include the test results demonstrating compliance with this condition and the project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-20 Emissions from this equipment may not exceed the following emission limits, based on a calendar day summary:

a. VOC as CH_4 – 4.55 lb/day, verified by compliance test.

b. Benzene – 1.9 lb/day, verified by compliance test.

<u>Verification:</u> As part of the Annual Compliance Report, the project owner shall include the test results demonstrating compliance with this condition and the project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-21 If current non-criteria substances become regulated as toxic or hazardous substances and are used in this equipment, the project owner shall submit to the District a plan demonstrating how compliance will be achieved and maintained with such regulations.

<u>Verification:</u> The project owner shall submit a compliance plan of the toxic or hazardous substances for District approval and CPM review if current non-criteria substances in the HTF become regulated as toxic or hazardous substances.

Application No. 00010947 and 00010948 (Two Cooling Towers)

EQUIPMENT DESCRIPTION

Two 6-cell cooling towers with drift eliminator rate of 0.0005% and water circulation rate of 90,000 gpm.

AQ-22 Operation of this equipment shall be conducted in compliance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted below.

Verification: The project owner shall make the site available for inspection of records and equipment by representatives of the District, ARB, and the Energy Commission.

AQ-23 This equipment shall be operated and maintained in strict accord with the recommendations of its manufacturer or supplier and/or sound engineering principles.

Verification: The project owner shall make the site available for inspection of records and equipment by representatives of the District, ARB, and the Energy Commission.

AQ-24 The drift rate shall not exceed 0.0005 percent with a maximum circulation rate of 90,000 gallons per minute. The maximum hourly PM10 emission rate shall not exceed 2.24 pounds per hour, as calculated per the written District-approved protocol.

Verification: The manufacturer guarantee data for the drift eliminator, showing compliance with this condition, shall be provided to the CPM and the District 30 days prior to cooling tower operation. As part of the Annual Compliance Report the project owner shall include information on operating emission rates to demonstrate compliance with this condition.

AQ-25 The project owner shall perform weekly specific conductivity tests of the blow-down water to indirectly measure total dissolved solids (TDS). Quarterly tests of the blow-down water will be done to confirm the relationship between conductance and TDS. The TDS shall not exceed 10,000 ppm on a calendar monthly basis.

Verification: The cooling tower recirculation water TDS content test results shall be provided to representatives of the District, ARB, and the Energy Commission upon request.

AQ-26 The project owner shall conduct all required cooling tower water tests in accordance with a District-approved test and emissions calculation protocol. Thirty (30) days prior to the first such test the project owner shall provide a written test and emissions calculation protocol for District review and approval.

Verification: The project owner shall provide an emissions calculation and water sample testing protocol to the District for approval and CPM for review at least 30 days prior to the first cooling tower water test.

AQ-27 This equipment shall not be operated for more than 5,840 hours per rolling twelve month period.

Verification: The project owner shall submit to the CPM the cooling tower operating data demonstrating compliance with this condition as part of the Annual Operation Report.

AQ-28 The project owner shall maintain an operations log for this equipment on-site and current for a minimum of five (5) years, and said log shall be provided to District personnel on request. The operations log shall include the following information at a minimum:

a. Total operation time (hours per day, hours per month, and hours per rolling twelve month period); and

b. The date and result of each blow-down water test in TDS ppm, and the resulting mass emission rate.

Verification: The project owner shall make the site available for inspection of records and equipment by representatives of the District, ARB, and the Energy Commission.

AQ-29 A maintenance procedure shall be established that states how often and what procedures will be used to ensure the integrity of the drift eliminators. This procedure is to be kept onsite and available to District personnel on request.

Verification: The project owner shall make available at request the written drift eliminator maintenance procedures for inspection by representatives of the District, ARB, and the Energy Commission.

Application No. 00010712 and 00010713 (Two - 4,190 HP Emergency IC Engine)

EQUIPMENT DESCRIPTION

Two - Tier II 4,190 HP diesel fueled emergency generator engines, each driving a generator.

AQ-30 This equipment shall be installed, operated and maintained in strict accord with those recommendations of the manufacturer/supplier and/or sound engineering principles which produce the minimum emissions of contaminants. Unless otherwise noted, this equipment shall also be operated in accordance with all data and specifications submitted with the application for this permit.

Verification: The project owner shall make the site available for inspection of equipment and records by representatives of the District, ARB, and the Energy Commission

AQ-31 This unit shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15 ppm) on a weight per weight basis per CARB Diesel or equivalent requirements.

Verification: The project owner shall make the site available for inspection of equipment and fuel purchase records by representatives of the District, ARB, and the Energy Commission.

AQ-32 A non-resettable hour meter with a minimum display capability of 9,999 hours shall be installed and maintained on this unit to indicate elapsed engine operating time. (Title 17 CCR §93115.10(e)(1)).

Verification: At least thirty (30) days prior to the installation of the engine, the project owner shall provide the District and the CPM the specification of the hour meter.

AQ-33 This unit shall be limited to use for emergency power, defined as in response to a fire or when utility back-feed power is not available. In addition, this unit shall be operated no more than 0.5 hours per day and 50 hours per year for testing and maintenance, excluding compliance source testing. Time required for source testing will not be counted toward the 50 hour per year limit.

Verification: The project owner shall make the site available for inspection of records and equipment by representatives of the District, ARB, and the Energy Commission.

AQ-34 The project owner shall maintain a operations log for this unit current and on-site, either at the engine location or at a on-site location, for a minimum of two (2) years, and for another year where it can be made available to the District staff within five (5) working days from the District's request, and this log shall be provided to District, State and Federal personnel upon request. The log shall include, at a minimum, the information specified below:

a. Date of each use and duration of each use (in hours);

b. Reason for use (testing & maintenance, emergency, required emission testing);

c. Calendar year operation in terms of fuel consumption (in gallons) and total hours; and,

d. Fuel sulfur concentration (the project owner may use the supplier's certification of sulfur content if it is maintained as part of this log).

Verification: The project owner shall submit records required by this condition that demonstrating compliance with the sulfur content and engine use limitations of conditions **AQ-28** and **AQ-30** in the Annual Compliance Report, including a photograph showing the annual reading of engine hours. The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-35 This unit shall not be used to provide power to the interconnecting utility and shall be isolated from the interconnecting utility when operating.

Verification: The project owner shall make the site available for inspection of records and equipment by representatives of the District, ARB, and the Energy Commission.

AQ-36 This engine may operate in response to notification of impending loss of utility back-feed power if the interconnected utility has ordered an outage to the plant or expects to order such outages at a particular time, the engine is operated no more than 30 minutes prior to the forecasted outage, and the engine is shut down immediately after the utility advises that the outage is no longer imminent or in effect.

Verification: The project owner shall make the site available for inspection of records and equipment by representatives of the District, ARB, and the Energy Commission.

AQ-37 No two permitted stationary emergency engines (emergency generators or emergency fire pump engines) ~~Equipment with valid District permit numbers E0XXXX, E0XXXX, E0XXXX and E0XXXX~~ shall ~~not~~ be readiness tested on the same calendar day.

Verification: The project owner shall make the site available for inspection of records and equipment by representatives of the District, ARB, and the Energy Commission.

AQ-38 This engine shall exhaust through a stack at a minimum height of 60 feet.

Verification: The project owner shall make the site available for inspection of equipment by representatives of the District, ARB, and the Energy Commission.

AQ-39 This unit is subject to the requirements of the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines (Title 17 CCR 93115). In the event of conflict between these conditions and the ATCM, the more stringent shall govern.

Verification: Not necessary.

AQ-40 This unit is subject to the requirements of the Federal National Source Performance Standards (NSPS) for Stationary Compression Ignition Internal Combustion Engines (40 CFR Part 60 Subpart IIII).

Verification: The project owner shall submit the engine specifications at least 30 days prior to purchasing the engines for review and approval demonstrating that the engines meet NSPS and ARB ATCM emission limit requirements at the time of engine purchase.

Application No. 00010714 and 00010715 (Two - 346 HP Emergency IC Engine)

EQUIPMENT DESCRIPTION

Two - Tier III 346 HP diesel fueled emergency generator engines, each driving a fire suppression water pump.

AQ-41 This equipment shall be installed, operated and maintained in strict accord with those recommendations of the manufacturer/supplier and/or sound engineering principles which produce the minimum emissions of contaminants. Unless otherwise noted, this equipment shall also be operated in accordance with all data and specifications submitted with the application for this permit.

Verification: The project owner shall make the site available for inspection of equipment and records by representatives of the District, ARB, and the Energy Commission

AQ-42 This unit shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15 ppm) on a weight per weight basis per CARB Diesel or equivalent requirements.

Verification: The project owner shall make the site available for inspection of equipment and fuel purchase records by representatives of the District, ARB, and the Energy Commission.

AQ-43 A non-resettable hour meter with a minimum display capability of 9,999 hours shall be installed and maintained on this unit to indicate elapsed engine operating time. (Title 17 CCR §93115.10(e)(1)).

Verification: At least thirty (30) days prior to the installation of the engine, the project owner shall provide the District and the CPM the specification of the hour timer.

AQ-44 This unit shall be limited to use for emergency fire suppression, defined as in response to a fire or due to low fire water pressure. In addition, this unit shall be operated no more than 50 hours per year for testing and maintenance, excluding compliance source testing. Time required for source testing will not be counted toward the 50 hour per year limit. The 50 hour limit can be exceeded when the emergency fire pump assembly is driven directly by a stationary diesel fueled CI engine operated per and in accord with the National Fire Protection Association (NFPA) 25 - "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems," 1998 edition. This requirement includes usage during emergencies. {Title 17 CCR 93115.3(n)}

Verification: The project owner shall make the site available for inspection of records and equipment by representatives of the District, ARB, and the Energy Commission.

AQ-45 The project owner shall maintain a operations log for this unit current and on-site, either at the engine location or at a on-site location, for a minimum of two (2) years, and for another year where it can be made available to the District staff within five (5) working days from the District's request, and this log shall be provided to District, State and Federal personnel upon request. The log shall include, at a minimum, the information specified below:

a. Date of each use and duration of each use (in hours);

b. Reason for use (testing & maintenance, emergency, required emission testing);

c. Calendar year operation in terms of fuel consumption (in gallons) and total hours; and,

d. Fuel sulfur concentration (the project owner may use the supplier's certification of sulfur content if it is maintained as part of this log).

Verification: The project owner shall submit records required by this condition that demonstrating compliance with the sulfur content and engine use limitations of conditions **AQ-42, AQ-44, and AQ-46** in the Annual Compliance Report, including a photograph showing the annual reading of engine hours. The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-46 No two permitted stationary emergency engines (emergency generators or emergency fire pump engines) ~~Equipment with valid District permit numbers E0XXXX, E0XXXX, E0XXXX and E0XXXX~~ shall ~~not~~ be readiness tested on the same calendar day.

Verification: The project owner shall make the site available for inspection of records and equipment by representatives of the District, ARB, and the Energy Commission.

AQ-47 This engine shall exhaust through a stack at a minimum height of 60 feet.

Verification: The project owner shall make the site available for inspection of equipment by representatives of the District, ARB, and the Energy Commission.

AQ-48 This unit is subject to the requirements of the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines (Title 17 CCR 93115). In the event of conflict between these conditions and the ATCM, the requirements of the ATCM shall govern.

Verification: Not necessary.

AQ-49 This unit is subject to the requirements of the Federal National Source Performance Standards (NSPS) for Stationary Compression Ignition Internal Combustion Engines (40 CFR Part 60 Subpart IIII).

Verification: The project owner shall submit the engine specifications at least 30 days prior to purchasing the engines for review and approval demonstrating that the engines meet NSPS and ARB ATCM emission limit requirements at the time of engine purchase.

Application No. 00010995 (One – Gasoline Storage Tank)

EQUIPMENT DESCRIPTION

One – Above ground gasoline storage tank and fuel receiving and dispensing equipment.

AQ-50 The toll-free telephone number that must be posted is 1-800-635-4617.

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-51 The project owner shall maintain a log of all inspections, repairs, and maintenance on equipment subject to Rule 461. Such logs or records shall be maintained at the facility for at least two (2) years and shall be available to the District upon request.

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-52 Any modifications or changes to the piping or control fitting of the vapor recovery system require prior approval from the District.

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-53 The gasoline vapor vent pipe(s) are to be equipped with pressure relief valve(s) per applicable CARB requirements.

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-54 The project owner shall perform the following tests within 60 days of construction completion and annually thereafter in accordance with the applicable CARB test methods.

The District shall be notified a minimum of 10 days prior to performing the required tests with the final results submitted to the District within 30 days of completion of the tests.

The District shall receive passing test reports no later than six (6) weeks prior to the expiration date of this permit.

Verification: The project owner shall notify the District at least 10 days prior to performing the required tests. The test results shall be submitted to the District within 30 days of completion of the tests and shall be made available to the CPM if requested.

AQ-55 The annual throughput of gasoline shall not exceed 25,000 gallons per year. Throughput Records shall be kept on site and available to District personnel upon request. Before this annual throughput can be increased the facility may be required to submit to the District a site specific Health Risk Assessment in accord with a District approved plan. In addition public notice and/or comment period may be required.

Verification: The project owner shall submit to the CPM gasoline throughput records demonstrating compliance with this condition as part of the Annual Compliance Report. The project owner shall maintain on site the annual gasoline throughput records and shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-56 The project owner shall install, operate, and maintain CARB approved Phase I and Phase II vapor recovery systems on the proposed facility gasoline tank and dispensing system. The Phase I and Phase II vapor recovery systems will meet all applicable CARB standards at the time of installation for the systems selected.

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-57 The California Air Resources Board (CARB) has established a timeline for Aboveground Storage Tanks (AST) Enhanced Vapor Recovery (EVR) system implementation. Pursuant to CARB requirements and State mandated retrofits, the project owner shall ensure that this tank meets all the applicable requirements within the designated timeframes. Prior to conducting any modifications the project owner shall obtain a District approved Authority to Construct (ATC) Permit. See the following link for AST EVR Timeline: http://o3.arb.ca.gov/vapor/asttimeline_123009.pdf

Verification: The project owner shall provide the District and the CPM documentation, at least 30 days prior to installation, showing that the tank at the time of installation will meet appropriate ARB EVR requirements.

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ACRONYMS

AAQS	Ambient Air Quality Standard
AERMOD	ARMS/EPA Regulatory Model
AFC	Application for Certification
AMS	Abengoa Mojave Solar (the proposed project)
AQMD	Air Quality Management District
AQCMM	Air Quality Construction Mitigation Manager
AQCMP	Air Quality Construction Mitigation Plan
ARB	California Air Resources Board
ATC	Authority to Construct
ATCM	Airborne Toxic Control Measure
BACT	Best Available Control Technology
bhp	brake horsepower
Btu	British thermal unit
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
EIR	Environmental Impact Report
ERC	Emission Reduction Credit
FDOC	Final Determination Of Compliance
HTF	Heat Transfer Fluid (Therminol® VP-1)
GHG	Greenhouse Gas
hp	horsepower
H_2S	Hydrogen Sulfide
lbs	Pounds
LORS	Laws, Ordinances, Regulations and Standards
MACT	Maximum Achievable Control Technology (for Hazardous Air Pollutants)
MDAB	Mojave Desert Air Basin
MDAQMD	Mojave Desert Air Quality Management District
mg/m^3	milligrams per cubic meter

MMBtu	Million British thermal units
MW	Megawatts (1,000,000 Watts)
NAAQS	National Ambient Air Quality Standard
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
PDOC	Preliminary Determination Of Compliance
PM	Particulate Matter
PM10	Particulate Matter less than 10 microns in diameter
PM2.5	Particulate Matter less than 2.5 microns in diameter
ppm	Parts Per Million
ppmv	Parts Per Million by Volume
ppmvd	Parts Per Million by Volume, Dry
ppmw	Parts Per Million by Weight
PSD	Prevention of Significant Deterioration
PTO	Permit to Operate
SSA	Supplemental Staff Assessment (this document)
scf	Standard Cubic Feet
SO_2	Sulfur Dioxide
SOx	Oxides of Sulfur
U.S. EPA	United States Environmental Protection Agency
$\mu g/m^3$	Microgram per cubic meter
VMT	Vehicles Miles Traveled
VOC	Volatile Organic Compounds

APPENDIX AIR-1 - GREENHOUSE GAS EMISSIONS

Testimony of William Walters, P.E.

SUMMARY OF CONCLUSIONS

The Abengoa Mojave Solar Project (AMS) is a proposed addition to the state's electricity system. AMS is a 250 MW solar concentrating thermal power plant, which would utilize parabolic trough solar thermal technology to solar heat a heat transfer fluid (HTF). This hot HTF would be used to generate steam in a solar steam generator. As a solar project its greenhouse gas (GHG) emissions would be considerably less than the existing statewide average GHG emissions per unit of generation and considerably less than the GHG emissions from existing fossil fuel fired power plants providing generation to California, and thus would contribute to continued reduction of GHG emissions in the interconnected California and the western United States electricity systems.

While AMS would emit some GHG emissions, the contribution of AMS to the system build-out of renewable resources to meet the goals of the Renewable Portfolio Standard (RPS) in California would result in a net cumulative reduction of energy generation and GHG emissions from new and existing fossil-fired electricity resources. Electricity is produced by operation of inter-connected generation resources. Operation of one power plant, like AMS, affects all other power plants in the interconnected system. AMS would be a "must-take" facility and its operation would affect the overall electricity system operation and GHG emissions in several ways:

- AMS would provide low-GHG, renewable generation.
- AMS would facilitate to some degree the replacement high GHG emitting (e.g., out-of-state coal) electricity generation that must be phased out to meet the State's 2006 Emissions Performance Standard.
- AMS could facilitate to some extent the replacement of generation provided by aging fossil-fired power plants that use once-through cooling.

These system impacts would result in a net reduction in GHG emissions across the electricity system providing energy and capacity to California. Thus, staff concludes that the proposed project would result in a cumulative overall reduction in GHG emissions from power plants, does not worsen current conditions, and would not result in impacts that are cumulatively CEQA significant.

Staff concludes that the short-term minor emission of greenhouse gases during construction that are necessary to create this new, low GHG-emitting power generating facility would be sufficiently reduced by "best practices" and would be more than offset by GHG emission reductions during operation. Thus, construction GHG emissions would not be CEQA significant.

The Abengoa Mojave Solar Project, as a renewable energy generation facility, is determined by rule to comply with the Greenhouse Gas Emission Performance Standard requirements of SB 1368 (Chapter 11, Greenhouse Gases Emission Performance Standard, Article 1, Section 2903 [b][1]).

The California Air Resources Board (ARB) has promulgated regulations for mandatory GHG emission reporting to comply with the California Global Warming Solutions Act of 2006 (AB 32 Núñez, Statutes of 2006, Chapter 488, Health and Safety Code sections 38500 et seq.) (ARB 2008a). The Abengoa Mojave Solar Project, which solely generates electricity from solar power, is exempt from the mandatory GHG emission reporting requirements for electricity generating facilities [CCR Title 17 §95101(c)(1)]. However, the proposed project may be subject to future reporting requirements and GHG reductions or trading requirements as additional state or federal GHG regulations are developed and implemented.

INTRODUCTION

Greenhouse gas (GHG) emissions are not criteria pollutants, but they are discussed in the context of cumulative impacts. However, on April 2, 2007, the U.S. Supreme Court found that GHGs are pollutants that must be covered by the federal Clean Air Act. In response, on September 30, 2009, the U.S. Environmental Protection Agency proposed to apply Prevention of Significant Deterioration (PSD) requirements to facilities whose carbon dioxide-equivalent emissions exceed 25,000 tons per year (U.S.EPA 2009c). The rule making is not finalized, but the GHG emissions for AMS are not expected to exceed this amount.

The state has demonstrated a clear willingness to address global climate change through research, adaptation and inventory reductions. In that context, staff evaluates the GHG emissions from the proposed project, presents information on GHG emissions related to electricity generation, and describes the applicable GHG standards and requirements.

Generation of electricity can produce greenhouse gases with the criteria air pollutants that have been traditionally regulated under the federal and state Clean Air Acts. For fossil fuel-fired power plants, the GHG emissions include primarily carbon dioxide, with much smaller amounts of nitrous oxide (N_2O, not NO or NO_2, which are commonly known as NOx or oxides of nitrogen), and methane (CH_4 – often from unburned natural gas). For solar energy generation projects the stationary source GHG emissions are much smaller than fossil fuel-fired power plants, but the associated maintenance vehicle emissions are higher. Other sources of GHG emissions include 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 carbon-based fuels; other sources of GHG emissions are small and also are more likely to be easily controlled or reused or recycled, but are nevertheless documented here as some of the compounds have very high global warming potentials.

Global warming potential is a relative measure, compared to carbon dioxide, of a compound’s residence time in the atmosphere and ability to warm the planet. Mass emissions of GHGs are converted into carbon dioxide equivalent (CO2E) metric tonnes (MT) for ease of comparison.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The following federal, state, and local laws and policies in **Greenhouse Gas Table** 1 pertain to the control and mitigation of greenhouse gas emissions. Staff's analysis examines the proposed project's compliance with these requirements.

Greenhouse Gas Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
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.
State	
California Global Warming Solutions Act of 2006, AB 32 (Stats. 2006; Chapter 488; Health and Safety Code sections 38500 et seq.)	This act requires the California Air Resource Board (ARB) to enact standards that will reduce GHG emission to 1990 levels by 2020. Electricity production facilities will be regulated by the ARB.
California Code of Regulations, tit. 17, Subchapter 10, Article 2, sections 95100 et. seq.	These ARB regulations implement mandatory GHG emissions reporting as part of the California Global Warming Solutions Act of 2006 (Stats. 2006; Chapter 488; Health and Safety Code sections 38500 et seq.)
Title 20, California Code of Regulations, section 2900 et seq.; CPUC Decision D0701039 in proceeding R0604009	The regulations prohibit utilities from entering into long-term contracts with any base load facility that does not meet a greenhouse gas emission standard of 0.5 metric tonnes carbon dioxide per megawatt-hour (0.5 $MTCO_2$/MWh) or 1,100 pounds carbon dioxide per megawatt-hour (1,100 lbs CO_2/MWh).

GLOBAL CLIMATE CHANGE AND ELECTRICITY PRODUCTION

There is general scientific consensus that climate change is occurring and that human activity contributes in some measure (perhaps substantially) to that change. Man-made emissions of greenhouse gases, if not sufficiently curtailed, are likely to contribute further to continued increases in global temperatures. Indeed, the California Legislature finds that "[g]lobal warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California" (Cal. Health & Safety Code, sec. 38500, division 25.5, part 1).

In 1998, the Energy Commission identified a range of strategies to prepare for an uncertain climate future, including a need to account for the environmental impacts associated with energy production, planning, and procurement (CEC 1998, p.5). In 2003, the Energy Commission recommended that the state require reporting of greenhouse gases (GHG) or global climate change[18] emissions as a condition of state licensing of new electric generating facilities (CEC 2003, IEPR p. 42). In 2006, California enacted the California Global Warming Solutions Act of 2006 (AB 32). It requires the California Air Resources Board (ARB) to adopt standards that will reduce statewide GHG emissions to statewide GHG emissions levels in 1990, with such reductions to be achieved by 2020.[19] To achieve this, ARB has a mandate to define the 1990 emissions level and achieve the maximum technologically feasible and cost-effective GHG emission reductions.

The ARB adopted early action GHG reduction measures in October 2007, adopted mandatory reporting requirements and the 2020 statewide target in December 2007, and adopted a statewide scoping plan in December 2008 to identify how emission reductions will be achieved from major sources of GHG via regulations, market mechanisms, and other actions. ARB staff is developing regulatory language to implement its plan and holds ongoing public workshops on key elements of the recommended GHG reduction measures, including market mechanisms (ARB 2006). The regulations must be effective by January 1, 2011 and mandatory compliance commences on January 1, 2012. The mandatory reporting requirements are effective for electric generating facilities with a nameplate capacity equal or greater than 1 megawatt (MW) capacity if their emissions exceed 2,500 metric tonnes per year. The due date for initial reports by existing facilities was June 1, 2009.

Examples of strategies that the state might pursue for managing GHG emissions in California, in addition to those recommended by the Energy Commission and the Public Utilities Commission, were identified in the California Climate Action Team's Report to the Governor (CalEPA 2006). The scoping plan approved by ARB in December 2008 builds upon the overall climate policies of the Climate Action Team report and shows the recommended strategies to achieve the goals for 2020 and beyond. Some strategies focus on reducing consumption of petroleum across all areas of the California economy. Improvements in transportation energy efficiency (fuel economy), land use planning, and alternatives to petroleum-based fuels are slated to provide substantial reductions by 2020 (CalEPA 2006). The scoping plan includes a requirement for 33% of California's electrical energy to be provided from renewable sources by 2020 (implementing California's 33% RPS goal), aggressive energy efficiency targets, and a cap-and-trade system that includes the electricity sector (ARB 2008b).

It is likely that GHG reductions mandated by ARB will not be uniform across emitting sectors, in that reductions will be based on cost-effectiveness (i.e., the greatest effect for the least cost). For example, the ARB proposes a 40% reduction in GHG from the electricity sector, even though that sector currently only produces about 25% of the state's GHG emissions. In response, in September 2008 the Energy Commission and the Public Utilities Commission provided recommendations (CPUC 2008) to ARB on

[18] Global climate change is the result of greenhouse gases, or air emissions with global warming potentials, affecting the global energy balance, and thereby, climate of the planet. The term greenhouse gases (GHG) and global climate change (GCC) gases are used interchangeably.

[19] Governor Schwarzenegger has also issued Executive Order S-3-05 establishing a goal of 80% below 1990 levels by 2050.

how to achieve such reductions through both programmatic and regulatory approaches, and identified regulation points should ARB decide that a multi-sector cap and trade system is warranted.

The Energy Commission's *2007 Integrated Energy Policy Report* (IEPR) also addressed climate change within the electricity, natural gas, and transportation sectors (CEC 2007). For the electricity sector, it recommended such approaches as pursuing all cost-effective energy efficiency measures and meeting the Governor's stated goal of a 33% renewable portfolio standard. The Energy Commission's *2009 Integrated Energy Policy Report* continues to emphasize the importance of meeting greenhouse gas emissions reduction goals along with other important statewide issues such as backing out use of once-through cooling in coastal California power plants (CEC 2009d).

SB 1368[20], enacted in 2006, and regulations adopted by the Energy Commission and the Public Utilities Commission pursuant to the bill, prohibits California utilities from entering into long-term commitments with any base load facilities that exceed the Emission Performance Standard of 0.500 metric tonnes CO_2 per megawatt-hour[21] (1,100 pounds CO_2/MWh). Specifically, the SB 1368 Emission Performance Standard (EPS) applies to base load power from new power plants, new investments in existing power plants, and new or renewed contracts with terms of five years or more, including contracts with power plants located outside of California.[22] If a project, instate or out of state, plans to sell base load electricity to a California utility that utility will have to demonstrate that the project meets the EPS. *Base load* units are defined as units that operate at a capacity factor higher than 60%. As a renewable electricity generating facility, AMS is determined by rule to be compliant with the SB 1368 EPS.

In addition to these programs, California is involved in the Western Climate Initiative, a multi-state and international effort to establish a cap and trade market to reduce greenhouse gas emissions in the Western United States and the Western Electricity Coordinating Council (WECC). The timelines for the implementation of this program are similar to those of AB 32, with full roll-out beginning in 2012. And as with AB 32, the electricity sector has been a major focus of attention.

ELECTRICITY PROJECT GREENHOUSE GAS EMISSIONS

Electricity use can be as simple as turning on a switch to operate a light or fan. The system to deliver adequate and reliable electricity supply is complex and variable. But it operates as an integrated whole to meet demand, such that the dispatch of a new source of generation generally curtails or displaces one or more less efficient or less competitive existing sources. Within the system, generation resources provide electricity, or energy, generating capacity, and ancillary services to stabilize the system and facilitate electricity delivery, or movement, over the grid. *Capacity* is the instantaneous output of a resource, in megawatts. *Energy* is the capacity output over a unit of time, for example an hour or year, generally reported as megawatt-hours or

[20] Public Utilities Code § 8340 et seq.

[21] The Emission Performance Standard only applies to carbon dioxide, and does not include emissions of other greenhouse gases converted to carbon dioxide equivalent.

[22] See Rule at http://www.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/64072.htm

gigawatt-hours (GWh). Ancillary services[23] include regulation, spinning reserve, non-spinning reserve, voltage support, and black start capability. Individual generation resources can be built and operated to provide only one specific service. Alternatively, a resource may be able to provide one or all of these services, depending on its design and constantly changing system needs and operations.

California is actively pursuing policies to reduce GHG emissions that include adding non-GHG emitting renewable generation resources to the system mix. The generation of electricity using fossil fuels, even in a back-up generator at a thermal solar plant, produces air emissions known as greenhouse gases in addition to the criteria air pollutants that have been traditionally regulated under the federal and state Clean Air Acts. Greenhouse gas emissions contribute to the warming of the earth's atmosphere, leading to climate change.

PROJECT CONSTRUCTION

Construction of industrial facilities such as power plants requires coordination of numerous equipment and personnel. The concentrated on-site activities result in short-term, unavoidable increases in vehicle and equipment emissions that include greenhouse gases. The construction would last approximately 26 months. The greenhouse gas emissions estimate, for the entire construction period, provided by the applicant[24] is below in **Greenhouse Gas Table 2**.

Greenhouse Gas Table 2
Estimated AMS Potential Construction Greenhouse Gas Emissions

	CO_2-Equivalent (MTCO2E) [a,b]
Onsite Equipment (all four phases)	29,661
Delivery Vehicles	2,984
Construction Worker Vehicles	10,369
Entire Construction Period Total	**43,015** [c]

Source: ESH 2010g.
[a] One metric tonne (MT) equals 1.1 short tons or 2,204.6 pounds or 1,000 kilograms.
[b] The vast majority of the CO2E emissions, over 99%, is CO_2 from construction combustion sources.
[c] Staff performed a separate construction emission estimate and determined considerably lower total construction period CO_2 emissions than estimated by the applicant, but has retained the more conservative applicant estimate. Staff's estimate shows higher on-road equipment emissions (delivery and worker vehicles emissions), but substantially lower off-road equipment emissions due to two main factors: 1) the applicant estimated emissions for a large number of onsite on-road equipment as if they were off-road equipment. The applicant did not appear to apply load factors to adjust the off-road equipment horsepower hour estimate down from 100 percent load.

[23] See page CEC 2009b, page 95.

[24] As noted in the Air Quality Section staff may be re-estimating certain construction emissions which would revise some of the values in **Greenhouse Gas Table 2.** If so, staff will provide a revised construction GHG emission estimate as part of a Staff Assessment Addendum.

PROJECT OPERATIONS

Operations GHG emissions are shown in **Greenhouse Gas Table 3**. Operation of the AMS would cause GHG emissions from the auxiliary boiler, fire pump engine, emergency generator engine, maintenance fleet and employee trips, and sulfur hexafluoride emissions from new electrical component equipment.

Greenhouse Gas Table 3
Estimated AMS Potential Operating Greenhouse Gas Emissions

	Annual CO_2-Equivalent (MTCO2E)[a]
Auxiliary HTF Heaters [b]	10,018
Emergency Generator Engine [b]	183.2
Fire Pump Engine [b]	8.1
Maintenance Vehicles [b]	119.6
Delivery Vehicles [b]	31.3
Employee Vehicles [b]	512.7
Equipment Leakage (SF_6)	10.5
Total Project GHG Emissions – MTCO2E [b]	**10,884**
Facility MWh per year	600,000
Facility GHG Emission Rate (MTCO2E/MWh)	0.018

Sources: ESH 2010g
[a] One metric tonne (MT) equals 1.1 short tons or 2,204.6 pounds or 1,000 kilograms.
[b] The vast majority of the CO2E emissions, over 99%, is CO_2 from these emission sources.

Greenhouse Gas Table 3 shows what the proposed project, as permitted, could potentially emit in greenhouse gases on an annual basis. All emissions are converted to CO_2-equivalent and totaled. Electricity generation GHG emissions are generally dominated by CO_2 emissions from the carbon-based fuels; other sources of GHG are typically small and also are more likely to be easily controlled or reused/recycled. For this solar project the primary fuel, solar energy, is greenhouse gas free, but there is natural gas use in the two auxiliary HTF heaters used for morning startup and for freeze protection, and gasoline and diesel fuel use in the maintenance vehicles, offsite delivery vehicles, staff and employee vehicles, the two fire water pump engines, and the two emergency generator engines. Another GHG emission source for this proposed project is SF_6 from electrical equipment leakage.

The proposed project is estimated to emit, directly from primary and secondary emission sources on an annual basis, nearly 11,000 metric tonnes of CO_2-equivalent GHG emissions per year. AMS, as a renewable energy generation facility, is determined by rule to comply with the Greenhouse Gas Emission Performance Standard requirements of SB 1368 (Chapter 11, Greenhouse Gases Emission Performance Standard, Article 1, Section 2903 [b][1]). Regardless, AMS has an estimated GHG emission rate of 0.018 MTCO2E/MWh, well below the Greenhouse Gas Emission Performance Standard of 0.500 MTCO2/MWh.

Solar Project Energy Payback Time

The beneficial energy and greenhouse gas impacts of renewable energy projects can also be measured by the *energy payback time*[25]. **Greenhouse Gas Tables 2** and **3** provide an estimate of the onsite construction and operation emissions, employee transportation emissions, and the final segment of offsite materials and consumables transportation. However, there are additional direct transportation and indirect manufacturing GHG emissions associated with the construction and operation of the proposed project, which are all considered in the determination of the energy payback time. A document sponsored by Greenpeace estimates that the energy payback time for concentrating solar power plants, such as AMS, to be on the order of five months (Greenpeace 2005, Page 9); and the project life for AMS is on the order of 30 years. Therefore, the proposed project's GHG emissions reduction potential from energy displacement would be substantial[26].

Natural Carbon Uptake Reduction

This proposed project would cause the clearing of land and removal of vegetation, which would reduce the ongoing natural carbon uptake by vegetation. This project site is an agricultural brownfield site, but if the site were left fallow it would revert to desert. A study of the Mojave Desert indicated that the desert may uptake carbon in amounts as high as 100 grams per square meter per year (Wohlfahrt et. al. 2008). This would equate to a maximum reduction in carbon uptake, calculated as CO_2, of 1.48 MT of CO_2 per acre per year for areas with complete vegetation removal. For this 1,765 acre proposed project (SM 2010a), which does require the complete removal of vegetation over most of the project site, the maximum equivalent loss in carbon uptake would be 2,612 MT of CO_2 per year, which would correspond to 0.004 MT of CO_2 per MW generated. Therefore, the natural carbon uptake loss is negligible in comparison with the reduction in fossil fuel CO_2 emissions, which can range from 0.35 to 1.0 MT of CO_2 per MW depending on the fuel and technology, that is enabled by this proposed project.

CLOSURE AND DECOMMISSIONING

Closure and decommissioning, as a one-time limited duration event, would have emissions that are similar in type and magnitude, but likely lower than, the construction emissions as discussed above.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Staff assesses four kinds of impacts: construction, operation, closure and decommissioning, and cumulative effects. As the name implies, construction impacts

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[25] The energy payback time is the time required to produce an amount of energy as great as what was consumed during production, which in the context of a solar power plant includes all of the energy required during construction and operation.

[26] The GHG displacement for the project would be similar to, but not exactly the same as, the amount of energy produced after energy payback is achieved multiplied by the average GHG emissions per unit of energy displaced. The average GHG emissions for the displaced energy over the project life is not known but currently fossil fuel fired power plants have GHG emissions that range from 0.35 MT/MWh CO2E for the most efficient combined cycle gas turbine power plants to over 1.0 MT/MWh for coal fired power plants.

result from the emissions occurring during the construction of the proposed project. The operation impacts result from the emissions of the proposed project during operation. Cumulative impacts analysis assesses the impacts that result from the proposed project's incremental effect viewed over time. The impact of GHG emissions caused by this solar facility is characterized by considering how the power plant would affect the overall electricity system. The integrated electricity system depends on non-fossil and fossil-fueled generation resources to provide energy and satisfy local capacity needs. As directed by the Energy Commission's adopted order initiating an informational (OII) proceeding (08-GHG OII-1) (CEC 2009a), staff is refining and implementing the concept of a "blueprint" that describes the long-term roles (i.e., retirements and displacement) of fossil-fueled power plants in California's electricity system as we move to a high-renewable, low-GHG electricity system, which will include projects like AMS.

PROPOSED PROJECT

Construction Impacts

Staff concludes that the GHG emission increases from construction activities would not be CEQA significant for several reasons. First, the period of construction would be short-term and the emissions intermittent during that period, not ongoing during the life of the proposed project. Second, best practices control measures that staff recommends, such as limiting idling times and requiring, as appropriate, equipment that meets the latest emissions standards, would further minimize greenhouse gas emissions since the use of newer equipment would increase efficiency and reduce GHG emissions and be compatible with low-carbon fuel (e.g., bio-diesel and ethanol) mandates that will likely be part of the ARB regulations to reduce GHG from construction vehicles and equipment. And lastly, these temporary GHG emissions are necessary to create this renewable energy source that would provide power with a very low GHG emissions profile, and the construction emissions would be more than offset by the reduction in fossil fuel fired generation that would be enabled by this proposed project. If the project construction emissions were distributed over the estimated 30 year life of the proposed project they would only increase the project life time annual facility GHG emissions rate by 0.0024 MT CO2E per MWh.

Direct/Indirect Operation Impacts and Mitigation

The proposed Abengoa Mojave Solar Project promotes the state's efforts to move towards a high-renewable, low-GHG electricity system, and, therefore, reduces both the amount of natural gas used by electricity generation and greenhouse gas emissions.

Net GHG emissions for the integrated electric system will decline when new renewable power plants are added to: 1) move renewable generation towards the 33% target; 2) improve the overall efficiency, or GHG emission rate, of the electric system; or 3) serve load growth or capacity needs more efficiently, or with fewer GHG emissions.

The Role of AMS in Renewables Goals/Load Growth

As California moves towards an increased reliance on renewable energy by implementing the Renewables Portfolio Standard (RPS), non-renewable energy resources will be displaced. These reductions in non-renewable energy, shown in **Greenhouse Gas Table 4**, are targeted to be as much as 36,500 GWh. These assumptions are conservative in that the forecasted growth in electricity retail sales assumes that the impacts of planned increases in expenditures on (uncommitted) energy efficiency are already embodied in the current retail sales forecast[27]. Energy Commission staff estimates that as much as 18,000 GWh of additional savings due to uncommitted energy efficiency programs may be forthcoming.[28] This would reduce non-renewable energy needs by a further 12,000 GWh given a 33% RPS.

Greenhouse Gas Table 4
Estimated Changes in Non-Renewable Energy
Potentially Needed to Meet California Loads, 2008-2020

California Electricity Supply	**Annual GWh**	
Statewide Retail Sales, 2008, actual [a]	264,794	
Statewide Retail Sales, 2020, forecast [a]	289,697	
Growth in Retail Sales, 2008-20	24,903	
Growth in Net Energy for Load [b]	29,840	
California Renewable Electricity	**GWh @ 20% RPS**	**GWh @ 33% RPS**
Renewable Energy Requirements, 2020 [c]	57,939	95,600
Current Renewable Energy, 2008	29,174	
Change in Renewable Energy-2008 to 2020	28,765	66,426
Resulting Change in Non-Renewable Energy	176	(36,586)

Source: Energy Commission staff 2010.
Notes:
a. 2009 IPER Demand Forecast, Form 1.1c. Excludes pumping loads for entities that do not have an RPS.
b. 2009 IEPR Demand Forecast, Form 1.5a.
c. RPS requirements are a percentage of retail sales.

The Role of AMS in Retirements/Replacements

Abengoa Mojave Solar Project would be capable of annually providing 500 GWh of renewable generation energy to replace resources that are or will likely be precluded from serving California loads. State policies, including GHG goals, are discouraging or prohibiting new contracts and new investments in high GHG-emitting facilities such as coal-fired generation, generation that relies on water for once-through cooling, and aging power plants (CEC 2007). Some of the existing plants that are likely to require substantial capital investments to continue operation in light of these policies may be unlikely to undertake the investments and will retire or be replaced.

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[27] Energy efficiency savings are already represented in the current Energy Commission demand forecast adopted December 2009 (CEC 2009c).

[28] See *Incremental Impacts of Energy Efficiency Policy Initiatives Relative to the 2009 Integrated Energy Policy Report Adopted Demand Forecast* (CEC-200-2010-001-D, January, 2010), page 2. Table 1 indicates that additional conservation for the three investor-owned utilities may be as high as 14,374 GWh. Increasing this value by 25% to account for the state's publicly-owned utilities yields a total reduction of 17,967 GWh.

Replacement of High GHG-Emitting Generation

High GHG -emitting resources, such as coal, are effectively prohibited from entering into new long-term contracts for California electricity deliveries as a result of the Emissions Performance Standard adopted in 2007 pursuant to SB 1368. Between now and 2020, more than 18,000 GWh of energy procured by California utilities under these contracts will have to reduce GHG emissions or be replaced; these contracts are presented in **Greenhouse Gas Table 5**.

Greenhouse Gas Table 5
Expiring Long-term Contracts with Coal-fired Generation 2009 – 2020

Utility	Facility [a]	Contract Expiration	Annual GWh Delivered to CA
PG&E, SCE	Misc In-state Qual. Facilities [a]	2009-2019	4,086
LADWP	Intermountain	2009-2013	3,163 [b]
City of Riverside	Bonanza, Hunter	2010	385
Department of Water Resources	Reid Gardner	2013 [c]	1,211
SDG&E	Boardman	2013	555
SCE	Four Corners	2016	4,920
Turlock Irrigation District	Boardman	2018	370
LADWP	Navajo	2019	3,832
		TOTAL	**18,522**

Source: Energy Commission staff based on Quarterly Fuel and Energy Report (QFER) filings.
Notes:
a. All facilities are located out-of-state except for the Miscellaneous In-state Qualifying Facilities.
b. Estimated annual reduction in energy provided to LADWP by Utah utilities from their entitlement by 2013.
c. Contract not subject to Emission Performance Standard, but the Department of Water Resources has stated its intention not to renew or extend.

This represents almost half of the energy associated with California utility contracts with coal-fired resources that will expire by 2030. If the State enacts a carbon adder[29], all the coal contracts (including those in **Greenhouse Gas Table 5**, which expire by 2020, and other contracts that expire beyond 2020 but are not shown in the table) may be retired at an accelerated rate as coal-fired energy becomes uncompetitive due to the carbon adder or the capital needed to capture and sequester the carbon emissions. Also shown are the approximate 500 MW of in-state coal and petroleum coke-fired capacity that may be unlikely to contract with California utilities for baseload energy due to the SB1368 Emission Performance Standard. As these contracts expire, new and existing generation resources will replace the lost energy and capacity. Some will come from renewable generation such as this proposed project; some will come from new and existing natural gas fired generation. All of these new facilities will have substantially lower GHG emissions rates than coal and petroleum coke-fired facilities which typically

[29] A carbon adder or carbon tax is a specific value added to the cost of a project for per ton of associated carbon or carbon dioxide emissions. Because it is based on, but not limited to, actual operations and emission and can be trued up at year end, it is considered a simple mechanism to assign environmental costs to a project.

average about 1.0 $MTCO_2$/MWh without carbon capture and sequestration. Thus, new renewable facilities will result in a net reduction in GHG emissions from the California electricity sector.

Retirement of Generation Using Once-Through Cooling

The State Water Resource Control Board (SWRCB) has proposed major changes to once-through cooling (OTC) units, shown in **Greenhouse Gas Table 6**, which would likely require extensive capital to retrofit, or retirement, or substantial curtailment of dozens of generating units. In 2008, these units collectively produced almost 58,000 GWh. While the more recently built OTC facilities may well install dry or wet cooling towers and continue to operate, the aging OTC plants are not likely to be retrofit to use dry or wet cooling towers without the power generation also being retrofit or replaced to use a more efficient and lower GHG emitting combined cycle gas turbine technology. Most of these existing OTC units operate at low capacity factors, suggesting a limited ability to compete in the current electricity market. Although the timing would be uncertain, new resources would out-compete aging plants and would displace the energy provided by OTC facilities and likely accelerate their retirements.

Any additional costs associated with complying with the SWRCB regulation would be amortized over a limited revenue stream today and into the foreseeable future. Their energy and much of their dispatchable, load-following capability will have to be replaced. These units constitute over 15,000 MW of merchant capacity and 17,800 GWh of merchant energy. Of this, much but not all of the capacity and energy are in local reliability areas, requiring a large share of replacement capacity – absent transmission upgrades – to locations in the same local reliability area. **Greenhouse Gas Table 6** provides a summary of the utility and merchant energy supplies affected by the OTC regulations.

New renewable generation resources will emit substantially less GHG emissions on average than other energy generation sources. Existing aging and OTC natural gas facility generation typically averages 0.6 to 0.7 $MTCO_2$/MWh, which is much less efficient, higher GHG emitting, than a renewable energy project like AMS. A project like AMS, located far from the coastal load pockets like the Los Angeles Local Reliability Area (LRA), would more likely provide energy support to facilitate the retirement of some aging and/or OTC power plants, but would not likely provide any local capacity support at or near the coastal OTC units. Regardless, due to its low greenhouse gas emissions, AMS would serve to reduce GHG emissions from the electricity sector.

Closure and Decommissioning

Eventually the facility would close, either at the end of its useful life or due to some unexpected situation such as a natural disaster or catastrophic facility breakdown. When the facility closes, all sources of air emissions would cease to operate and thus impacts associated with those greenhouse gas emissions would no longer occur. The only other expected, albeit temporary, GHG emissions would be equipment exhaust (off-road and on-road) from dismantling activities. These activities would be of much a shorter duration than construction of the proposed project, equipment used to dismantle the facility are assumed to have lower comparative GHG emissions due to technology advancement, and would be required to be controlled in a manner at least equivalent to that required during construction. It is assumed that the beneficial GHG impacts of this facility, displacement of fossil fuel fired generation, would be replaced by the construction of newer more efficiency renewable energy or other low GHG generating technology facilities. Also, the recycling of the facility components (steel, concrete, etc.) could indirectly reduce GHG emissions from decommissioning activities. Therefore, while there would be temporary adverse greenhouse gas CEQA impacts during decommissioning they are determined to be less than significant.

Greenhouse Gas Table 6
Aging and Once-Through Cooling Units: 2008 Capacity and Energy Output [a]

Plant, Unit Name	Owner	Local Reliability Area	Aging Plant?	Capacity (MW)	2008 Energy Output (GWh)	GHG Emission Rate ($MTCO_2$/MWh)
Diablo Canyon 1, 2	Utility	None	No	2,232	17,091	Nuclear
San Onofre 2, 3	Utility	L.A. Basin	No	2,246	15,392	Nuclear
Broadway 3 [b]	Utility	L.A. Basin	Yes	75	90	0.648
El Centro 3, 4 [b]	Utility	None	Yes	132	238	0.814
Grayson 3-5 [b]	Utility	LADWP	Yes	108	150	0.799
Grayson CC [b]	Utility	LADWP	Yes	130	27	0.896
Harbor CC	Utility	LADWP	No	227	203	0.509
Haynes 1, 2, 5, 6	Utility	LADWP	Yes	1,046	1,529	0.578
Haynes CC	Utility	LADWP	No	560	3,423	0.376
Humboldt Bay 1, 2 [a]	Utility	Humboldt	Yes	107	507	0.683
Olive 1, 2 [b]	Utility	LADWP	Yes	110	11	1.008
Scattergood 1-3	Utility	LADWP	Yes	803	1,327	0.618
Utility-Owned				7,776	39,988	0.693
Alamitos 1-6	Merchant	L.A. Basin	Yes	1,970	2,533	0.661
Contra Costa 6, 7	Merchant	S.F. Bay	Yes	680	160	0.615
Coolwater 1-4 [b]	Merchant	None	Yes	727	576	0.633
El Segundo 3, 4	Merchant	L.A. Basin	Yes	670	508	0.576
Encina 1-5	Merchant	San Diego	Yes	951	997	0.674
Etiwanda 3, 4 [b]	Merchant	L.A. Basin	Yes	666	848	0.631
Huntington Beach 1, 2	Merchant	L.A. Basin	Yes	430	916	0.591
Huntington Beach 3, 4	Merchant	L.A. Basin	No	450	620	0.563
Mandalay 1, 2	Merchant	Ventura	Yes	436	597	0.528
Morro Bay 3, 4	Merchant	None	Yes	600	83	0.524
Moss Landing 6, 7	Merchant	None	Yes	1,404	1,375	0.661
Moss Landing 1, 2	Merchant	None	No	1,080	5,791	0.378
Ormond Beach 1, 2	Merchant	Ventura	Yes	1,612	783	0.573
Pittsburg 5-7	Merchant	S.F. Bay	Yes	1,332	180	0.673
Potrero 3	Merchant	S.F. Bay	Yes	207	530	0.587
Redondo Beach 5-8	Merchant	L.A. Basin	Yes	1,343	317	0.810
South Bay 1-4	Merchant	San Diego	Yes	696	1,015	0.611
Merchant-Owned				15,254	17,828	0.605
Total In-State OTC				23,030	57,817	

Source: Energy Commission staff based on Quarterly Fuel and Energy Report (QFER) filings.

a. OTC Humboldt Bay Units 1 and 2 are included in this list. They must retire in 2010 when the new Humboldt Bay Generating Station (not ocean-cooled), currently under construction, enters commercial operation.

b. Units are aging but are not OTC.

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 proposed project alone would not be sufficient to change global climate, but would emit greenhouse gases and therefore has been analyzed as a potential cumulative impact in the context of existing GHG regulatory requirements and GHG energy policies.

COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

AMS, as a solar energy generation project, is exempt from the mandatory GHG emission reporting requirements for electricity generating facilities as currently required by the California Air Resources Board (ARB) for compliance with the California Global Warming Solutions Act of 2006 (AB 32 Núñez, Statutes of 2006, Chapter 488, Health and Safety Code sections 38500 et seq.) (ARB 2008a).

AMS, as a renewable energy generation facility, is determined by rule to comply with the Greenhouse Gas Emission Performance Standard requirements of SB 1368 (Chapter 11, Greenhouse Gases Emission Performance Standard, Article 1, Section 2903 [b][1]).

Since AMS would have emissions that are below 25,000 MT/year of CO2E, the proposed project would not be subject to federal mandatory reporting of greenhouse gases. It would also be exempt from the state's greenhouse gas reporting requirements.

NOTEWORTHY PUBLIC BENEFITS

Greenhouse gas related noteworthy public benefits include the construction of renewable and low-GHG emitting generation technologies and the potential for successful integration into the California and greater WECC electricity systems. Additionally, the AMS project would contribute to meeting the state's AB 32 goals.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

There have been no agency or public comments received on staff's greenhouse gas section.

CONCLUSIONS

The Abengoa Mojave Solar Project would emit considerably less greenhouse gases (GHG) than existing power plants and most other generation technologies, and thus would contribute to continued improvement of the overall western United States, and specifically California, electricity system GHG emission rate average. The proposed project would lead to a net reduction in GHG emissions across the electricity system that provides energy and capacity to California. Thus, staff concludes that the proposed project's operation would result in a cumulative overall reduction in GHG emissions from the state's power plants that would create a beneficial CEQA and NEPA, would not worsen current conditions, and would thus not result in CEQA impacts that are cumulatively significant or result in adverse NEPA impacts.

Staff concludes that the GHG emission increases typical from construction and decommissioning activities would not be CEQA significant for several reasons. First, the periods of construction and decommissioning would be short-term and not ongoing during the life of the proposed project. Second, the best practices control measures that staff recommends, such as limiting idling times and requiring, as appropriate, equipment that meets the latest emissions standards, would further minimize greenhouse gas emissions since the use of newer equipment would increase efficiency and reduce GHG emissions and be compatible with low-carbon fuel (e.g., bio-diesel and ethanol) mandates that will likely be part of the ARB regulations to reduce GHG from construction vehicles and equipment. Finally, the construction and decommissioning emissions are miniscule when compared to the reduction in fossil-fuel power plant greenhouse gas emissions during project operation. For all these reasons, staff would conclude that the short-term emission of greenhouse gases during construction would be sufficiently reduced and would be offset during proposed project operations and would, therefore, not be CEQA significant.

The AMS, as a renewable energy generation facility, is determined by rule to comply with the Greenhouse Gas Emission Performance Standard requirements of SB 1368 (Chapter 11, Greenhouse Gases Emission Performance Standard, Article 1, Section 2903 [b][1]).

MITIGATION MEASURES/PROPOSED CONDITIONS OF CERTIFICATION

No Conditions of Certification related to project greenhouse gas emissions are proposed because the proposed project would create beneficial GHG impacts. The project owner would have to comply with any future applicable GHG regulations formulated by the ARB or the U.S.EPA, such as GHG reporting or emissions cap and trade markets.

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ACRONYMS

AMS	Abengoa Mojave Solar (the proposed project)
ARB	California Air Resources Board
CalEPA	California Environmental Protection Agency
CEE	California Energy Commissions
CEQA	California Environmental Quality Act
CH_4	Methane
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO2E	Carbon Dioxide Equivalent
CPUC	California Public Utilities Commission
EIR	Environmental Impact Report
EPS	Emission Performance Standard
GCC	Global Climate Change
GHG	Green House Gas
GWh	Gigawatt-hour
HFC	Hydrofluorocarbons
IEPR	Integrated Energy Policy Report
IGCC	Integrated Gasification Combined Cycle
LADWP	Los Angeles Department of Water and Power
LRAs	Local Reliability Areas
MT	Metric tonnes
MW	Megawatt
MWh	Megawatt-hour
N_2O	Nitrous Oxide
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
NO_3	Nitrates
NOx	Oxides of Nitrogen or Nitrogen Oxides
OII	Order Initiating an Informational
OTC	Once-Through Cooling
PFC	Perfluorocarbons
PSD	Prevention of Significant Deterioration

QFER	Quarterly Fuel and Energy Report
RPS	Renewables Portfolio Standard
SB	Senate Bill
SF_6	Sulfur hexafluoride
SWRCB	State Water Resource Control Board
WECC	Western Electricity Coordinating Council

BIOLOGICAL RESOURCES

Testimony of Heather Blair

SUMMARY OF CONCLUSIONS

The proposed Abengoa Mojave Solar project would occupy approximately 1,765 acres in the West Mojave Desert adjacent to the western margin of Harper Dry Lake in unincorporated San Bernardino County. The proposed project footprint and size were iteratively modified by the Applicant to avoid continuous stands of undisturbed native vegetation, conservation areas, and high quality wildlife habitat. As a result approximately 90% of the habitat within the project area is developed, disturbed, fallow or active agricultural lands. Overall, the proposed project area is composed of degraded habitat, which is of marginal suitability for special-status species and does not support a diverse assemblage of native plants and wildlife. However, the proposed project area is adjacent to the Harper Dry Lake Area of Critical Environmental Concern (ACEC) and otherwise surrounded by known populations of listed species (e.g., desert tortoise, Mohave ground squirrel, desert cymopterus), desert tortoise critical habitat, Desert Wildlife Management Area, and Mohave Ground Squirrel Conservation Area. Therefore, transient individuals of special-status species may be occasionally present onsite as they move between areas of suitable habitat adjacent to the proposed project and potentially within areas of suitable habitat presently re-establishing at the edges of the proposed project area.

Given the proximity of the proposed project to the aforementioned biological resources, construction and operation of the proposed project would result in various direct and indirect effects. It is staff's determination that with implementation of proposed conditions of certification, compliance with laws, ordinances, regulations, and standards pertaining to protection of biological resources would be achieved and direct, indirect, and cumulative impacts would be avoided, minimized, or mitigated to less than significant levels (refer to **Biological Resources Table 7** for a summary of the proposed project's impacts, applicable conditions of certification, and determinations of significance).

INTRODUCTION

This section provides the California Energy Commission (Energy Commission) staff's analysis of potential impacts to biological resources from the construction and operation of the Abengoa Mojave Solar Project (AMS or project) as proposed by Mojave Solar, LLC (applicant). This analysis addresses potential impacts to special-status species, wetlands and other waters of the U.S., and areas of critical biological concern. Information contained in this document 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 potential impacts to less than significant levels. Additionally, this analysis assesses compliance with applicable laws, ordinances, regulations, and standards (LORS).

This analysis is based, in part, on information provided in the AMS Application for Certification – Volumes 1, 2, and 3 (AS 2009a), responses to data requests, staff's observations during field visits on November 17 and December 17, 2009, and discussions with U.S. Fish and Wildlife Service (USFWS), California Department of Fish and Game (CDFG), and Bureau of Land Management (BLM).

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The applicant will need to abide by the LORS listed in **Biological Resources Table 1** during project construction and operation.

Biological Resources Table 1
Laws, Ordinances, Regulations, and Standards

Applicable LORS	Description
Federal	
Endangered Species Act (Title 16, United States Code, sections 1531 et seq.; Title 50, Code of Federal Regulations, part 17.1 et seq.)	Designates and provides for the protection of threatened and endangered plant and animal species and their critical habitat. The administering agency is U.S. Fish and Wildlife Service (USFWS).
Clean Water Act of 1977 (Title 33, United States Code, sections 1251–1376, and Code of Federal Regulations, part 30, Section 330.5(a)(26))	Prohibits the discharge of dredged or fill material into the waters of the United States without a permit. The administering agency is the U.S. Army Corps of Engineers (USACE).
Bald and Golden Eagle Protection Act (Title 16, United States Code, sections 668-668c)	Prohibits the take or trade of bald and golden eagles (or any part, nest or egg of such bird). September 2009 Final Rule provides for a regulatory mechanism under the Act to permit take of bald or golden eagles comparable to incidental take permits under the Endangered Species Act. The administering agency is USFWS.
Migratory Bird Treaty Act (Title 16, United States Code, sections 703–711)	Prohibits the take or possession of any migratory nongame bird (or any part of such migratory nongame bird), including nests with viable eggs. The administering agency is USFWS.
California Desert Conservation Area (CDCA) Plan	Establishes goals for protection and use of the Desert, designates distinct multiple use classes for covered areas, and establishes a framework for managing the resources within these classes. The Plan covers 25 million acres in southern California; approximately 10 million of these acres are administered by the BLM. Management goals include establishing Areas of Critical Environmental Concern (ACEC). The proposed project area is located within the CDCA adjacent to the Harper Dry Lake ACEC.
West Mojave Plan	Provides management strategies for conservation of desert tortoise, Mohave ground squirrel, and over 100 other sensitive plants and animals throughout the western Mojave Desert, while establishing a streamlined program for compliance with the regulatory requirements of the federal and California endangered species acts for projects on BLM land. The West Mojave Plan is an amendment to the CDCA Plan. The administering agency is BLM. The proposed project area is located within the West Mojave Plan area.

Applicable LORS	Description
State	
California Endangered Species Act (Fish and Game Code, sections 2050 et seq.)	Protects California's rare, threatened, and endangered species. The administering agency is CDFG.
California Code of Regulations (Title 14, sections 670.2 and 670.5)	Lists the plants and animals that are classified as rare, threatened, or endangered in California. The administering agency is CDFG.
California Code of Regulations (Title 14, sections 460)	Provides information regarding the protection and take of furbearing mammals. This regulation makes it unlawful to take fisher, marten, river otter, desert kit fox and red fox. The administering agency is CDFG.
California Code of Regulations (Title 20, sections 1702(q) and (v))	Protects "areas of critical concern" and "species of special concern" identified by local, state, or federal resource agencies within the project area. The administering agencies are USFWS and CDFG.
Fully Protected Species (Fish and Game Code, sections 3511, 4700, 5050, and 5515)	Designates certain species as fully protected and prohibits take of such species. The administering agency is CDFG.
Native Plant Protection Act (Fish and Game Code, section 1900 et seq.)	Designates rare, threatened, and endangered plants in California and prohibits the taking of listed plants. The administering agency is CDFG.
Nest or Eggs (Fish and Game Code, section 3503)	Prohibits take, possession, or needless destruction of the nest or eggs of any bird. The administering agency is CDFG.
Birds of Prey (Fish and Game Code, section 3503.5)	Specifically protects California's birds of prey in the orders Falconiformes and Strigiformes by making it unlawful to take, possess, or destroy any such birds of prey or to take, possess, or destroy the nest or eggs of any such bird. The administering agency is CDFG.
Migratory Birds (Fish and Game Code, section 3513)	Prohibits take or possession of any migratory nongame bird as designated in the Migratory Bird Treaty Act or any part of such migratory nongame bird. The administering agency is CDFG.
Public Resources Code, sections 25500 and 25527	Prohibits siting of facilities in certain areas of critical concern for biological resource, such as ecological preserves, refuges, etc. The administering agency is the Energy Commission (with comment from CDFG).
Fish and Game Code, sections 4150	Prohibits the take or possession of any nongame mammal or parts thereof except as provided in the Fish and Game Code or in accordance with regulations adopted by the commission. The administering agency is CDFG.
California Desert Native Plants Act (CDNPA) (Food and Agricultural Code, sections 80001 et seq. and California Fish and Game Code sections 1925-1926)	Protects non-listed California desert native plants from unlawful harvesting on both public and private lands in certain counties, unless a permit is secured from the Agricultural Commissioner or the sheriff in the county for which the action is to take place. Administering agency is CDFG and Department of Food and Agriculture.

Applicable LORS	Description
The Porter-Cologne Water Quality Control Act (Porter-Cologne; Public Resource Code, sections 13000 et seq.)	Regulates discharges of waste and fill material to waters of the state, including "isolated" waters and wetlands. The administering agency is Regional Water Quality Control Board.
Lake and Streambed Alteration (Fish and Game Code, sections 1600 et seq.)	Requires notification to CDFG prior to any activity that may result in substantial modification of the natural flow, or alteration of the bed, or bank, of any river, stream, or lake that supports fish or wildlife resources. The administering agency is CDFG.
Local	
San Bernardino County General Plan, Land Use/Conservation/Open Space Element (2004)	Implements programs that maintain and enhance biological diversity and healthy ecosystems throughout San Bernardino County by ensuring that proposed development projects demonstrate a high degree of compatibility with sensitive biological resources and that coordination with state and federal agencies is exercised so that protection of biological resources parallels the goals of those agencies.
Plant Protection and Management (San Bernardino County Development Code, sections 89.0101 et seq.)	Promotes the continued health of plant resources by providing regulations and guidelines that assist with management of plant resources in the unincorporated areas of San Bernardino County on property or combinations of property under private or public ownership.

SETTING

REGIONAL SETTING

The proposed project is located in the western Mojave Desert, approximately nine miles northwest of Hinkley and five miles north of State Route (SR) 58, in unincorporated San Bernardino County, California. Surrounding land uses include the existing Harper Lake Solar Electric Generating Station (SEGS) VIII and IX, located directly northwest of the proposed project area. Harper Dry Lake, managed in part by BLM, is located directly northeast of the project; the southwestern shore near the project area includes a Watchable Wildlife Area and an Area of Critical Environmental Concern (ACEC). There is an existing transmission corridor containing three transmission lines located at the southern boundary of the proposed project area. Further south and southeast of the project area is largely undisturbed land, with a few scattered residences. As shown in **Biological Resources Figure 1** at the end of this Supplemental Staff Assessment section, the majority of the lands within a 10-mile radius of the project area are designated conservation areas including Desert Wildlife Management Areas (DWMAs), ACECs, Mohave Ground Squirrel (MGS) Conservation Area, and desert tortoise critical habitat, as well as BLM land.

PROJECT AREA AND VICINITY DESCRIPTION

Proposed Project Facilities

The proposed project comprises two sites, Alpha (the northwest portion of the project area) and Beta (the southeast portion of the project area), covering approximately 884 and 800 acres, respectively. An additional 81 acres shared between the plant sites would be utilized for receiving and discharging offsite drainage improvements, for a total of 1,765 acres. All proposed project components including linear facilities would occur within the proposed AMS project boundary.

The proposed project components related to the generation and transmission of electricity are described below.

Solar Power Plant Process and Equipment

The proposed project would employ parabolic trough technology to collect solar thermal energy for a combined nominal electrical output of 250-megawatts (MW) from twin 125-MW power islands. Each Alpha and Beta site would require solar array fields, a power block, two evaporation ponds, and ancillary facilities. Engineered storm water drainage channels (described below) and access roads would traverse the project area. Existing Harper Lake Road runs north to south, bisecting the Alpha solar field and is currently paved, but would be widened during construction. The existing Lockhart Road, which provides access to the Harper Dry Lake Watchable Wildlife Area, divides the proposed Alpha and Beta sites. The project perimeter would be fenced with chain-link, metal-fabric fencing. In addition, desert tortoise exclusion fencing would be installed at the base of the perimeter (chain-link) fence and tortoise-proof gates would be installed at all points of access.

Natural Gas Pipeline

Natural gas for the AMS project's ancillary needs (e.g., auxiliary boilers, space heating) would reach the proposed project via an existing pipeline that runs to the proposed project boundary near the Alpha site under Harper Lake Road. Construction to interconnect with the existing gas pipeline would occur within the project footprint.

Transmission System Interconnection and Upgrades

The Alpha and Beta generation units would interconnect to the existing Southern California Edison (SCE) Kramer-Cool Water No. 1 230-kV transmission line, which runs east-to-west adjacent to the southern boundary of the proposed project area. Interconnection would be facilitated by a new 230-kV substation (Lockhart Substation) within the southern portion of the Beta solar field. The entire length of the proposed transmission lines required for interconnection is located within the proposed project area; 23 new steel poles would be required to interconnect the Alpha site and nine steel poles would be required to interconnect the Beta site. Various transmission system upgrades beyond the point of AMS interconnection would be required to accommodate the interconnection of AMS to the electrical grid; a description of the required upgrades and an analysis of potential environmental impacts will be presented in Supplemental Staff Assessment **Part C**.

Water Supply and Discharge

Operation of the AMS project would use groundwater from existing onsite wells. Cooling water blowdown would be piped to onsite evaporation ponds located at both the Alpha and Beta sites. Each evaporation pond would be five acres; there would be two adjacent ponds at the Alpha site and two adjacent ponds at the Beta site for a total of ten acres per site and 20 acres for the entire proposed project. The maximum depth of water in the ponds during operation would be six feet, plus a minimum of two feet of freeboard, for a maximum pond depth of eight feet. Interior sides of the ponds would be at a 33 percent slope (3:1, horizontal:vertical).

Drainage, Erosion, and Sediment Control

Currently, precipitation entering the proposed project area flows across the site toward Harper Dry Lake as sheet flow. The applicant proposes to intercept and direct any sheet flow that enters the southern and western boundaries of the proposed AMS site to a series of engineered drainage channels, which would convey offsite storm water around the project and redirect it to its natural flow location and parameters toward Harper Dry Lake. There are six drainage channels proposed for the site, the largest of the channels, Channel A, runs west to east through the project area, with a discharge outlet at the Harper Dry Lake ACEC. Preliminary design estimates this channel to be 3.6 miles long, up to 15 feet deep, with banks at a 2:1 slope, and approximately 313 to 335 feet wide through the project area (AS 2009a, Appendix K); the channel would open up to 1200 feet wide at the discharge outlet to reduce the flow velocity. The smaller secondary drainage channels border the southern and western portion of the Beta field and the northern section of the Alpha site and would capture and convey storm water to Channel A. The proposed drainage channel would be earthen bottom with gabion mattress banks.

Onsite stormwater or process water (e.g., mirror washing excess) would be contained within the project site and allowed to percolate and evaporate within the solar fields. Containments would be established around hazardous areas (e.g., oil-filled transformers and chemical storage areas). Site runoff of stormwater or process water is not anticipated during power plant operation.

Existing Vegetation and Wildlife

The applicant conducted a reconnaissance-level survey of biological resources within the proposed project area and one-mile buffer in 2006. General botanical surveys, which included generating an inventory of all plant species observed and characterizing and mapping vegetation communities, were conducted in 2007, 2008, and 2009 generally between March and July. Surveys for common wildlife species were conducted concurrently with protocol special-status wildlife and general botanical surveys; all wildlife sign and sightings were recorded. The following description of biological resources presents the results of general biological surveys of the proposed AMS site and vicinity as well as observations from staff’s site visits. Special-status species are discussed below.

As described above, the proposed AMS site, construction laydown areas, natural gas pipeline route, and transmission line right-of-way and interconnection facilities are all contained within the project boundary. The project design has changed extensively in both footprint and size since 2006. The project footprint and size were iteratively modified by the applicant to avoid continuous stands of undisturbed native vegetation, conservation areas, and high quality wildlife habitat.

Vegetation

Twelve vegetation communities occur within the proposed project area. Most of the project area has been converted from desert salt bush scrub and creosote bush scrub to agriculture and portions have been subsequently retired. **Biological Resources Table 2** (from AS 2009a, Table 5.3-7) presents the acreage of each vegetation community within the proposed project area. The vegetation communities are described following the table and illustrated in **Biological Resources Figure 2**, which can be found at the end of this Supplemental Staff Assessment section.

Biological Resources Table 2
Vegetation Communities and Acreages Occurring in AMS Project Area

Vegetation Communities	Acres
Fallow Agricultural – Ruderal	832.7
Disturbed	256.1
Disturbed - Saltbush Scrub Re-growth	226.0
Fallow Agricultural – Saltbush Scrub Re-growth	202.9
Active Agricultural	128.0
Developed	66.6
Desert Sink Scrub	39.6
Tamarisk Scrub	13.2
Unvegetated Dry Lake Bed	9.3
Disturbed – Desert Saltbush Scrub	1.1
Desert Saltbush Scrub	0.6
Total Acreage	**1,776.1**[1]

[1] The total acreage for all vegetation communities and other cover types within the Project Area is slightly different than the area calculated during the AMS land survey performed by engineers. The variation in acreage is attributed to a difference in equipment used for determining acreage of the project area (i.e., land survey versus GIS processing). Acreages in **Table 2** are the habitat acreages from which habitat compensation is based.

Fallow agricultural-ruderal vegetation covers most of the proposed project area, occurring on land formerly used for agriculture. The dominant plant species are non-native such as Russian thistle (*Salsola tragus*), Saharan mustard (*Brassica tournefortii*), and split grass (*Schismus arabicus*).

Disturbed-saltbush scrub regrowth is the second most common plant community at the site, it occurs on lands not previously used specifically for agriculture. Non-native species are abundant in this cover type.

Fallow agriculture-saltbush scrub regrowth is the third most common vegetation cover at the proposed project area. It occurs on land used previously for agriculture and is now dominated by several native atriplex shrub species. The dominant species is allscale (*Atriplex polycarpa*), an effective colonizer of abandoned agriculture lands in the Mojave Desert, and spinscale (*Atriplex spinifera*). Other shrub species found within this vegetation community are winter fat (*Krascheninnikovia lanata*), horsebrush (*Tetradymia canescens*), and spiny senna (*Senna armata*).

Disturbed habitat is characterized as having been altered by previous human activity including grading, repeated clearing, and vehicle damage. The disturbed area within the proposed project area is more than 50 percent bare ground and lacking remnant native vegetation. Vegetation that occurs in this area mostly consists of Saharan mustard.

Active agriculture covers approximately 128 acres within the project vicinity. The current crop is alfalfa (*Medicago sativa*) and is irrigated with a center-point pivot system.

Desert sink scrub is located in the northeastern portion of the project area intermixed with alkali marsh and desert saltbush scrub. Desert sink scrub is characterized as being dominated by chenopod-type plants that grow on poorly drained soils with high alkalinity. Dominant species of this vegetation community are annual bursage (*Ambrosia acanthicarpa*), bush seepweed (*Suaeda moquinii*), and five-hook bassia (*Bassia hyssopifolia*).

Tamarisk scrub occurs in several areas throughout the proposed project area, mainly near the western margin of Harper Dry Lake. This vegetation community is dominated by tamarisk (*Tamarix ramosissima*), a non-native shrub or small tree that is commonly planted for erosion control and wind breaks. Tamarisk is deep rooted and can outcompete native vegetation for water.

Dry lake bed refers to the playa at Harper Dry Lake, which is located at the northeastern portion of the proposed project area at the proposed drainage channel outlet location. This area is unvegetated but occurs between desert sink scrub and tamarisk shrub.

Disturbed desert saltbush scrub occurs along portions of the western and southern edges of the Beta site, at the edges of the abandoned agriculture fields. This vegetation community was subject to previous human activity including grading, repeated clearing, and vehicular damage, which contributed to the degradation of the naturally occurring desert saltbush scrub habitat, resulting in low shrub density and increased non-native vegetation. This cover type is dominated by allscale and spinescale with an understory of non-native herbaceous plants.

Desert saltbush scrub is located at the western edge of the AMS project. This cover type is dominated by four-wing saltbush (*Atriplex canescens*), spinescale, and allscale shrubs up to six feet in height. Other shrubs within this vegetation community include winter fat, horsebrush, and creosote.

Developed areas within the proposed project area include paved roads, dirt roads, and residential areas.

Wildlife

Active and fallow agricultural areas in the desert support a variety of common wildlife species. Additionally, the proposed project area's proximity to undisturbed native vegetation increases its wildlife habitat value. Reptiles detected by the applicant during

2007, 2008, and 2009 surveys include long-nosed leopard lizard (*Gambelia wislizenii*), zebra-tailed lizard (*Callisaurus draconoides*), side-blotched lizard (*Uta stansburiana*), and Great Basin whiptail (*Aspidoscelis tigris tigris*). Mammals recorded during the surveys include desert cottontail (*Sylvilagus audubonii*), black-tailed jack rabbit (*Lepus californicus*), Merriam's kangaroo rat (*Dipodomys merriami*), white-tailed antelope squirrel (*Ammospermophilus leucurus*), and bobcat (*Felis rufus*).

The proposed project's proximity to Harper Dry Lake marsh and its existing vegetation cover, including fallow and disturbed agriculture fields, provides resident and migratory bird species with cover, forage, nesting and roosting habitat. Some of the resident and migratory bird species observed during 2007, 2008 and 2009 surveys include, but are not limited to, great egret (*Ardea alba*), great blue heron (*Ardea herodias*), snowy egret (*Egretta thula*), white-faced ibis (*Plegadis chihi*), mallard (*Anas platyrhynchos*), red-tailed hawk (*Buteo jamaicensis*), osprey (*Pandion haliaetus*), kill deer (*Charadrius vociferous*), savannah sparrow (*Passerculus sandwichensis*), lesser nighthawk (*Chordeiles acutipennis*), horned lark (*Eremophils alpestris*), greater roadrunner (*Geococcyx californianus*), barn owl (*Tyto alba*), great horned owl (*Bubo virginianus*), American kestrel (*Falco sparverius*), and Western snowy plover (*Charadrius alexandrines nivosus*). Several common ravens (*Corvus corax*) were observed by staff throughout the project area and perched on the fence along Harper Lake Road.

Noxious Weeds

Noxious weeds are species of non-native plants included on the weed list of the California Department of Food and Agriculture (CDFA 2009), the California Invasive Plant Council (Cal-IPC 2006), or those weeds of special concern identified by BLM. Noxious weeds species that occur within the proposed project area include Russian thistle (*Salsola tragus*), herb Sophia (*Descurania sophia*), Saharan mustard, London rocket (*Sisymbrium irio*), tamarisk, slender wild-oat (*Avena barbata*), red brome (*Bromus madritensis* ssp. *rubens*), cheat grass (*Bromus tectorum*), and hare barley (*Hordeum murinum*). The most abundant invasive weeds within the project vicinity, Russian thistle and tamarisk, occur in disturbed areas at the edges of Harper Dry Lake.

Special-Status Species

Special-status species include those listed as threatened or endangered under the federal or state endangered species acts, species proposed for listing, California species of special concern, and other species that have been identified by the USFWS or CDFG or another agency as unique or rare.

Special-Status Plant Surveys

Focused botanical surveys for special-status plants and sensitive vegetation communities were conducted by the applicant within the project area and one-mile buffer in 2007, 2008, and 2009 between March and August. Staff conducted focused special-status plant surveys in April 2010.

No special-status plants were observed within the proposed project area; however three special status plants were observed within the 1-mile survey area buffer: desert cymopterus (*Cymopterus deserticola*; CNPS List 1B.2), Mojave fish-hook cactus (*Sclerocactus polyancistrus*; CNPS List 4.2), and Mojave spineflower (*Chorizanthe* *spinosa*; CNPS List 4.2), as described below. Their locations relative to the proposed project area are illustrated in **Biological Resources Figure 2**.

- One occurrence of desert cymopterus was observed in an open area of small sandy wash approximately 4,000 feet (0.75 mile) south of the project area. A CNDDB occurrence of this species was recorded immediately adjacent to the southernmost portion of the project area. Five individuals were observed in 1998, which is a reduction from 78 plants observed in 1989 (CDFG 2009). This population was not re-located during surveys.
- One occurrence of Mojave fish-hook cactus was observed southeast of the desert cymopterus within the sandy wash approximately 4,975 feet (0.95 mile) south of the project area.
- Two populations of Mojave spineflower were identified. The western population comprises approximately 22 acres within the survey area and extends west outside of the survey area. This population is associated with Mojave creosote bush scrub and desert wash scrub and occurs approximately 4,625 feet (0.88 mile) west of the project area. The eastern population of Mojave spineflower covers 3.2 acres and was observed at the edge of Harper Dry Lake, 4,500 feet (0.85 mile) east of the project area.

Special-status Wildlife Surveys

Focused or protocol surveys were conducted for desert tortoise (*Gopherus agassizii*), burrowing owl (*Athene cunicularia*), Mohave ground squirrel (MGS; *Xerospermophilus mohavensis*), and raptors according to established wildlife agency survey protocol (USFWS 1992a; USFWS 2009a; CBOC 1993; CDFG 2003; CEC 2007; Pagel et al. 2010). Focused surveys for Swainson's hawk (*Buteo swainsoni*) and golden eagle (*Aquila chrysaetos*) are in progress.

Desert Tortoise

In the Mojave Desert, desert tortoise (federal and state-threatened) is most often found in association with creosote bush, Joshua tree woodland, and saltbush scrub with adequate annual forbs for foraging. Tortoises are not likely to occur on dry lake beds. The region encompassing Harper Dry Lake and the project area historically and recently have supported moderate densities of tortoise (BLM 2005). The proposed project area, particularly the eastern portion, includes disturbed areas that are re-establishing native vegetation (i.e., saltbush scrub re-growth), which provide suitable habitat for tortoise. Native vegetation surrounding the site, including desert saltbush scrub, Mojave creosote bush scrub, and Mojave desert wash scrub, provide higher quality desert tortoise habitat.

Reconnaissance surveys for desert tortoise and areas of suitable habitat were conducted in 2006. Protocol-level surveys were conducted in 2007, 2008, and 2009 between April and May, extending into early June with permission from USFWS. Between 2006 and 2009, the project boundary was reconfigured several times; however, surveys ultimately covered the entire project site as proposed in the AFC as well as a buffer up to one mile in some areas. Following is a description of the annual survey efforts for desert tortoise (EDAW 2007; EDAW 2009a; EDAW 2009b; EDAW 2009c):

- **2006.** The 2006 project area encompassed the entire Beta site, as currently proposed, and the south and west portions of Section 29 within the Alpha site. This previous project area is approximately 515 acres less than the current proposed project area and included a 0.1 square mile area in the northwest portion of Section 29 that has been eliminated from the current proposed project area. Reconnaissance surveys conducted in 2006 covered approximately 1,250 acres within the previous project area plus a one mile buffer surrounding the site.
- **2007.** The 2007 project area was the same as described for 2006. Protocol surveys conducted in 2007 covered approximately 1,250 acres within the previous project area plus a one mile buffer surrounding the site.
- **2008.** The 2008 project area is very similar to the current proposed project area except in the 2008 project area, a 0.1 square mile section within the northwest portion of Section 29 was removed and a 0.1 square mile section within the northeast corner of Section 5 was added to the southern boundary of the Beta site.

  Protocol surveys conducted in 2008 covered the largest area, encompassing the entire current proposed project area plus an additional 3,146 acres surrounding the proposed project area.
- **2009.** The 2009 project area is the current proposed project area and protocol surveys of certain areas of suitable habitat identified by CDFG were conducted in 2009. These areas totaled approximately 660 acres and did not include Zone of Influence transects, with concurrence by USFWS.

Relatively high concentrations of live tortoise and tortoise sign were documented immediately east and west of the project area. Only one live tortoise was observed within the proposed project area; this was an incidental observation during Mohave ground squirrel surveys in 2006. Survey results are presented below in **Biological Resources Table 3.**

Biological Resources Table 3
Desert Tortoise Survey Results

Survey Year	Live Tortoise Observed	Tortoise Sign Observed
Proposed Project Area[1]		
2006 (reconnaissance, not protocol)	1 adult female	1 scat
2007	0	7 carcass; 1 burrow
2008	0	5 carcass
2009	0	5 carcass; 1 burrow; 3 scat; 3 other
Zone of Influence Transects[2]		
2007	1 adult male	1 carcass; 2 burrow; 14 scat
2008	41 (33 adults, 6 sub-adults, 2 juveniles)	86 carcasses; 220 burrows; 654 scat; 118 other

[1]Project area boundaries as proposed in AFC (AS 2009a).
[2] Surveys using Zone of Influence transects were conducted in 2007 and 2008 only.

Mohave Ground Squirrel

The Mohave ground squirrel (MGS) is state-listed as threatened and the USFWS is currently reviewing a petition to list the species as endangered under the federal Endangered Species Act (ESA). This species is limited to the western Mojave Desert; its range encompasses the proposed project area. MGS occurs in a variety of habitats including desert saltbush scrub and creosote bush scrub, which occur adjacent to the project area and which are beginning to re-colonize fallow and disturbed areas within the project site.

Protocol surveys were conducted in 2006 in support of the proposed Harper Lake Dairy Park, which covered a large portion of the current proposed project area, excluding the portion west of Harper Lake Road. No MGS were observed in visual surveys or captured in trapping efforts. The AMS project took over the area originally proposed for the Harper Lake Dairy Park and surveys were repeated in 2007 within the same project footprint, although in a different grid configuration. MGS was not observed during visual surveys, but one adult female was trapped south of the active alfalfa field, immediately adjacent to, but outside of, the proposed project area. Protocol surveys were not conducted within the proposed project area west of Harper Lake Road. Because MGS are notoriously difficult to capture, trapping surveys do not provide a definitive quantification of the number of individuals onsite.

A subsequent MGS habitat assessment (Leitner 2008a) determined that the native vegetation east (undisturbed creosote scrub) and west (undisturbed desert saltbush scrub and creosote scrub) of the proposed project area provides high quality suitable habitat for MGS. Disturbed habitat within the project area does not provide food resources to support a substantial permanent MGS population; however, transient individuals may be occasionally present as they move between areas of suitable habitat. This characterization includes the not-protocol-surveyed areas west of Harper Lake Road.

Western Burrowing Owl

Burrowing owl, a California Species of Concern, is a yearlong resident of open, dry grassland, prairie, and desert floor habitats, but is also known to occur in urban, disturbed areas and at the edges of agricultural fields. Burrowing owl protocol surveys were conducted during summer 2007 and spring 2008. All four phases of the surveys were completed, as required by the protocol. Reconnaissance surveys of the project area in 2006 identified four burrowing owls.

As with MGS, protocol surveys conducted in 2007 did not cover the entire proposed AMS project area as currently proposed; specifically the one-square mile portion west of Harper Lake Road had not been identified and was therefore excluded from site surveys. However, surveys within the one-mile buffer of the 2007 site allowed for coverage of this western portion of the proposed project area. In total for 2007, six burrows, three burrows with recent owl sign (e.g., white-wash, pellets), one roost, and one owl were observed within the proposed AMS project area; the owl was an incidental observation during desert tortoise surveys. Outside of the project area, but within the survey buffer, three owls, nine burrows, and six burrows with recent owl sign were documented.

As with desert tortoise, protocol surveys conducted in 2008 covered the largest area, encompassing the entire proposed project area. One burrowing owl and one instance of burrowing owl sign were observed within the project area. Outside of the project area, but within the survey buffer, one owl, 20 burrows with recent owl sign, and four instances of owl sign were documented. The highest concentrations of burrowing owls and sign were recorded in the undisturbed desert scrub habitat east and west of the proposed project boundaries.

Raptors

Raptor surveys, with emphasis on detection of northern harrier, prairie falcon, peregrine falcon, Swainson’s hawk, and short-eared owl were conducted during spring and winter 2007. As with MGS and burrowing owl surveys, the entire AMS project area as currently proposed had not been identified in 2007; specifically the one-square mile portion west of Harper Lake Road was excluded from site surveys. However, surveys within the one-mile buffer of the 2007 site allowed for coverage of this western portion of the proposed project area.

Species observed during focused raptor surveys include American kestrel, Swainson’s hawk, turkey vulture, northern harrier, Cooper’s hawk, Red-tailed hawk, golden eagle, merlin, prairie falcon, and great horned owl as well as common raven. Other special status-bird species observed during reconnaissance and other focused surveys are noted below. The applicant will be conducting focused Swainson’s hawk surveys between April and July 2010.

Golden Eagle

Golden eagles are a California Species of Concern, Fully Protected under Fish and Game Code section 3511, and protected under the federal Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act. Golden eagles are typically year-round residents throughout most of their western United States range (Kochert et al. 2002). Golden eagles need open terrain for hunting and prefer grasslands, deserts, savanna, and early successional stages of forest and shrub habitats. This species prefers to nest in rugged, open habitats with canyons and escarpments, with overhanging ledges and cliffs and large trees for cover.

An Environmental Assessment (EA) and Implementation Guidance for take permits were issued under the Bald and Golden Eagle Protection Act (USFWS 2009b). The EA specifies that in implementing the resource recovery permit for take of inactive golden eagle nests (50 CFR 22.26), data within a 10-mile radius of the nest provides information to evaluate potential effects. To this end, the applicant is currently conducting inventory surveys for nesting golden eagles according to USFWS protocol (Pagel et al. 2010), which recommends two surveys separated by a minimum of 30 days. Non-breeding season surveys will be conducted in late 2010. Results of the first survey conducted in late April 2010 found two golden eagle nests (one active and one inactive) approximately 10.2 miles northeast of the project site at Black Mountain (AECOM 2010a). In addition, a pair of golden eagles was observed perched on a utility pole immediately south of the project site during raptor surveys in 2007 (EDAW 2008) and two historic nests occur within 4.1 miles (active in 1977) and 8.3 miles (active in 1965) of the project site (AECOM 2010b).

Given the presence of golden eagles within 10 miles of the project area, it is expected that this species forages within the disturbed and active agricultural land within the project area. However, suitable nesting substrate (i.e., cliff ledges, rocky outcrops, or large trees), does not occur within or immediately adjacent to the proposed project area; the nearest suitable nesting habitat is approximately 4.0 miles west of the proposed project.

Biological Resources Table 4 identifies the special-status species that were reported to or potentially occur within ten miles of the proposed project area, based on surveys of the proposed project area and vicinity, and searches of the California Natural Diversity Database (CNDDB) and California Native Plant Society’s (CNPS) Inventory of Rare and Endangered Plants.

Biological Resources Table 4
Special-status Species Potentially Occurring in AMS Project Area

Species	Status*	Habitat	Likelihood of Occurrence in Project Area+
PLANTS			
Barstow woolly sunflower *(Eriophyllum mohavense)*	1B.2	Creosote bush scrub, desert saltbush scrub, playas; blooms April-May	**Moderate.** Marginal suitable habitat occurs onsite; 11 CNDDB records within five miles; not observed during surveys
Chaparral sand-verbena *(Abronia villosa* var. *aurita)*	1B.1	Chaparral, coastal scrub, and desert dunes or sandy areas; blooms January-September	**Low.** Marginal habitat occurs adjacent to project area; nearest record is five miles south of project area
Desert cymopterus *(Cymopterus deserticola)*	1B.2	Mojave desert scrub, sandy desert; blooms March- May	**Moderate.** Marginal habitat occurs onsite; observed 0.75 mile south of project area during surveys; historically robust population recorded immediately south of project area in 1998.
Mojave fish-hook cactus *(Sclerocactus polyancistrus)*	4.2	Mojave desert scrub, Joshua tree woodland, Great Basin scrub; blooms April-July	**Moderate.** Marginal habitat occurs onsite; observed 0.95 mile south of project area during surveys;
Mojave monkeyflower *(Mimulus mohavensis)*	1B.2	Mojave desert scrub and Joshua tree woodland; blooms April- June	**Low.** Not known from project area or vicinity; not observed onsite.
Mojave spineflower *(Chorizanthe spinosa)*	4.2	Mojave desert scrub, chenopod scrub, Joshua tree woodland; blooms March-July	**Moderate.** Marginal habitat occurs onsite; two populations observed 0.8 mile east and west of project area during surveys
Recurved larkspur *(Delpinium recurvatum)*	1B.2	Chenopod scrub, cismontane woodland, and valley/foothill grassland; blooms March-June	**Absent.** Suitable habitat does not occur onsite or adjacent or project area
Sagebrush loeflingia *(Loeflingia squarrosa* var. *artemisiarum)*	2.2	Desert dunes, great basin scrub, and Sonoran desert scrub; blooms April- May	**Absent.** Suitable habitat does not occur onsite or adjacent to project area
Utah glasswort *(Sarcocornia utahensis)*	2.2	Chenopod scrub, alkali playas and marshes; blooms August-September	**Moderate.** Suitable habitat occurs in northeast project area; not observed during surveys; recorded along west shore of Harper Lake, north of project area

Species	Status*	Habitat	Likelihood of Occurrence in Project Area+
REPTILES			
Desert tortoise *(Gopherus agassizii)*	FT; ST	Desert scrub and desert washes up to approximately 5,000 feet	**Present.** One live tortoise and several sign observed onsite; higher densities adjacent to project area
BIRDS			
American peregrine falcon *(Falco peregrinus)*	SE (PD), FP	Open habitats, usually adjacent to lakes, rivers, or marshes that support large populations of other bird species. Nests and roosts on protected ledges and high cliffs	**Present.** One individual observed onsite; marsh at Harper Dry Lake provides suitable foraging habitat
American white Pelican *(Pelecanus erythrorhynchos)*	CSC	Fresh water lakes with islands for breeding; inhabits river sloughs, freshwater marshes, estuaries, bays. Nests usually in brackish or freshwater lake islands	**Present.** Carcass observed in survey area; marsh at Harper Dry Lake provides stopover habitat during migration
Burrowing owl *(Athene cunicularia)*	CSC	Sparse grassland, open desert scrub, and agriculture lands; strongly associated with ground squirrel burrows	**Present.** Owls, burrows, and sign were observed onsite during surveys.
Cooper's hawk *(Accipiter cooperi)*	WL	Forages in open woodlands; nests in riparian forest dominated by deciduous species.	**Present.** Observed soaring over project area; nesting habitat does not occur onsite
Golden eagle *(Aquila chrysaetos)*	FP; CSC	Forage in grassy and open shrub habitats; nest primarily on cliffs, secondarily in large trees	**Present.** Suitable foraging habitat occurs throughout project area; pair observed perched on utility pole immediately south or project area during surveys; nesting occurs in Black Mountains 10 miles northeast of project site
LeConte's thrasher *(Toxostoma lecontei)*	CSC	Yearlong residents of desert flats, washes and alluvial fans with sandy and/or alkaline soil and scattered shrubs	**Present.** Observed onsite; suitable foraging and nesting habitat occurs throughout the project area
Loggerhead shrike *(Lanius ludovicianus)*	CSC	Prefers open habitats with scattered shrubs, trees, posts, fences, utility lines or other perches	**Present.** Observed onsite; suitable foraging and nesting habitat occurs throughout the project area
Merlin *(Falco columbarius)*	WL	Forages in open grasslands, savannahs, woodlands, near wetlands	**Present.** Observed onsite in fallow agricultural fields

Species	Status*	Habitat	Likelihood of Occurrence in Project Area+
Mountain plover *(Charadrius montanus)*	CSC	Occupies open plains or rolling hills with short grasses or very sparse vegetation; may use newly plowed or sprouting grain fields	**Moderate.** Suitable wintering habitat occurs onsite; within range of species in San Bernardino County
Northern harrier *(Circus cyanus)*	CSC	Characteristically occurs in marshlands; forages over grasslands. Nests on the ground in thick grass, shrubbery, or other vegetation	**Present.** Two individuals observed in survey area; marsh at Harper Dry Lake and portions of the project area provide suitable foraging and ground-nesting habitat.
Prairie falcon *(Falco mexicanus)*	WL	Nests in cliffs or escarpments; forages in adjacent dry, open terrain or uplands, marshes	**Present.** Pair observed soaring and individual observed hunting onsite; suitable nesting habitat does not occur within survey
Short-eared owl *(Asio flammeus)*	CSC	Freshwater marshlands, seasonal wetlands, fallow fields, meadows, and alfalfa fields; needs dense vegetation for nesting (conceal female) and daytime cover	**Present.** Observed onsite; suitable nesting habitat occurs near active agricultural (alfalfa) field
Swainson's hawk *(Buteo swainsoni)*	ST	Nests in oaks or cottonwoods in or near riparian habitat; forages in grasslands, irrigated pastures and grain fields	**Present.** Three individuals observed within project area and survey area; project area provides suitable foraging habitat.
Yellow warbler *(Dendroica petechia)*	CSC	Nests in riparian areas dominated by willows, cottonwoods, sycamores, or alders in mature chaparral; may also use oaks, conifers, and urban areas near stream courses	**Present.** One transient individual was observed onsite; no suitable nesting habitat exists in survey area; marsh at Harper Dry Lake provides stopover habitat during migration
Yuma clapper rail *(Rallus longirostris yumanensis)*	FE; SE; FP	Fresh-water and brackish marshes dominated by cattail or bulrush, mosaic of densely vegetated areas interspersed with shallow open water areas.	**Low.** Marsh at Harper Dry Lake historically provided nesting habitat for this species; calling birds reported at marsh in 1977 (BLM 2005); retirement of agriculture has subsequently reduced habitat quality in the marsh.
Western snowy plover *(Charadrius alexandrinus nivosus)*	CSC (inland population)	Inland shores of salt ponds and alkali or brackish inland lakes.	**Moderate.** Marsh at Harper Dry Lake historically provided nesting habitat for this species; 94 birds reported in CNDDB at marsh in 1978; retirement of agriculture has subsequently reduced habitat quality in the marsh.

Species	Status*	Habitat	Likelihood of Occurrence in Project Area+
Willow flycatcher *(Empidonax traillii)*	SE	Riparian habitat dominated by willows or alder and permanent water, often in the form of low gradient watercourses, ponds, lakes, wet meadows, marshes, and seeps within and adjacent to forested landscapes.	**Present.** One transient individual was observed onsite; no suitable nesting habitat exists in survey area; marsh at Harper Dry Lake provides stopover habitat during migration
MAMMALS			
Desert kit fox (*Vulpes macrotis*)	CCR	Open desert, areas of desert scrub, grasslands, and sandy dunes; sandy and loamy soils	**Present.** Two dens, and juvenile female road kill observed onsite
Mohave ground squirrel (*Xerospermophilus mohavensis*)	ST	Saltbrush, alkali desert, and creosote bush scrub at elevations from 1,800 to 5,000 feet.	**Present.** One MGS trapped within the project area; high quality habitat adjacent to project area
Mojave River vole *(Microtus californicus mohavensis)*	CSC	Weedy herbaceous growth in wet areas along the Mojave River.	**Low.** Marsh at Harper Dry Lake historically provided suitable habitat; reported in ACEC in mid-1980's; retirement of agriculture has subsequently reduced habitat quality in the marsh
American badger *(Taxidea taxus)*	CSC	Open, arid habitats, grasslands, savannas, mountain meadows, and open areas of desert scrub.	**High.** One den observed during reconnaissance surveys.

***Status Legend** (Federal/State/California Native Plant Society (CNPS) lists, CNPS list is for plants only):
FE = Federally listed Endangered; **FT** = Federally listed Threatened; **FC** = Candidate Species for Listing; **SE** = State-listed Endangered; **ST** = State-listed Threatened; **CSC** = California Species of Concern; **FP** = Fully Protected; **SR** = State Rare; **WL** = State Watch List; **PD** = proposed for Delisting; **CCR** = protected under CDFG Code Title 14, CCR §460; **List 1B** = Rare or Endangered in California and elsewhere; **List 2** = Rare, threatened, or endangered in California but more common elsewhere; **List 4** = Limited distribution – a watch list; .1 = Seriously threatened in California (high degree/immediacy of threat); **.2** = Fairly threatened in California (moderate degree/immediacy of threat) (Sources: CDFG 2009; CNPS 2009; AS 2009a).

+Definitions Regarding Potential Occurrence:

Present:	Species or sign of its presence observed onsite
High:	Species or sign not observed on the site, but reasonably certain to occur onsite
Moderate:	Species or sign not observed on the site, but conditions suitable for occurrence
Low:	Species or sign not observed on the site, conditions marginal for occurrence
Absent:	Species or sign not observed on the site, conditions unsuitable for occurrence

Sensitive Habitat

Harper Dry Lake

The Harper Valley Basin is enclosed by the Tehachapi Mountains to the west and the San Gabriel and San Bernardino Mountains to the south. All surrounding areas within the Harper Valley Basin drain into Harper Dry Lake (CEC 1988), which is one of the largest dry lake beds in the Mojave Desert. The Harper Dry Lake marsh is restricted to a narrow band along the southwestern shore of Harper Dry Lake in the Harper Valley Basin. Historically, the Harper Dry Lake marsh comprised three wetland areas: northern, central, and southern. Currently, the central and southern wetlands are the most prolific; the northern wetland is non-functional.

Wetlands, particularly the Harper Dry Lake marsh, are a uniquely important resource in the Mojave Desert for resident wildlife and thousands of migratory birds (Cardiff 1998; BLM 2007). Some bird species known to utilize the wetlands and surrounding habitat at Harper Dry Lake marsh include, but are not limited to, white-faced ibis (*Plegadis chihi*), tricolor blackbird (*Agelaius tricolor*), killdeer (*Charadrius vociferus*), black-necked stilt (*Himantopus mexicanus*), American avocet (*Recurvirostra americana*), black-crowned night herons (Nycticorax nycticorax), western snowy plover (Charadrius alexandrinus nivosus), marsh wren (*Cistothorus palustris*), cinnamon teal (*Anas cyanoptera*), mallard (*Anas platyrhynchos*), and many neotropical migratory birds and raptors. Golden eagles (*Aquila chrysaetos*) have also been known to utilize the marsh (BLM 2007). In addition to a diverse assemblage of birds, the Harper Lake ACEC provides water, shelter, and foraging habitat for a variety of terrestrial species including coyote, desert kit fox, snakes, and mice.

Several conservation organizations and resource agencies have formally recognized the resource value of the wetlands at Harper Dry Lake, including BLM and the National Audubon Society. In 1982, BLM designated 480 acres, including 20 acres of wetlands, as an ACEC (BLM 1982). In 2003, BLM constructed public viewing facilities within the ACEC to create a Watchable Wildlife Area, which is intended to encourage public interest in the ACEC. BLM also designated Harper Dry Lake as a Key Raptor Area, one of seven such areas in the Mojave Desert. The National Audubon Society designated the Harper Dry Lake marsh as an Important Bird Area because it was one of the most productive wetlands in the Mojave Desert (NAS 2008). In addition, preservation and enhancement of the Harper Dry Lake marsh has been identified as important to the long-term conservation of western snowy plover nesting habitat (BLM 1999a).

The groundwater table in the Harper Dry Lake area has been subjected to decades of water extraction for agricultural irrigation purposes causing the groundwater level below Harper Dry Lake to decline significantly. United States Geological Survey (USGS) records show that groundwater levels adjacent to Harper Dry Lake marsh were 16 feet below ground surface (bgs) in 1919 (USGS 2010). This is a strong indicator that the marsh was originally sustained by groundwater. Significant water usage from farming practices which utilized a flooding irrigation system were not established until 1930 (AS 2009a), when Lockhart and Evans ranches were constructed. USGS records indicate that groundwater levels west of Harper Dry Lake fell drastically from 1919 to 1986 (16 feet bgs in 1919, 95 feet bgs in 1953, 157 feet bgs in 1979, and 183 feet in 1986 (USGS 2010). Consequently, persistence of the Harper Dry Lake wetlands became reliant on surface runoff from agricultural irrigation as a water source. Agricultural runoff reaching the marsh peaked during the late 1970s early 1980s, supplying approximately 800 to 1,000 acre-feet per year. The Lockhart Ranch, which irrigated more than 3,080 acres, was taken out of production in 1983 and 1984. In 1989 and 1990, construction of SEGS VIII and IX retired approximately 800 acres of active agriculture, further reducing available irrigation runoff the marsh (CEC 1988-89). The estimated runoff during the late 1980s early 1990s to the central and southern marshes declined to 400 to 800 acre-feet per year (Luz 1988). In 1997, agriculture operations surrounding the marsh ceased almost entirely, cutting off this water supply to the marsh. Consequently, the northern, central, and southern wetlands were completely dry between 1998 and 2001 (AS 2009a).

The combined effects of groundwater drawdown and cessation of agricultural runoff have seriously degraded the habitat value within the Harper Dry Lake marsh and eliminated the local artesian wells and springs. Because of these adverse effects, groundwater does not exist at a depth that would allow water to collect at the surface through capillary action, which would let the wetland be self-sustaining.

Currently, BLM artificially maintains the central and southern wetlands of the Harper Dry Lake ACEC by pumping groundwater to the wetlands via underground pipes and a surface drainage channel. With the exception of extraordinary precipitation events, the BLM groundwater transfers are likely the only reason the wetlands persist today. However, this does not diminish their biological value for plants and wildlife. BLM's management plan for the Harper Dry Lake ACEC recognized the future threats of salination, lowered groundwater table, and reduction in agricultural production and established management objectives to "provide adequate protection to a sensitive and unique wetland habitat which has no independent water supply" (BLM 1982). In 2007, BLM completed NEPA review of their Harper Dry Lake ACEC Wetlands Restoration Project, which includes native tree planting, removal of invasive species, an upgraded and improved water delivery system, and water quality monitoring (BLM 2007). However, grant funding has not yet been available to complete the work.

The well currently used to pump groundwater to the marsh is located within the proposed Beta solar field. Consequently, this well would be decommissioned approximately six months after the initiation of project construction. As stated by the applicant during the January 15, 2009 Data Response Workshop, an existing well on BLM property would be retrofitted and deepened to serve the marsh.

Jurisdictional Wetlands and Waters

Ephemeral drainages within the Coyote-Cuddeback Lakes Watershed tributary to Harper Dry Lake flow from the adjacent Black Mountains, Rand Mountains, and other perimeter highlands towards the center of the basin at Harper Dry Lake. The majority of the proposed project area has been graded for agricultural uses and is relatively flat with a gentle downward slope (one percent grade) southwest-to-northeast toward Harper Dry Lake. Grading for agricultural operations eliminated any ephemeral washes within the proposed project area. Several relictual ephemeral washes leading to the site are intercepted at the SEGS VIII and IX drainage or abate into dirt roads or the perimeters of agricultural fields. During infrequent large precipitation events, water may reach Harper Dry Lake as sheet flow; however, much of the surface water infiltrates into the sandy alluvium.

Approximately 11.03 acres of potentially USACE-jurisdictional waters of the U.S occur within the project area along the west shore of Harper Dry Lake. The wetlands comprise a 1.59 acre monoculture of tamarisk scrub and meet the three parameters required for designation as potential waters of the U.S (i.e., wetland hydrology, hydric soils, and hydrophytic vegetation). The tamarisk stand is dying from lack of water. Other potentially jurisdictional waters include 9.44 acres of dry lakebed (alkali playa).

But for the Energy Commission's exclusive siting jurisdiction, waters of the State under the jurisdiction of CDFG and the RWQCB comprise 1.47 acres of lacustrine riparian extent (tamarisk scrub). This acreage of tamarisk scrub does not include 1.59 acres of the aforementioned potentially USACE-jurisdictional wetlands, although potential waters of the U.S. are also potential waters of the state. The acreages of potentially jurisdictional waters of the U.S and state within the proposed project area are presented below in **Biological Resources Table 5**.

Biological Resources Table 5
Potential Jurisdictional Waters of the U.S. and/or State within the AMS Project Area

Type of Jurisdictional Waters	Type of Habitat (Holland 1986)	Type of Habitat (Cowardin et al. 1979)	Regulatory Authority	Area of Resource (Acres)
Wetland	Tamarisk Scrub (63810)	Palustrine; Scrub/Shrub, Needle-Leaved, Evergreen, Seasonally Flooded/Saturated, Mixosaline, Alkaline	USACE, CDFG	1.59
Other Waters	Playa Lakebed (46000)	Lacustrine, Littoral, Unconsolidated Bottom, Sand, Intermittently Flooded/Temporary, Hypersaline, Alkaline	USACE, CDFG	9.44
Total USACE Waters =				**11.03**
Lacustrine Riparian Extent	Tamarisk Scrub (63810)	Palustrine; Scrub/Shrub, Needle-Leaved, Evergreen, Seasonally Flooded/Saturated, Mixosaline, Alkaline	CDFG, RWQCB	1.47
Total CDFG Waters =				**12.50**[1]

Source: AECOM 2009

[1]This total includes the 11.03 acres of potentially jurisdictional waters of the U.S. which are also potentially jurisdictional waters of the State.

Desert Tortoise Critical Habitat

Critical habitat is a formal designation under the federal Endangered Species Act for specific, legally defined areas that are essential for the conservation of desert tortoise, that support physical and biological features essential for desert tortoise survival, and that may require special management considerations or protection. Desert tortoise critical habitat extends north, west, and south of the proposed project area. The proposed project area does not overlap with any designated or proposed critical habitat units; however, the Western Mojave Recovery Unit of desert tortoise critical habitat is located 0.7 mile southwest of the Beta site.

Superior-Cronese and Fremont-Kramer Desert Wildlife Management Areas (DWMAs)

DWMAs are designated by BLM under the CDCA plan and are managed with the goal of protecting desert tortoise (BLM 1999a). Nearest to the proposed project area are the

Superior-Cronese and Fremont-Kramer DWMAs. The Superior-Cronese DWMA is located north, east and south of the proposed project boundary and Fremont-Kramer is within five miles of the eastern boundary of the proposed project area. The Superior-Cronese DWMA serves as a link between the east and west Mojave Desert tortoise populations, and it is likely that this is the only DWMA that will support the Recovery Plan target of 10 tortoises per square mile (USFWS 1994). The proposed project area does not overlap with any DWMAs.

Mohave Ground Squirrel Conservation Area

The West Mojave Plan designated the 1,726,712-acre MGS Conservation Area and outlined goals to reestablish the MGS population within this area. Goals for the MGS Conservation Area include ensuring the long term protection of MGS habitat and ensure the long-term viability of the species by controlling off-road vehicle use, grazing and commercial activities. As illustrated in **Biological Resources Figure 1**, the MGS Conservation Area surrounds the AMS project and vicinity, which is within a 30 square-mile area that was excluded from this designation.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

The threshold for determining significance is based on the biological resources present or potentially present within the proposed project area in consideration of the proposed project description. A proposed project would have a significant impact to biological resources, if it would:

- Have an adverse impact, either directly through take, or indirectly through habitat modification or interruption of migration corridors, on any state- or federally-listed species;
- Have an indirect or direct adverse effect on any sensitive natural community identified in federal, state or local plans, policies, or regulations;
- Interfere with the movement of any native wildlife species (resident or migratory) or with established native wildlife (resident or migratory) corridors; or
- Conflict with applicable federal, state, or local laws, ordinances, regulations, and standards protecting biological resources, as listed in **Biological Resources Table 1**.

DIRECT AND INDIRECT IMPACTS AND MITIGATION

The California Environmental Quality Act (CEQA) Guidelines define "direct" impacts as those impacts that result from the project and occur at the same time and place. Indirect impacts are caused by the project, but can occur later in time or farther removed in distance and are still reasonably foreseeable and related to the operation of the project. Significance of impacts is generally determined by compliance with applicable LORS; however, guidelines adopted by resource agencies may also be used.

This section analyzes the potential for direct and indirect impacts of construction and operation of the proposed project to biological resources and provides mitigation, as necessary, in an effort to reduce the severity of potentially adverse impacts. Staff recommends that a Designated Biologist and biological monitor(s) be assigned to ensure avoidance and minimization of the impacts described below and protection of the sensitive biological resources described above. Selection of the Designated Biologist and biological monitor(s) is described in staff's proposed Conditions of Certification **BIO-1** (Designated Biologist Selection) and **BIO-3** (Biological Monitor Qualifications); their duties and authority are described in staff's proposed Conditions of Certification **BIO-2** (Designated Biologist Duties) and **BIO-4** (Designated Biologist and Biological Monitor Authority), respectively. The Designated Biologist and/or biological monitor(s) would be responsible, in part, for developing and implementing the Worker Environmental Awareness Program (WEAP) (see Condition of Certification **BIO-5**), which is a mechanism for training the construction workers on protection of the biological resources described in this document.

Construction-Related Impacts and Mitigation

Construction Impacts to General Vegetation

Construction impacts to vegetation would occur through the direct removal of native plants during construction. These impacts are not usually considered significant unless the habitat type is regionally unique or is known to support special-status species. **Biological Resources Table 2** identifies the acreages of vegetation communities that would be subject to direct and permanent impacts within the project footprint. These plant communities are disturbed native plant communities as well as active and fallow agriculture, with marginal habitat value for special-status species. However, undisturbed creosote bush scrub and Mojave Desert wash scrub surround the project area. Condition of Certification **BIO-7** (Impact Avoidance and Minimization Measures) requires the boundaries of all permanent disturbance areas to be delineated and all work, vehicles, and equipment to be confined to these areas, thereby preventing disturbance of native vegetation outside of the proposed project area.

Construction of the proposed project would not result in substantial loss of native vegetation or a regionally unique habitat type; with implementation of staff's proposed Conditions of Certification **BIO-7**, impacts to general vegetation would be less than significant.

Construction Impacts to General Wildlife

Direct loss of small mammals, reptiles, and other less mobile species could occur during construction of the proposed project. This would result primarily from the use of construction vehicles and grading equipment at the AMS site. Small burrowing animals (e.g., lizards, snakes, and small mammals) could be harmed through crushing of burrows, loss of refugia from predators, and direct mortality from construction activities. Construction activities and human presence could also alter or disrupt breeding and foraging behavior of common wildlife species.

Wildlife could become entrapped in open trenches during construction, especially if trenches remain open during inactive construction periods. In addition, common wildlife could experience increased predation levels from ravens and other predators attracted to the project area by perching opportunities and other subsidies introduced by the project. Common wildlife could also be disturbed by increased levels of noise and lighting. Implementation of staff's proposed conditions of certification for special-status species, as described in the following subsections, would effectively avoid and minimize potential impacts to common wildlife. Impacts would be less than significant.

Construction Impacts to Special-status Plants

No special-status plants were observed within the proposed project area during focused botanical surveys conducted by the applicant in 2007, 2008, and 2009 or focused surveys conducted by staff in April 2010. The potential for special-status plants to occur within the proposed project area is low given the disturbed nature of existing habitats. However, three CNPS-listed plants were detected within 4000 to 4975 feet of the project area during surveys: desert cymopterus (*Cymopterus deserticola*; CNPS List 1B.2), Mojave fish-hook cactus (*Sclerocactus polyancistrus*; CNPS List 4.2), and Mojave spineflower (*Chorizanthe spinosa*; CNPS List 4.2).

Special-status plants adjacent to the proposed AMS project area may be crushed or otherwise damaged by construction equipment and vehicle or foot traffic. The potential for these direct impacts to occur is increased if construction equipment or personnel inadvertently work outside of the project boundary. Clear delineation of work areas and prohibition of work outside these areas, as proposed by the applicant (AS 2009a; pg. 5.3-41) and incorporated into staff's proposed Condition of Certification **BIO-7**, would avoid direct impacts to special-status plants.

Rare plant populations adjacent to the AMS project area could also be indirectly affected by construction due to increases in wind-blown dust. Disturbance of the soil surface caused by construction traffic, grading, and other construction activities would result in increased wind erosion of the soil. Aeolian (wind-borne) transport of dust and sand can result in the degradation of soil and vegetation over a wide area (Okin et al. 2001). Impacts to vegetation may include killing plants by burial and abrasion, interrupting natural processes of nutrient accumulation, and allowing the loss of soil resources. Dust abatement, as described in Conditions of Certification **AQ-SC3** and **AQ-SC4** is recommended to minimize these impacts.

Direct and indirect impacts to special-status plants adjacent to the proposed AMS site would be avoided or minimized by implementation of staff's proposed Conditions of Certification **BIO-7**, **AQ-SC3,** and **AQ-SC4**.

Construction Impacts to Special-status Wildlife

The loss of portions of the 1,765-acre project site would result in habitat loss for several special-status species. This habitat loss would displace home ranges and potentially reduce carrying capacity for Northern harrier, short-eared owl, loggerhead shrike, LeConte's thrasher, California horned lark, Swainson's hawk, golden eagle, burrowing owl, Mohave ground squirrel, and desert tortoise, all of which may utilize disturbed agricultural lands for foraging and/or nesting, particularly when they adjoin higher-quality habitats. The loss of access to habitat within the proposed project area and the resultant fragmentation would lead to potentially reduced reproductive success, increased adverse edge effects on adjoining lands, and an overall reduction in the area's capacity to support these species. Species-specific impacts and proposed avoidance, minimization, and mitigation measures are discussed in the following sub-sections. Elevated noise and lighting from construction activities may also affect special-status species; these potential impacts are discussed below under **GENERAL CONSTRUCTION IMPACTS**.

Migratory/Special-status Birds

The majority of the proposed project area is devoid of trees due to current and past agricultural operations. Scattered tamarisk trees, which provide suitable nesting substrate for a variety of birds, occur along the western edge of Harper Lake and along some roadsides adjacent to agricultural fields. Suitable nesting habitat is also available within the desert saltbush scrub and Mojave creosote bush scrub within the project area. Northern harrier, short-eared owl, loggerhead shrike, LeConte's thrasher, and California horned lark are special-status species likely to breed and forage at the proposed project area. Focused surveys for nesting Swainson's hawk will be conducted between April and July 2010; at the time of publication, results were unavailable. However, 95% of the California population exists in the Central Valley (CDFG 2005) and there are no known breeding pairs east of Palm Springs (Anderson 2009). Therefore, it is unlikely that nesting Swainson's hawks occur in the vicinity of the AMS project area. Western burrowing owl and golden eagle, which were observed at the proposed AMS site, are discussed below. Additionally, some common bird species adapted to disturbed and transitional environments could nest in equipment or other available substrate within and surrounding the proposed project area.

The loss of active bird nests or young is regulated by the federal Migratory Bird Treaty Act and Fish and Game Code section 3503. Construction activities during the nesting season (February through September) could adversely affect breeding birds through direct take or indirectly through disruption or harassment, which may ultimately result in nest failure or abandonment.

The applicant proposes to conduct pre-construction breeding bird surveys (AS 2009a, pg. 5.3-49). Staff incorporated this applicant-proposed measure into Condition of Certification **BIO-8** (Pre-construction Nest Surveys and Impact Avoidance Measures for Migratory Birds), which provides additional detail on survey timing and measures to avoid disturbance to active nests and ensure compliance with the Migratory Bird Treaty Act. With implementation of staff's proposed Condition of Certification **BIO-8**, significant impacts to nesting birds would not result from proposed project construction activities. Potential impacts to nesting western burrowing owls and golden eagles are discussed below.

In addition to the aforementioned special-status bird species, Swainson's hawk, American peregrine falcon, Cooper's hawk, Merlin, and prairie falcon are special-status birds that are known to forage within the proposed AMS site. Project construction would result in the loss of approximately 1,704 acres of suitable foraging habitat, including fallow and active agricultural areas and scrub habitat. Although Swainson's hawk are adapting to the conversion of natural habitat throughout the Central Valley by foraging within agricultural lands, Swainson's hawk, especially in the desert, do not rely solely on agricultural lands for foraging. In desert habitat, Swainson's hawks will eat animals not associated with agriculture, such as reptiles and other small birds.

Siting large-scale solar projects on disturbed agricultural land is preferable to siting them on undisturbed land, both of which provide foraging habitat for Swainson's hawk and other raptors, because development of undisturbed land in the Mojave Desert results in greater biological impacts to more species (e.g., desert tortoise and MGS). However, conservation of Swainson's hawk foraging habitat in the desert is necessary given the rapid pace of development in the Mojave; to this end, CDFG is developing a region-wide plan (Weiss 2009). However, approved guidance is not in place. In light of the tradeoffs to developing undisturbed land and given the availability of natural lands nearly surrounding the project area, loss of Swainson's hawk foraging habitat in the form of active and fallow agricultural land within the project area is considered adverse, but less than significant, and no mitigation is proposed.

Golden Eagle

As described above, a pair of golden eagles was observed perched on a utility pole immediately south of the project site during raptor surveys in 2007 (EDAW 2008) and two golden eagle nests (one active and one inactive) were observed approximately 10 miles northeast of the project site at Black Mountain during the first of two protocol surveys conducted in spring 2010 (AECOM 2010a).

Golden eagles are extremely susceptible to disturbance during the breeding season (Anderson et al. 1990; USFWS 2009b), and adverse effects are possible from various human activities up to (and in some cases exceeding) one mile from a nest site (Whitfield et al. 2008). It is expected that the active eagle territories at Black Mountain are too far from the project area to be disturbed by construction activities. Also, given the lack of suitable nesting substrate proximate to the project area (i.e., cliff ledges, rocky outcrops, or large trees), it is unlikely that yet unidentified golden eagles would be nesting close enough to the proposed project area to be disturbed by construction or operation activities. However, golden eagle nesting survey results are necessary to substantiate this. If an active territory is observed closer to the project site than Black Mountain during future surveys, development and implementation of a Golden Eagle Territory-Specific Management Plan would be required to avoid and minimize disturbance to eagles, as described in Condition of Certification **BIO-9** (Golden Eagle Territory-Specific Management Plan). Implementation of this condition, which was developed in coordination with USFWS (Pagel 2010), would reduce impacts to nesting golden eagles to less-than-significant levels under CEQA and would likely avoid take (i.e., disturbance) of the species under the federal Bald and Golden Eagle Act. Also, the proposed project would be in compliance with CDFG's provision for no take of this Fully Protected species under Section 3511 of California Fish and Game Code.

In addition, the project would result in loss of foraging habitat for golden eagles. A compilation in Kochert et al. (2002) of breeding season home ranges from several western United States studies showed an average home range of 7.7 to 12.7 square miles that ranged from 0.7 to 32.2 square miles; however, home ranges in desert habitat may exceed these estimates. Significant impacts to golden eagle would occur if the indirect effects of a reduced prey base caused by development of the AMS result in loss of productivity or abandonment of nesting territories. It is not anticipated that the loss of approximately 1,704 acres of suitable foraging habitat would result in these indirect effects, given the large foraging range of this species and the amount of available suitable foraging habitat in the protected lands surrounding the project area (**Biological Resources Figure 1**). As with Swainson's hawk and other raptors, siting large-scale solar projects on disturbed agricultural land is preferable to siting them on undisturbed land, both of which provide foraging habitat for golden eagles, because development of undisturbed land in the Mojave Desert results in greater biological impacts to more species (e.g., desert tortoise and MGS). Loss of golden eagle foraging habitat from construction of the proposed project is considered adverse but likely less than significant and at this time no additional mitigation is proposed.

Desert Tortoise

Protocol surveys conducted in 2007, 2008, and 2009 did not identify a resident population of desert tortoise within the project area. However, in 2006 a single live tortoise was observed in the project area. Higher concentrations of desert tortoise and sign were recorded immediately east and west of the project area. Although the majority of the 1,765-acre proposed project area is disturbed and lacks suitable forage and burrow sites for this species, transient individuals could occur within the portions of the site that support disturbed fallow saltbush scrub and desert wash scrub. Desert tortoise likely access this habitat from the Mojave creosote bush scrub and desert saltbush scrub to the east, south, and west of the AMS site. A burrow was observed in 2009 adjacent to the southeastern boundary of the project area and several other sign were recorded along the eastern edge of the project area, suggesting that tortoise may be attempting to move into the disturbed areas of the project site that are re-establishing saltbush scrub vegetation.

Direct mortality, injury, or harassment of desert tortoise could result from encounters with construction vehicles or heavy equipment. Tortoises could be crushed or entombed in their burrows during site grading or other ground disturbing activities. Increased human activity in tortoise-occupied areas and excessive noise or vibration from the heavy equipment would disrupt the breeding and foraging behavior of desert tortoises. Desert tortoise would be attracted to any pooled water in the construction area that resulted from application of water to control dust, placing them at higher risk of injury or mortality from construction activities or predators (e.g., ravens, coyotes) that are also attracted to the water and human-provided scavenging opportunities. Also, tortoise may take shelter under parked vehicles and be killed, injured, or harassed when the vehicles are moved. These potential impacts to desert tortoise would be considered significant without mitigation. Impacts to tortoise from increased traffic during construction are discussed below under **CONSTRUCTION TRAFFIC**.

To avoid and minimize these direct and indirect impacts, the applicant proposes to control standing water, reduce speed limits to prevent road kills, conduct worker environmental awareness training programs, and implement other general measures. Staff has incorporated these applicant-proposed measures into Condition of Certification **BIO-7**. In addition, installation of tortoise-proof exclusion fencing and gates to keep desert tortoise out of construction areas followed by comprehensive clearance surveys and translocation of any individuals in the project area would ensure that there are no tortoise in the project area prior to construction activities. Based on survey results and habitat quality within the proposed project area, it is anticipated by staff, USFWS, and CDFG that few, if any, tortoises would require translocation. These efforts to exclude tortoise from the project area would avoid direct construction related impacts; refer to staff's proposed Condition of Certification **BIO-11** (Desert Tortoise Exclusion Fencing, Clearance Surveys, and Translocation Plan) for additional detail about clearance survey, exclusion, and translocation procedures. A draft Desert Tortoise Plan was submitted by the applicant in April 2010 and agency comments were provided by CDFG and USFWS in May 2010. An approved plan must be in place prior to the start of project construction (refer to Condition of Certification **BIO-11**) and based on review of the draft Plan, it is anticipated by staff, CDFG, and USFWS that this is achievable. Implementation of the measures and monitoring/management strategies in the final Desert Tortoise Exclusion Fencing, Clearance Surveys, and Translocation Plan will avoid and minimize potential impacts to desert tortoise.

In addition, the proposed project would result in the loss of approximately 430 acres of marginal desert tortoise habitat (refer to **Biological Resources Table 6**) and would exclude tortoise by fencing approximately 1,765 acres within an area surrounded by land designated as critical habitat or DWMA. Construction of a desert tortoise exclusion fence at the perimeter of the plant site could adversely affect desert tortoise by further constricting connectivity between established populations on the east and west sides of the proposed project and precluding future establishment within the proposed project area. An existing barrier to connectivity is the desert tortoise exclusion fencing along 95% of Harper Lake Road between Highway 58 and Lockhart Road (Nicholson 2009). It is uncertain whether there is currently any contact between these populations; however, the potential for gene flow between them exists through randomly interspersed gaps in the fence. Interpopulation connectivity is essential to maintaining genetic diversity within the species; this was identified as an integral factor to desert tortoise recovery (USFWS 2008). The Harper Lake area has not been identified as a regional linkage (CalWild 2000) and although fencing the project area and Harper Lake Road could potentially constrict local connectivity, this is not likely essential to the continued persistence of the populations within the Superior-Cronese DWMA on the east side of Harper Lake Road and the Western Mojave Recovery Unit on the west side of Harper Lake Road. Although impacts to population connectivity would be adverse but less than significant, loss of 430 acres of desert tortoise habitat would be significant without mitigation. Preservation and enhancement of land within the range of this species, particularly high quality habitat within existing critical habitat, would fully mitigate impacts from loss of marginal desert tortoise habitat within the proposed project area. Refer to **HABITAT COMPENSATION** below for additional information and acreage amounts.

In summary, potential direct and indirect impacts to desert tortoise within and adjacent to the proposed AMS site would occur during construction activities through mortality, injury, disruption, harassment, and habitat loss. These potential impacts to desert tortoise would be considered significant without mitigation. Ensuring to the maximum extent possible that no tortoise are within the construction area by translocating any individuals found onsite and excluding tortoise from hazardous construction areas (**BIO-11**) as well as implementing general impact avoidance and minimization measures (**BIO-7**) would minimize impacts. Mitigation for loss of 430 acres of habitat would be achieved through preservation and enhancement of compensatory habitat as described below under **HABITAT COMPENSATION** and in staff's proposed Condition of

Certification **BIO-15** (Compensatory Mitigation). Implementation of these conditions of certification would fully mitigate direct and indirect impacts to the federally and state-threatened desert tortoise.

Mohave Ground Squirrel

As described above, the majority of the project area lacks suitable habitat to support a substantial resident MGS population; however, the native vegetation east (undisturbed creosote scrub) and west (undisturbed desert saltbush scrub and creosote scrub) of the proposed project area provides high quality suitable habitat for MGS and therefore transient MGS may occur onsite. An adult female was trapped immediately south of the proposed project area at the edge of the active alfalfa field.

MGS moving through the project area or across access roads between patches of adjacent suitable habitat may be struck by construction vehicles of equipment. There is the potential that resident MGS may establish within the project area in patches of suitable habitat in advance of construction activities; these individuals may be crushed or entombed in their burrow by site grading or other ground disturbing activities. Resident MGS proximate to the proposed project boundary may be disturbed or harassed by ground vibration and noise as well as human presence during construction; this could adversely affect breeding and/or foraging behavior. In addition, the impermeable fence may lead to increased predation on MGS because the fence could impede escape routes. Assuming construction activities are confined to the fenced perimeter of the site, destruction of MGS burrows surrounding the project area would not occur.

Exclusion or relocation of MGS is difficult because this species is difficult to trap and can easily burrow under or climb over exclusion fencing. Also, MGS are difficult to visually detect because they spend the majority of their time underground in burrows. Nonetheless, direct impacts to MGS within the project area would be avoided and minimized to the extent possible by attempting to trap and relocate any individuals within the exclusion fence surrounding the project area. Visual surveys subsequent to installation of exclusion fence and immediately prior to ground disturbing activities would be conducted to identify MGS. Traps would be set for these individuals and if captured, they would be safely relocated to suitable habitat adjacent to the proposed AMS site. These proposed relocation measures are detailed in staff's proposed Condition of Certification **BIO-12** (Mohave Ground Squirrel Clearance Survey). In addition, the general impact avoidance and minimization measures described in Condition of Certification **BIO-7** would require monitoring during vegetation removal and grading activities and removal of any MGS attractants (e.g., human food, trash) from the project area, thereby further reducing the potential for adverse impacts to MGS.

In addition, the proposed project would result in the loss of approximately 430 acres of marginal MGS habitat (refer to **Biological Resources Table 6**) and would fence approximately 1,765 acres within an area surrounded by land designated by BLM as Mohave Ground Squirrel Conservation Area. Within this conservation area, four core MGS populations and four other major populations have been identified (Leitner 2008b). The proposed project is located between the Edwards Air Force Base core population and Coolgardie Mesa-Superior Valley core population, which are separated by approximately 25 to 30 miles. Ensuring sufficient connectivity to allow gene flow between core populations is an important conservation goal. However, there is not a wildlife movement corridor across the Harper Valley area between the Edwards Air Force Base and Coolgardie Mesa-Superior Valley core populations (Leitner 2008b). Therefore, development of the proposed project is not expected to constrain regional MGS population connectivity. Although impacts to population connectivity would be adverse but less than significant, loss of MGS habitat is considered significant without mitigation. Preservation and enhancement of land within MGS range, particularly high quality habitat within or adjacent to the MGS Conservation Area, would fully mitigate impacts from loss of marginal MGS habitat within the proposed project area. Refer to **HABITAT COMPENSATION** below for additional information and acreage amounts.

In summary, potential direct and indirect impacts to MGS within and adjacent to the proposed AMS site would occur during construction activities through mortality, injury, disruption, harassment, and habitat loss. These potential impacts to MGS would be considered significant without mitigation. Attempting to relocate any individuals onsite (**BIO-12**) and implementing the general impact avoidance and minimization measures (**BIO-7**) would minimize impacts. Mitigation for the loss of 430 acres of habitat would be achieved through preservation and enhancement of compensatory habitat as described below under **HABITAT COMPENSATION** and in staff's proposed Condition of Certification **BIO-15**. Implementation of these conditions of certification would fully mitigate direct and indirect impacts to state-threatened MGS.

Western Burrowing Owl

Burrowing owls, a California species concern, nest and forage within the proposed project area and could be directly and indirectly impacted by construction of the AMS project. Potential impacts to this species include displacement of individuals or pairs, increased predation risk, direct mortality from encounters with construction equipment, burrow/nest destruction during site clearing/grading, entombing burrowing owl adults, eggs, or young, and disruption or harassment. Disruption or harassment may result in nest abandonment or otherwise reduced reproductive success. In addition, project construction would result in the loss of approximately 1,704 acres of suitable foraging habitat, including fallow and active agricultural areas and scrub habitat. These potential impacts to burrowing owls would be considered significant without mitigation.

To identify burrowing owls within the proposed project impact area, the applicant has proposed conducting preconstruction surveys on the AMS site, using methods recommended by CDFG (CBOC 1993; CDFG 1995). To avoid direct take of owls, the applicant has also proposed passive relocation of individuals from the construction area to adjacent areas of contiguous suitable habitat. Passive relocation involves excluding the owls by use of one-way doors, at which point they may take residency in nearby artificial or natural burrows or disperse to another area (CDFG 1995). Passive relocation of owls is only implemented during the non-breeding season in order to avoid egg and dependent chick separation from adult owls, which would likely result in death of those eggs and young. In order to monitor relocation success and at the request of USFWS, burrowing owls within the AMS project area would be trapped and color-banded prior to implementation of passive relocation efforts. The applicant proposes to monitor the relocation area for a minimum of five years after initiation of passive relocation. Staff agrees that post-relocation monitoring is necessary and has incorporated a two-year monitoring and reporting measure as well as preconstruction survey and other passive relocation requirements into Condition of Certification **BIO-13** (Burrowing Owl Impact Avoidance, Minimization, and Mitigation Measures). A draft Burrowing Owl Monitoring and Mitigation Plan was submitted by the applicant in April 2010 and is currently under review by staff, CDFG, and USFWS. An approved plan must be in place prior to the start of project construction (refer to Condition of Certification **BIO-13**) and based on preliminary review of the draft Plan, it is anticipated by staff, CDFG, and USFWS that this is achievable. Implementation of the measures and monitoring/management strategies in the final Burrowing Owl Monitoring and Mitigation Plan will minimize and mitigate potential impacts to burrowing owl.

Although passive relocation would be conducted to avoid direct mortality of owls within the proposed project area, previously occupied burrow(s) would be destroyed and foraging habitat would be degraded; therefore habitat compensation is required to reduce these impacts to less than significant levels. The location and amount of compensatory habitat required to fully mitigate the project's impacts to burrowing owl are based on California Burrowing Owl Consortium guidelines (CBOC 1993). These guidelines recommend: 1) occupied habitat should be replaced with occupied habitat at 1.5 acres per displaced pair or single bird, or 2) occupied habitat should be replaced with unoccupied habitat at 3 times 6.5 acres per displaced pair or single bird. Due to variation in the number of burrowing owls observed during annual surveys of the proposed project area and vicinity (4 in 2006, 3 in 2007, 1 in 2008, 1 in 2009), CDFG has determined that the appropriate census to use to calculate habitat compensation for this species shall be determined based on 2010 pre-construction surveys. In addition, suitable compensatory habitat is assumed to be unoccupied unless otherwise demonstrated by the applicant. These mitigation requirements are described in staff's proposed Condition of Certification **BIO-13**. Refer to **HABITAT COMPENSATION** below for additional information.

In summary, direct and indirect impacts to burrowing owl resulting from construction of the proposed project would be mitigated to less than significant levels through pre-construction surveys and passive relocation of owls within the project footprint as well as acquisition of compensatory habitat and monitoring the relocated owls. These measures were adapted, in part, from the applicant-proposed Western Burrowing Owl Management and Monitoring Plan (AECOM 2010d), in consultation with CDFG and USFWS; refer to Conditions of Certification **BIO-13** and **BIO-15** for details.

American Badger and Desert Kit Fox

One American badger den and two desert kit fox dens were observed within the proposed project area; these species are considered present on the proposed project area. Construction activities, including site grading and heavy equipment operation, could kill or injure American badgers and desert kit foxes from contact with construction equipment or entombment in their den. Construction activities could also result in disturbance or harassment of individuals. Impacts to American badger and desert kit fox would be avoided or minimized by excluding these animals from the project area prior to construction activities. To this end, staff proposes Condition of Certification **BIO-14** (American Badger and Desert Kit Fox Impact Avoidance and Minimization Measures), which requires that a qualified biologist perform a preconstruction survey for badger and kit fox dens in the project area and a 250-foot buffer concurrent with desert tortoise surveys. Outside of the whelping season (i.e., not February 1 to September 30), individuals would be excluded from dens and the dens would be collapsed once confirmed vacant. This passive relocation technique encourages excluded animals to take residency in nearby habitat or disperse to another area. Implementation of this condition would avoid and minimize impacts to American badger and desert kit fox potentially resulting from project construction activities.

Construction Traffic

Roads and highways are ubiquitous landscape features that have a variety of direct (e.g., road mortality) and indirect effects (e.g., habitat fragmentation, proliferation of non-native and predatory species) on surrounding wildlife populations, including desert tortoise (Boarman and Sazaki 2006; Boarman 2002; Jennings 1997; USFWS 2008). The proposed project would not require construction of a new road; however, access by construction personnel and equipment would increase existing traffic levels along Harper Lake Road between State Route 58 and the proposed AMS site. During the peak project construction phase, it is estimated that approximately 490 additional trips per day would be required to transport 1,162 workers (AS 2009a, pg. 5.13-16).

The majority of Harper Lake Road has desert tortoise exclusion fencing; however, some areas along the roadway are unfenced at the request of private property owners or at intersections with utility crossings and roads (Nicholson 2009). Tortoise and other wildlife can access Harper Lake Road at these gaps in the exclusion fence and be forced to travel along the road, unable to cross the fence at the other side. These animals are especially vulnerable to vehicle collisions. Increased mortality of desert tortoise and other special-status wildlife due to collisions with project vehicles is a significant impact.

Further, roads and highways are the primary barrier to habitat connectivity and species movement in the west Mojave Desert (CalWild 2000; USFWS 2008); local connectivity constraints within the conservation areas (i.e., DWMA, desert tortoise critical habitat, MGS conservation area) would be exacerbated by increased traffic levels associated with project construction.

Environmental awareness training for workers traveling to and from the project area as well as adherence to posted speed limits may reduce traffic mortality to wildlife along Harper Lake Road and project access roads. These impact avoidance and minimization measures are described in staff’s proposed Conditions of Certification **BIO-5** and **BIO-7**, respectively. In addition, monitoring Harper Lake Road during construction and moving any desert tortoises or other vulnerable wildlife found within the roadway or shoulder would further reduce the potential for vehicle/wildlife collisions and may even prevent mortality of wildlife along Harper Lake Road and project access roads. Road monitoring requirements are presented in staff’s proposed Condition of Certification **BIO-7**, which include moving any tortoises trapped within the fenced roadways, escorting equipment or vehicles moving though unfenced areas, and checking beneath vehicles for tortoises or other wildlife before driving. Road kill reporting, per Condition of Certification **BIO-7**, would serve as an indicator of the effectiveness of these measures. Implementation of the impact avoidance and minimization measures in staff's proposed Conditions of Certification **BIO-5** and **BIO-7** would reduce impacts to special-status wildlife from construction traffic to less than significant levels.

Habitat Compensation

The objective of compensatory mitigation is to offset, to the extent practicable, adverse impacts (i.e., take, displacement effects, and habitat loss) of the proposed project by providing compensatory mitigation lands with some biologically relevant nexus to the impact. The mitigation lands should maintain the number and the range of the impacted species by creating new functional habitat, enhancing or restoring existing functional habitat, and/or initiating management actions in habitats to increase function (carrying capacity) and reduce/control adverse conditions (exotics, nest predators).

The California Code of Regulations, Section 783.4 stipulates that an incidental take of a state-listed species can be issued only when an applicant has minimized and fully mitigated the impacts of the proposed taking, including all impacts on the species that result from any act that would cause the proposed taking. Section 783.4 also states that measures must be capable of successful implementation.

Compensatory Mitigation Acreage and Location

Staff recommends that a minimum of 118.2 acres of high quality suitable habitat be managed and protected in perpetuity by conservation easement in order to fully mitigate the permanent direct, indirect, and cumulative impacts to desert tortoise and MGS resulting from development of the AMS project area. Mitigation for permanent direct, indirect, and cumulative impacts to western burrowing owl would also be achieved within the compensatory habitat required for desert tortoise and MGS if it is also suitable for occupation by burrowing owl.

The recommended acreage of compensation land reflects consideration of several factors. The habitat quality of the project area, proximity to the compensation area to natural lands (e.g., DWMA, desert tortoise critical habitat, MGS conservation area), and the habitat quality of the compensatory mitigation lands affects the number of individuals those lands can support. Given this, the objective is to determine the acreage within the applicant-proposed compensation area that will offset the reduced carrying capacity from developing the AMS site.

To this end, CDFG proposed the following methodology for calculating compensatory acreages of each affected suitable habitat type within the proposed project area:

Biological Resources Table 6
Recommended Compensatory Habitat Acreages for Impacts to Desert Tortoise and MGS

Suitable Habitat Type	Acreage in AMS Site	Mitigation Ratio	Compensation Acreage
Undisturbed Desert Saltbush Scrub	0.6	5:1	3
Disturbed – Desert Saltbush Scrub	1.1	2:1	2.2
Disturbed - Saltbush Scrub Regrowth	226	0.5:1	113
Fallow Agricultural – Saltbush Scrub Regrowth	202.9	0:1	0
TOTAL	**430.6 acres**	**----**	**118.2 acres**

Source: Moore 2009

Staff and USFWS concur with these ratios. The 5:1 mitigation ratio for impacts to undisturbed desert saltbush scrub is based on the proposed project's adjacency to a DWMA and desert tortoise critical habitat, as well as proximity to high concentrations of desert tortoise, known locations of MGS, and the potential for this habitat type to support several other special-status species, including rare plants and raptors. This is CDFG's standard for projects in the Hinkley area (Moore 2010) and was implemented for SEGS VII and IX (CEC 1988; CEC 1989).

The details of the project's compensatory mitigation requirements are found in staff's proposed Condition of Certification **BIO-15** (Compensatory Mitigation), which was developed in close coordination with CDFG and USFWS. Impacts to the federally and state-threatened desert tortoise and the state-threatened Mohave ground squirrel from habitat loss would be significant without mitigation; however, acquisition and enhancement of 118.2 acres of high quality suitable habitat would reduce permanent impacts to less than significant levels. Effectively, habitat compensation would also mitigate impacts to the other affected special-status mammals (i.e., American badger and desert kit fox) as well as raptor foraging habitat because of similar habitat requirements.

To satisfy compensatory mitigation requirements, the applicant proposes to permanently protect under conservation easement a portion of 647 acres of applicant-owned land located approximately 1.25 miles west of the proposed project area (AS 2009e). Vegetation communities within the applicant-owned land include desert saltbush scrub and desert wash scrub. Approximately 414 acres along the eastern portion of this land is encumbered under a Flood Runoff Easement, which leaves 233 acres available for compensatory mitigation; 118.2 acres would be required for compensatory mitigation as described above. As illustrated in **Biological Resources Figure 1**, the proposed compensation lands are entirely located within designated desert tortoise critical habitat and MGS Conservation Area. Desert tortoise sign, including live desert tortoise and tortoise burrows, were observed on and adjacent to the mitigation site (AECOM 2010c). In addition, CNDDB records for MGS occur within the proposed mitigation site (CNDDB 2010). The mitigation site also could potentially support western burrowing owls given the presence of animal burrows favorable to occupation by burrowing owls; friable soils, washes, and drainages into which fossorial animals can excavate burrows suitable for subsequent occupation by owls; and rocky outcrops on the north end of the site from which burrowing owls could hunt. However, it has not been determined whether the site is occupied by burrowing owls. Staff, CDFG, and USFWS concur that the applicant-proposed compensation land is of higher quality than the habitat that would be developed within the AMS project area and includes conditions favorable to support MGS, desert tortoise, and western burrowing owl.

In-lieu Fee Provision

The applicant may choose to satisfy its mitigation obligations by paying an in-lieu fee instead of acquiring compensation lands, pursuant to California Senate Bill (SB) 34 (enacting CESA § 2069 and 2099) or other applicable in-lieu fee provision, as described in Condition of Certification **BIO-15**). However, it is staff, USFWS, and CDFG's preference to satisfy compensatory mitigation requirements with the applicant proposed compensation adjacent to the proposed project area rather than with opportunities afforded by SB 34. This will ensure that the mitigation is as close as possible in time and location to the impacts of the proposed project.

Construction Impacts to Jurisdictional Waters

Approximately 1.59 acres of tamarisk scrub along the edge of Harper Dry Lake have been identified as potentially USACE jurisdictional waters of the U.S because they meet the three parameters required for designation as potential waters of the U.S (i.e., wetland hydrology, hydric soils, and hydrophytic vegetation). Other potentially jurisdictional waters include 9.44 acres of dry lakebed (alkali playa). Impacts to approximately 10.76 acres (1.32 acres of tamarisk + 9.44 acres of lakebed) of potential waters of the U.S would be avoided by establishing a construction exclusion zone within which no equipment or personnel would enter and no work would be conducted. Approximately 0.27 acres would be directly impacted (i.e., removed) during construction.

The USACE has determined that all aquatic features occurring within the proposed project area are isolated and therefore not under their jurisdiction. A permit is not required for the AMS Project under Section 404 of the Clean Water Act (Estes 2010).

Construction of the proposed project, specifically the drainage channel outlet at Harper Dry Lake, would result in direct impacts (i.e., removal) to 1.47 acres of tamarisk scrub. The applicant classified tamarisk scrub as lacustrine riparian extent given its proximity to Harper Dry Lake. However, CDFG and RWQCB do not typically exert jurisdiction over monotypic stands of tamarisk scrub because it is an invasive species with little habitat value. Direct impacts to tamarisk would not require mitigation. Rather, removal of tamarisk would be considered an environmental benefit because tamarisk is an invasive species that out-competes native vegetation and alters the desert ecosystem functions and values by converting habitats into monocultures, which reduces the diversity required to support native plants and wildlife populations. To ensure effective eradication of this invasive species, monitoring and reporting over a five year period would be required consistent with CDFG 1600 authorization practices (refer to Condition of Certification **BIO-16** [Tamarisk Eradication Monitoring and Reporting Program]). Impacts to waters of the state would be less than significant and no mitigation is proposed.

General Construction Impacts

Construction activities, including noise and lighting impacts, have the potential to create a variety of temporary impacts to biological resources. In addition, construction activities could spread noxious weeds in areas adjacent to the proposed AMS site. These general construction impacts are discussed below.

Noise

Construction activities would primarily occur between 7:00 AM and 6:00 PM and would result in a short-term, temporary increase in the ambient noise level. Although sporadic, existing noise sources from traffic on Harper Lake Road and Lockhart Road and overhead military aircraft from neighboring Edwards Air Force Base, create elevated ambient noise levels to which most local wildlife species have acclimated. Excessive construction noise could disrupt the nesting, roosting, or foraging activities of sensitive wildlife. The Harper Dry Lake marsh, immediately southeast of the proposed project, is an especially sensitive noise receptor due to the presence of breeding birds. Studies have shown that noise levels over 60 A-weighted decibels (dBA) can result in nest abandonment and intense, long-lasting noise can mask bird calls which can reduce reproductive success (Dooling and Popper 2007; Hunsaker 2001). In addition, 60 dBA has been used by the USFWS and the Energy Commission as a reference point for evaluating noise impacts on wildlife (CEC 2002; CEC 2003).

During construction, the noise levels from the project area to the nearest biologically sensitive receptor, Harper Dry Lake marsh, would range from 54 dBA to 60 dBA (ESH 2009c, Table 5). However, the applicant's construction noise level analysis utilizes averaged emission levels, and actual "noise levels at a particular location may be higher or may be lower than the tabled values on any given day and at any given time" (ESH 2009c, Table 5). Therefore, grading work on the proposed drainage channel outlet at the northeast corner of the site, which is the area of construction closest to the sensitive marsh habitat, could yield higher noise levels than the projected level of 59 dBA (ESH 2009c, Table 5) and may exceed the 60 dBA significance threshold for noise impacts to wildlife.

Pre-construction clearance surveys followed by surrounding the entire site with appropriate exclusion fencing prior to construction activities would ensure that no nesting birds or other sensitive wildlife are present onsite during construction. To minimize noise impacts to breeding birds at the marsh staff recommends Condition of Certification **BIO-8**, which requires a qualified biologist to monitor any areas expected to exceed 60 dBA during construction for nesting birds. With implementation of this condition, impacts to nesting birds from proposed project construction activities would be less than significant. For a complete analysis of construction noise impacts, refer to the **NOISE** section of this Staff Assessment.

Lighting

The majority of construction activities would occur between 7:00 AM and 6:00 PM; however, construction activities outside of these hours may be required to maintain schedule. For construction activities at night, lighting would mostly occur in the Solar Collection Assembly buildings located in the northeast corner of the Alpha site; however, some outside lighting may also be necessary. Bright lighting at night could disturb the nesting, foraging, or mating activities of wildlife and make wildlife more visible to predators. Night lighting could be especially disruptive to nocturnal animals, including desert kit fox and owls, which were observed onsite. Also, night lighting could be disorienting to migratory birds and, if placed on tall structures, may increase the likelihood of collision, as discussed under **AVIAN COLLISION AND ELECTROCUTION**.

Nocturnal mammals would be excluded from the project area prior to construction as described in staff's proposed Condition of Certification **BIO-14**. To minimize light visible outside of the project area, Condition of Certification **BIO-7** requires the use of light shields, light direction, and low intensity lighting and requires that side-cast light not be directed at the edges of the project boundary or the Harper Dry Lake marsh, thereby avoiding sensitive wildlife habitat. Lighting impacts during construction would be temporary and with implementation of staff's proposed Conditions of Certification **BIO-7** and **BIO-14**, impacts to wildlife from proposed project construction lighting activities would be less than significant. For a complete analysis of construction lighting impacts, refer to the **VISUAL** section of this Staff Assessment, including Condition of Certification **VIS-3**.

Spread of Noxious Weeds

The spread of noxious weeds is a major threat to biological resources in the Mojave Desert, particularly where disturbance has occurred and is ongoing. Non-native weeds frequently outcompete native plants resulting in several synergistic indirect effects: increased fire frequency by providing sufficient fuel to carry fires, especially in the inter-shrub spaces that are mostly devoid of native vegetation (Brown and Minnich 1986; Brooks and Esque 2002) as well as decreased quality and quantity of plant foods available to desert tortoises and other herbivores and thereby affecting their nutritional intake (Hazard et al. 2002; Nagy et al.1998). The entire proposed AMS site would be permanently disturbed and graded to eliminate existing vegetation and level the site. Construction activities and soil disturbance would aid the transport and dispersal of invasive weed propagules, thereby potentially introducing new species of noxious weeds to lands adjacent to the AMS plant site and exacerbating invasions already present in the project vicinity. There are several species of noxious weeds within the proposed project area and within its immediate vicinity including Saharan mustard and split grass, two of several species that are rapidly spreading and invading the Mohave Desert (LaBerteaux 2006). Staff's proposed Condition of Certification **BIO-7** requires construction vehicles to be inspected and washed offsite within an approved area or commercial facility prior to use, monitoring and eradication of any weed invasions, and quick revegetation of temporarily disturbed areas. Implementation of this Condition would reduce potential permanent, indirect impacts from the spread of noxious weeds to less than significant levels.

Operation Impacts and Mitigation

Potential operation-related impacts include: impacts to birds due to collision with and/or electrocution by the transmission line and exhaust stacks; disturbance to wildlife due to increased noise and lighting or glare; impacts to sensitive habitats from alterations in quality or quantity of water currently reaching Harper Dry Lake; and indirect impacts to wildlife from road mortality, exposure to evaporation ponds and other pitfalls, and raven predation.

Avian Collision and Electrocution

Proposed project components that may present an electrocution and/or collision hazard to wildlife include two 72.5-foot-tall steam generator buildings, two 44-foot-tall cooling tower stacks, and 31 80 to 100-foot-tall transmission line support structures. Existing infrastructure proximate to the AMS site that currently presents an electrocution and/or collision hazard includes the existing SCE Kramer-Cool Water No. 1 230-kV transmission line (100-foot-tall lattice towers), LADWP Mead-Adelanto 500-kV transmission line (150-foot-tall lattice towers) and low-voltage transmission line, which run parallel and adjacent to the southern boundary of the proposed project area. The tallest existing facilities at SEGS VIII and IX adjacent to the AMS site are the cooling tower stacks, which are approximately 50 feet tall.

Collision

Bird collisions with power lines and structures generally occur when a power line or other structure transects a daily flight path used by a concentration of birds and these birds are traveling at reduced altitudes and encounter tall structures in their path (Brown 1993). Collisions typically result when the structures are invisible (e.g., bare power lines or guy wires at night), deceptive (e.g., glazing and reflective glare), or confusing (e.g., light refraction or reflection from mist) (Jaroslow 1979). Collision rates generally increase in low light conditions, during inclement weather (e.g., fog, which is rare in the desert), during strong winds, and during panic flushes when birds are startled by a disturbance or are fleeing from 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 1996). Marsh habitat at Harper Dry Lake adjacent to the project attracts resident and migratory birds and has been known to support thousands of birds during the spring months (Cardiff 1998; BLM 2009).

It is possible that bird collisions with the AMS buildings, cooling tower stacks, transmission poles and other facilities would occur. Structures over 500 feet tall present a greater risk to migratory songbirds than shorter structures (Kerlinger 2000); bird mortality is significantly lower at towers shorter than 350 feet (Karlsson 1977; Longcore et al 2008). The tallest proposed AMS facilities are the transmission poles, which would be an average of 80 feet tall and a maximum of 100 feet tall. The solar trough mirrors would be approximately 21 feet tall.

Bird response to glare from the proposed solar trough technology is not well understood. Although the proposed AMS facilities are significantly shorter than 350 feet (the height above which is considered a collision danger for migrating birds), there is concern that the mirrors may appear to a bird as a no-hazard flight area. The mirrors reflect light and take on the color of the image being reflected (Ho et al. 2009). For example, when the mirrors reflect the sky, they can have a blue lake-like appearance, and the reflection tends to be similar to the reflection off a body of water. The reflection may also appear as clouds or terrain. Birds may fly directly into the mirrors not expecting to encounter a hard surface thereby suffering an injury or death. Staff, CDFG, and USFWS have determined that the potential for bird injury and mortality is heightened due to the proposed project's proximity to and east-facing orientation toward the Harper Dry Lake marsh, a concentration area for migratory birds.

Given the lack of research-based data on these impacts, staff cannot conclude that they are significant. However, due to potential for significant impacts, staff recommends monitoring so that if impacts do occur, they can be addressed (refer to Condition of Certification **BIO-17** [Monitoring Impacts of Solar Collection Technology on Birds]). Glare impacts with regard to potential ocular injury from beam intensity is discussed below.

Electrocution

Egrets, herons, raptors, and other large aerial perching birds, including those accorded state and/or federal protection, are susceptible to transmission line electrocution if they simultaneously contact 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/pole with insufficient clearance between these energized elements. The majority of bird electrocutions are caused by lines that are energized at voltage levels between 1-kV and 60-kV, and "the likelihood of electrocutions occurring at voltages greater than 60-kV is low" because phase-to-phase and phase-to-ground clearances for lines greater than 60-kV are typically sufficient to prevent bird electrocution (APLIC 2006). The proposed AMS transmission lines would be 230-kV; therefore, phase-to-phase and phase-to-ground clearances are expected to be sufficient to minimize bird electrocutions.

Potential impacts to wildlife resulting from electrocution by transmission lines required for AMS project interconnection may be mitigated by incorporating the construction design recommendations provided in *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006* (APLIC 2006). Specifically, the phase conductors shall be separated by a minimum of 60 inches and bird perch diverters and/or specifically designed avian protection materials should be used to cover electrical equipment where adequate separation is not feasible (APLIC 2006). This is further described in staff's proposed Condition of Certification **BIO-7** (Impact Avoidance and Minimization Measures); implementation of Condition of Certification **BIO-7** would prevent bird mortality from electrocution.

Operation Lighting – Glare

The proposed solar mirrors and heat collection elements (HCEs) or receiver tubes are sources of bright light caused from the diffuse reflection of the sun. The first row of solar mirrors and receiver tubes would be approximately 200 meters (650 feet) west and southwest of the marsh. The solar mirrors would face east at dawn toward the Harper Dry Lake marsh and would be reflective at the marsh until approximately noon, at which time the mirrors would track the sun into a horizontal position. Glare intensity from the solar mirrors at distances beyond 100 feet would not be any different than the sun's intensity (URS 2008). The illuminated receiver tubes would be visible to an observer who is not looking directly at the mirrors axis or center, however this illumination would be much less than that of the sun (ESH 2009d). The light reflecting from the solar mirrors and the receiver tubes would not pose a significant impact to wildlife at the marsh given the distance of the marsh from the first row of solar mirrors and the absorptive properties of the receiver tubes. However, glint and glare studies of solar trough technology found that pedestrians standing within 20 meters (60 feet) of the perimeter fence when the mirrors rotate from the stowed position to a vertical position may see a light intensity equal or greater to levels considered safe for the human retina (CESF 2008; URS 2008). Staff concludes that any wildlife on the ground at a distance of 20 meters or closer could experience similar hazards from unsafe light intensity. Implementation of staff's proposed Condition of Certification **VIS-4**, which requires slatted fencing 10 feet in height be used as the perimeter fencing along the southern and eastern project boundaries, would prevent glare exposure to wildlife on the ground, thereby reducing potential impacts to less than significant levels.

Operation Noise

In consideration of existing ambient noise levels and the proposed project's operational noise, cumulative operational noise levels would not increase above existing ambient conditions, which is approximately 42 to 52 dBA (AS 2009a, Table 5.8-6). The majority of operational noise would originate from the power blocks, which would be roughly centered at each Alpha and Beta site and surrounded by solar fields; this creates a buffer for noise to attenuate before reaching the AMS property boundary and the Harper Dry Lake marsh. Other minor operational noise sources include mirror rotation and maintenance activities (e.g., mirror washing). Operational noise from the existing SEGS XIII and IV, which is anticipated to be nearly identical to the proposed project, was observed by staff during several site visits and determined to be diminutive. Staff concludes there would be no significant impacts to biological resources by increased operational noise and no mitigation is proposed. For a complete analysis of operational noise impacts, refer to the **NOISE** section of this Staff Assessment.

Operation Impacts to Desert Tortoise

Stormwater Drainage Channels

The proposed stormwater drainage channels present a serious entrapment hazard to desert tortoise and other wildlife. As described above, the main drainage Channel A would be at approximately 15 feet deep and 300 feet wide through the project area, opening to 1200 feet wide at the outlet. Any wildlife unable to fly that fell into this drainage channel would likely be injured from the fall and would be unable to escape, resulting in increased vulnerability to predation and mortality. Further, wildlife could become entangled in the gabion mattress and energy dissipation materials as well as any debris within the drainage channels. To avoid injury and mortality to wildlife, staff recommends that exclusion fencing be reinforced around the drainage channels, particularly at the headwalls, outlet, and road crossings, and monitored for breaches or disrepair (refer to Condition of Certification **BIO-11**). Implementation of staff's proposed Condition of Certification **BIO-11** would avoid and minimize impacts to desert tortoise and other wildlife by excluding them from the stormwater drainage channels within the project area.

Raven Predation

The common raven is the most highly visible predator of juvenile desert tortoises (USFWS 2008). Predation pressure by ravens is increased through elevated raven populations as a result of resource subsidies associated with human activities. Ravens are attracted to food in the form of organic garbage in trash containers, water from dust abatement and evaporation ponds, and nesting substrates on transmission line towers and other infrastructure (Boarman et al. 2006). Transmission lines and support structures as well as other infrastructure provide perching and nesting opportunities. Loss of juvenile tortoise due to raven predation could have a long-term effect on the regional tortoise population by reducing the recruitment of juvenile tortoises into the adult life stages (Boarman 2003).

Eliminating or decreasing raven subsidies would discourage their residence and proliferation at the project area, thereby reducing the risk of predation on juvenile tortoises. To this end, staff's proposed Condition of Certification **BIO-7** requires trash control and disposal offsite; **BIO-7** also requires minimal water application and monitoring to ensure water does not puddle; **BIO-18** (Common Raven Monitoring, Management, and Control) requires installation of physical deterrents to raven nesting and perching (e.g., bird spikes) on proposed AMS facilities as well as nest removal and monitoring to ensure the effectiveness of these project design features. Evaporation ponds are discussed below. These and potentially other measures to avoid and minimize raven predation as well as raven monitoring and reporting strategies will be included in a project-specific Common Raven Monitoring, Management, and Control Plan. A draft Plan was submitted by the applicant in December 2009 and comments were provided by staff, CDFG, and USFWS to the applicant in March 2010. An approved plan must be in place prior to the start of project construction (refer to Condition of Certification **BIO-18**) and based on review of the Plan, it is anticipated by staff, CDFG, and USFWS that this is achievable. Implementation of the project-specific measures and monitoring/management strategies in the final Common Raven Monitoring, Management, and Control Plan will avoid and minimize direct and localized impacts ravens predation attributable to subsidies provided by the AMS project.

Long-term effects of reduced recruitment on the regional tortoise population may not be apparent for years because tortoises do not typically reach sexual maturity until approximately 15 to 20 years of age. In response, USFWS is proactively developing a comprehensive, regional raven management plan that will implement recommendations in the USFWS *Environmental Assessment to Implement a Desert Tortoise Recovery Plan Task: Reduce Common Raven Predation on the Desert Tortoise* (Raven EA; USFWS 2008b). The Raven EA identifies several activities to reduce raven predation on desert tortoise, including reduction of human-provided subsidies (e.g., food, water, sheltering and nesting sites), education and outreach, common raven nest removal, common raven removal, and evaluation of effectiveness and adaptive management. An account has been established with the National Fish and Wildlife Foundation (NFWF) under a Memorandum of Agreement between the Renewable Energy Action Team Agencies (i.e., Energy Commission, BLM, CDFG, and USFWS) to manage the funds that will be used to implement the regional raven management plan (NFWF and REAT Agencies 2010).

To mitigate the proposed project's contribution to cumulative and indirect impacts on desert tortoise from raven predation, staff proposes that the applicant submit payment to the REAT account, as described in Condition of Certification **BIO-18**. The applicant's payment would support the regional raven management plan activities focused within the desert tortoise West Mojave Recovery Unit, which would be adversely affected by increases in raven subsidies attributable to the proposed AMS project.

In summary, implementation of the project-specific raven management requirements presented in **BIO-7** and **BIO-18** as well as payment toward the regional raven management plan would reduce impacts to desert tortoise from raven predation to less-than-significant levels.

Operation Traffic

Operation of the AMS project would generate a maximum of 250 trips per day (AS 2009a, pg. 5.13-23); thereby resulting in an increase in traffic along Harper Lake Road. Direct impacts to wildlife, including desert tortoise, are the same for operational traffic as described for construction traffic, above. Similarly, implementation of staff's proposed Condition of Certification **BIO-5**, which requires environmental awareness training for workers and staff's proposed Condition of Certification **BIO-7**, which requires adherence to posted speed limits, periodic monitoring for desert tortoise within the roadway, and checking beneath parked vehicles for tortoises or other wildlife before driving, would avoid and minimize potential impacts from operation traffic. Road kill reporting, per Condition of Certification **BIO-7**, would serve as an indicator of the effectiveness of these measures. Implementation of the impact avoidance and minimization measures in staff's proposed Conditions of Certification **BIO-5** and **BIO-7** would reduce impacts to special-status wildlife from operation traffic to less than significant levels.

Evaporation Ponds

The proposed project includes four, five-acre evaporation ponds that would collect blowdown water from the cooling towers. It is estimated that operational capacity depth would be approximately six feet with at least two feet of freeboard; side slopes would be 3:1 (horizontal: vertical) or steeper (AS 2009d).

A variety of waterfowl and shorebirds seasonally inhabit or utilize evaporation ponds as resting, foraging, and nesting areas. Evaporation ponds in the Mojave Desert pose several threats to wildlife: increased exposure to predators, salt toxicosis, and bioaccumulation of selenium and other hazardous water quality constituents. Wildlife predation on prey having accumulations of selenium and other constituents provides a trophic pathway for exposure of these wildlife species to hazardous water quality constituents in the evaporation pond. Impacts to wildlife from evaporation ponds are considered significant if they: increase mortality, reduce growth or conditions, result in reproductive impairment, cause post-hatch juvenile mortality, or cause or contribute to substantial short- or long-term reductions in species abundance (EPTC 1999).

Although effects of selenium uptake are species specific, exposure of waterfowl and shorebirds to selenium has been shown to contribute to sub-lethal effects that include, but are not limited to, changes in enzyme activity, histological abnormalities, impaired growth, and increased susceptibility to disease (EPTC 1999). In turn, these effects are likely to adversely affect species growth, survival, and reproductive success. Selenium concentrations in water over 0.005 mg/L (or 5 µg/L) in combination with invertebrates with concentrations greater than 5 parts per million (dry weight) are considered hazardous to the health and long-term survival of wildlife populations (Lemly 1996).

Water quality samples taken from wells proximate to the proposed project indicated that selenium levels in the groundwater are between 0.005 mg/L (5 µg/L) and 0.013 (13 µg/L), which is already at or in exceedance of the impact threshold; cooling water processes would concentrate selenium. However, the proposed AMS project includes a precipitation unit that captures minerals (e.g., selenium) and metals (e.g., chromium) in cooling water prior to discharging it into the evaporation ponds. This is expected to remove the majority of selenium and chromium from the wastewater stream. Conservatively assuming that no selenium is removed in the clarifier and filter processes (as the applicant has done in its Report of Waste Discharge), 0.25 mg/L (250 µg/L) would be discharged into the AMS evaporation ponds (AS 2009b), which is approximately 50 times the aforementioned impact threshold.

Salt accumulation on bird tail feathers adversely affects the bird's ability to fly and avoid predators and also increases the weight of a bird, which increases energy expenditure for movement. Elevated salinity levels in evaporation ponds may contribute to reduced hatching success, increased juvenile mortality, and cause salt toxicosis. Salt toxicosis occurs when the bird can no longer excrete salt at levels equal to ingestion, but can be reversed if the birds ingest fresh water. Salt toxicosis in waterfowl has been reported in ponds with sodium concentration over 17,000 mg/L (USFWS 1992b; Windingstad et al. 1987). Birds spending a minimum of three hours at evaporation ponds with 52,000 to 66,000 mg/L of sodium were considered to have toxic brain sodium concentrations (USFWS 1992b). It is estimated that sodium concentrations in the AMS evaporation ponds would range from 27,996 mg/L to 35,870 mg/L (AMS 2009a, pg. 5.3-36).

In August 2007, 19 ducks died of salt toxicosis and encrustation at SEGS VIII evaporation ponds. Abnormally low water levels in the evaporation ponds caused total dissolved solids (TDS), including salt, to concentrate to lethal levels. At that time, it is likely that sodium concentrations were approximately 80,000 mg/L to 102,000 mg/L. A second mortality incident occurred in October 2007, but the cause was not determined. Both the proposed AMS and the existing SEGS VIII and IX use groundwater within the Harper Lake groundwater sub-basin for cooling. Minor differences in water quality are expected between the projects due to the use of different groundwater wells and the associated variability in groundwater quality within the basin; TDS are expected to be lower at AMS. Nonetheless, wildlife issues at SEGS VIII and IX are a good proxy for potential impacts from the AMS evaporation ponds.

Because water quality can vary markedly in the evaporation ponds depending on depth, concentration of solids, and/or contamination, evaporation ponds are hazardous to wildlife. Further, USFWS is opposed to the use of wet cooling in the desert (Blackford 2009). Ensuring wildlife avoidance of the evaporation pond would minimize the potential for impacts from exposure to contaminants. To this end, staff proposes Condition of Certification **BIO-19** (Evaporation Pond Monitoring and Adaptive Management Plan), which requires development of a plan to implement technologies (e.g., netting and/or radar deterrent systems) to exclude or deter birds and other wildlife as well as a monitoring program to ensure the effectiveness of these technologies. Adaptive management of the exclusion/deterrent technologies would be based on the evaporation pond monitoring data, which will be regularly collected and analyzed. A draft Evaporation Pond Plan was submitted by the applicant in December 2009 and is currently under review by staff, CDFG, and USFWS. An approved plan must be in place prior to project construction (refer to Condition of Certification **BIO-19**); it is anticipated by staff, CDFG, and USFWS that this is achievable. Implementation of effective exclusion/deterrent technologies as demonstrated by routine monitoring, and adaptive management strategies (per the final Evaporation Pond Plan) would reduce evaporation pond impacts to birds and other wildlife to less-than-significant levels.

Function and Value of Harper Dry Lake

Potential impacts to the wetlands at Harper Dry Lake would occur if the quality or quantity of water currently reaching the marsh is degraded or diminished; these are described below as they pertain to surface water and groundwater.

Surface Flow Quantity and Quality

The proposed stormwater drainage channel would convey offsite surface flow around the project and redirect it to its natural flow location and parameters toward Harper Dry Lake ACEC. The channel is designed to accommodate a 100-year precipitation event (AS 2009a); however, given that annual average precipitation is approximately five inches, it is not likely that the drainage channels would convey surface flows that would ultimately reach the ACEC during normal precipitation years. Rather, the limited precipitation entering the channel during normal precipitation years is anticipated to percolate into the earthen channel bottoms. In a heavy precipitation event, sheet flow within the drainage channels would be returned to its historical flow volume via energy dissipaters and diffusers before discharge to the ACEC. Sediment control practices would be implemented to allow sediment to settle and be trapped prior to discharge at the ACEC (refer to the **SOIL & WATER RESOURCES** section of this Staff Assessment for additional detail regarding sedimentation and Condition of Certification **SOIL&WATER-1** for the Drainage Erosion and Sediment Control Plan requirements. Given that the habitat at the proposed drainage channel outlet is degraded and does not support standing water, the energy of stormwater flow would be dissipated, and sediment control would be implemented, stormwater discharged to the ACEC at this location would not adversely affect sensitive vegetation or wildlife.

Prior to groundwater transfers by BLM, the wetlands at Harper Dry Lake were sustained by runoff from agricultural irrigation. Agricultural operations proximate to Harper Dry Lake and their irrigation runoff to the marsh have entirely ceased with the exception of approximately 123 acres, which would be retired under the proposed project. Irrigation runoff from this remaining parcel of active agriculture does reach the marsh; therefore, its retirement would not affect the quantity of surface water reaching the marsh.

Groundwater Quantity

Due to historic groundwater extraction in the Harper Lake groundwater sub-basin for agricultural irrigation, the Harper Dry Lake wetlands ceased to rely on groundwater to sustain saturation. The perched water table at the marsh no longer communicates with the groundwater aquifer (AS 2009e); therefore, groundwater drawdown resulting from pumping to support AMS project operations would not affect water availability at the marsh.

However, retirement of local agricultural operations has resulted in a significant decrease in groundwater extraction over the past twenty years. Consequently, the Harper Dry Lake area is the only area in the Mojave River groundwater basin[1] where water levels increased more than five feet since 2000 (Smith et. al 2004). In the absence of any drawdown, there is the potential for the groundwater table to rise over time to potentially sustain the marsh; however, this is unlikely given the proposed development and groundwater usage within the basin and the time it would require given that the current groundwater level below the marsh is approximately 140 feet below ground surface (USGS 2010).

The well currently used to pump groundwater to the marsh is located within the proposed Beta solar field, on Abengoa-owned property. Consequently, this well would be decommissioned approximately six months after the initiation of project construction. As stated by the applicant during the January 15, 2009 Data Response Workshop, an existing well on BLM property would be retrofitted and deepened to serve the marsh in lieu of the well on Abengoa-owned property. Significant impacts to the marsh and the biological resources therein could occur if groundwater transfers to the marsh were suspended due to a delay between well decommissioning and retrofitting. To avoid this potentially significant impact, staff recommends Condition of Certification **BIO-20** (Harper Dry Lake Marsh Water Delivery and Water Quality Monitoring), which would require that a well capable of providing at least 75 acre feet per year of water to the marsh be in service prior to decommissioning the well on Abengoa-owned property.

Groundwater Quality

The applicant reports that concentrations of total dissolved solids generally increase towards Harper Dry Lake, suggesting that poor quality groundwater may exist in the main aquifer beneath the playa (AMS 2009a). However, no data exist to support or refute this assumption. Modeling results prepared by the applicant show that AMS project groundwater pumping will induce the lateral movement of groundwater from beneath the playa towards the AMS project wells and any wells between the playa lake area and the AMS project wells (e.g., the aforementioned existing well on BLM property).

Between 1930 and 1997, groundwater was pumped for agricultural use from wells on the proposed project site at a rate approximately five times greater than is proposed for the AMS project. It does not appear that groundwater quality from project site wells decreased from the lateral movement of water induced by this historical pumping for agricultural operations. However, it is possible that travel times from beneath the playa to adjacent wells are so long that an impact has not yet been detected. For example, the applicant’s modeling results indicate travel times could be on the order of 50 to 100 years (AMS 2009a). Alternatively, groundwater in the main aquifer beneath the playa may not be sufficiently degraded to show an impact at adjacent wells. Therefore, Energy Commission Soil & Water staff has concluded there is no evidence to confirm

[1] The Harper Lake groundwater sub-basin is within the Mojave River groundwater basin.

that a water quality impact would occur, and based on limited historical groundwater quality data any impact to the groundwater quality in other wells in the Harper lake area would likely be less than significant (refer to the **SOIL & WATER RESOURCES** section of this Staff Assessment).

Degradation of the quality of the groundwater delivered to the marsh would adversely impact the biological resources therein. To ensure that potential impacts to groundwater quality would be less than significant, staff recommends groundwater quality monitoring at the well intended to serve the Harper Dry Lake marsh so that if impacts do occur, they can be immediately addressed by the applicant, as described in Conditions of Certification **SOIL & WATER-6** and **7** (Groundwater Level and Quality Monitoring and Reporting Plan). Implementation of this condition would mitigate potentially adverse impacts to the marsh from degraded groundwater quality attributable to the proposed project.

CUMULATIVE IMPACTS

"Cumulative" impacts refer to a proposed project's incremental effect viewed over time together with other closely related past and present projects and projects in the reasonably foreseeable future whose impacts may compound or increase the incremental effect of the proposed project (Public Resources Code Section 21083; California Code of Regulations., Title 14, Sections 15064[h], 15065[c], 15130, and 15355). The following sections present a definition of the geographic extent within which cumulative impacts are analyzed and an analysis of the AMS project's potential incremental effects in consideration of past, present, and future projects.

Geographic Extent

As defined in the following subsections, the geographic extent under consideration for cumulative impacts to biological resources encompasses the range of the key species potentially affected by the proposed project, including the western Mojave Desert and beyond. The threats to these species, which may be exacerbated by construction and operation of the proposed project, are also described below.

Desert Tortoise

The range of the Mojave population of desert tortoise encompasses the area north and west of the Colorado River in the Mojave and Sonoran/Colorado deserts in California, southern Nevada, southwestern Utah, and extreme north western Arizona (USFWS 1994). The Mojave population occurs in valleys, flat areas, fans, bajadas and washes below 4,000 feet in native desert vegetation (e.g., creosote bush, saltbush scrub, Joshua tree, Mohave yucca, and ocotillo-creosote vegetation communities). Desert tortoises occupy a variety of soil types, ranging from sand dunes to rocky hillsides, and utilize caliche caves in washes in addition to sandy soils and desert pavements. Desert tortoises require suitable soils and terrain for constructing a burrow as well as an adequate supply of annual and perennial plants for foraging.

The reasons for listing the desert tortoise as threatened include several factors, each of which tends to be exacerbated by the next and all of which are associated with human development activities. Habitat degradation and loss to due to development and habitat conversion, grazing, mining, geothermal development, highway construction and expansion have all contributed to the rapid decline of this species. Off-road vehicle use is a popular recreation activity in the desert that causes direct mortality from vehicle collision or crushed burrows and destruction of habitat. Desert tortoises are also susceptible to vehicle collisions on existing or newly constructed roads and highways. Drought, habitat degradation and associated noxious weed invasion decrease nutrients available to desert tortoise in food items; this makes them susceptible to upper respiratory tract disease, which can be fatal and is transmittable between populations (Jacobson 1992). Infrastructure development creates perching opportunities for ravens, which elevates predation pressure on juvenile tortoise. Habitat fragmentation and development can isolate tortoise populations, further increasing risk of disease and lowering genetic diversity.

In an effort to create substantial populations of desert tortoises within the Mojave population range, the 1994 Recovery Plan (USFWS) designated six Recovery Units traversing all four abovementioned states. The establishment of the Recovery Units is intended to protect the species and its habitat requirements in order to elevate populations to levels acceptable for delisting, (i.e. 50,000 breeding adults per recovery unit). However, desert tortoises are slow-growing animals that don’t reach sexual maturity until 15-20 years and have a low reproductive rate over a long period of reproductive potential; these life history characteristics makes recovery of the species difficult since tortoises experience high mortality rates prior to reaching sexual maturity (USFWS 2008a).

Mohave Ground Squirrel

MGS is endemic to the western Mojave Desert, California (Best 1995). It’s historic range covers approximately 20,000 km^2 from Palmdale in the southwest to Lucerne Valley in the southeast, extending northeast to Fort Irwin National Training Center (NTC) and west to Sequoia National Forest terminating north at Owens Dry Lake (Leitner 2008). According to BLM, the entire range of the MGS is contained in the Western Mojave Planning Area and significant populations occur in the Indian Wells Valley, Kramer Hills, Edwards Air Force Base (AFB), China Lake Naval Air Weapons Station (NAWS), southern Sierra Nevada canyons and portions of Fort Irwin NTC. These populations essentially surround the proposed project area.

MGS is currently listed as threatened under the California Endangered Species Act and USFWS is reviewing a petition to list the species as endangered under the federal ESA. The steady decline of this species since the 1970’s is due to a combination of factors that are not mutually exclusive. Rapid growth and development occurring in the desert including the development and expansion of three large military reservations (i.e., Fort Irwin NTC, China Lake NAWS and Edwards AFB), construction and expansion of highways and energy transmission corridors, land conversion activities such as grazing, mining and agriculture operations all interact to effect MGS habitat loss and degradation. Off road vehicle recreation is common in the desert and contributes to these combined effects. Other threats that contribute to the species’ decline are poisoning, predation by cats and dogs, and collision with vehicles. Indirect threats, including habitat fragmentation, vegetation community changes, and reduced genetic diversity attributable to small population sizes occur as the result of the abovementioned actions and are also reasons for the species decline (BLM 1999b).

Existing Cumulative Conditions

Over the past two hundred years, California's southern deserts have been subject to major human-induced changes that have threatened native plant and animal communities by habitat loss, fragmentation, and degradation. Some of the most conspicuous threats are those activities that have resulted in large scale habitat loss due to urbanization, agricultural uses, landfills, military operations, mining activities, as well as activities that fragment and degrade habitats such as roads, off-highway vehicle activity, recreational use, and grazing (Berry et al. 1996; Boarman and Sazaki 2006; Avery 1997; Jennings 1997). In addition, these development pressures facilitated the introduction of non-native plant species and increases in predators such as ravens, which contribute to population declines and range contractions for many special-status plant and animal species (Boarman 2002).

In the Harper Lake area, the construction of SEGS VIII and IX in 1989 and 1990 resulted in the loss of approximately 800 acres of potential desert tortoise and MGS habitat as well as the construction of 45 acres of evaporation ponds. SEGS VIII and IX is the only project in the existing cumulative scenario. Otherwise, existing development in the area consists of sparse rural residences and one active agricultural operation on 128 acres. Former agricultural fields within the proposed project area are in the early stages of recolonization by native vegetation, which over time would provide suitable habitat for desert tortoise and Mohave ground squirrel as well as rare plants. Construction of the proposed AMS project would develop 1,765 acres of land, including more than 1,260 acres of this early successional scrub habitat and establish 20 acres of evaporation ponds.

In consideration of the existing cumulative conditions encompassing the Harper Lake area and the greater west Mojave Desert, the AMS project would contribute to the loss of habitat for sensitive species including desert tortoise and MGS. The proposed project's incremental effect of habitat loss, when combined with habitat loss created by existing development throughout the range of these affected species would be less than significant with acquisition and enhancement of compensatory habitat (refer to Condition of Certification **BIO-15**).

In addition, the proposed project would exacerbate the proliferation of non-native weeds, provide additional subsidies for predators (e.g., ravens), and present additional wildlife hazards (e.g., evaporation ponds, project traffic); these incremental effects of the AMS project on desert tortoise and other sensitive wildlife would be cumulatively considerable given the existing stressors on these species through their ranges. However, with implementation of staff's proposed conditions of certification, particularly **BIO-7**, **BIO-18**, and **BIO-19**, the project's contribution to cumulative impacts would be less than cumulatively considerable.

Future Foreseeable Projects

Foreseeable Renewable Projects in the Western Mojave Desert

Solar and wind projects are proposed on approximately 553,000 acres of BLM land and 13,900 acres of non-federal land in the Western Mojave Planning Area (refer to the **CUMULATIVE IMPACTS** section of this Staff Assessment). In consideration of the existing cumulative conditions in the western Mojave Desert, these proposed renewable energy projects have the potential to further reduce and degrade native plant and animal populations, especially sensitive species such as desert tortoise. The proposed AMS project would similarly contribute to the cumulative loss and degradation of habitat for desert plants and wildlife within the western Mojave Desert. As described above under **EXISTING CUMULATIVE CONDITIONS**, implementation of staff's proposed conditions of certification would render the proposed project's incremental effects less than cumulatively considerable.

Foreseeable Projects in the Project Area

The reasonably foreseeable future projects in the Harper Lake area are listed below and described further in **Cumulative Impacts Table 3**. Their locations relative to the proposed project are illustrated in **Cumulative Impacts Figure 2.**

- Hawes Composting Facility
- State Route (SR) 58 via Hinkley
- Solar Photovoltaic Project (BLM: CACA 48941)
- Wind Project (BLM: CACA 46805)

Of particular importance in considering cumulative biological resource impacts of the AMS project is the proposed solar photovoltaic (PV) project located on approximately 5,000 acres of BLM land adjacent to the Harper Lake ACEC on the east side of Harper Dry Lake. Construction of the proposed project and the PV project would essentially surround the ACEC with solar fields thereby reducing its habitat quality. The Harper Lake marsh is an important local water source for wildlife including desert tortoise and desert kit fox. Development of these projects would make the ACEC and marsh less accessible to wildlife; however, access would be maintained south of the ACEC, which is the most used area by wildlife based on surveys of the AMS project vicinity. Additional groundwater extraction in the Harper Lake groundwater sub-basin could also exacerbate the water quality impacts to water conveyed to the marsh. Refer to the **SOIL & WATER RESOURCES** section of this Staff Assessment for an analysis of cumulative impacts to groundwater resources.

While no precise estimate can be made of the future habitat loss associated with the proposed projects listed above, collectively these projects, especially the PV project and the 10,000 acre wind project, would remove and fragment over 16,000 acres of habitat for desert wildlife and plants. The majority of habitat within the project area is degraded and comprises developed, disturbed, fallow or active agricultural land. Therefore, the proposed project's incremental effect of habitat loss would be less than cumulatively considerable with acquisition and enhancement of compensatory habitat (refer to Condition of Certification **BIO-15**).

In addition, the reasonably foreseeable future development projects in the Harper Lake area combined with the AMS project present the same threats to sensitive wildlife as discussed above under **EXISTING CUMULATIVE CONDITIONS**. Traffic impacts to desert tortoise would be exacerbated by increased traffic volumes along SR-58 resulting from the SR-58 via Hinkley project. Predation pressure on juvenile desert tortoises and other vulnerable wildlife would be increased through elevated raven populations as a result of resource subsidies at the proposed Hawes Composting Facility, which would process green material and biosolids. Noxious weed proliferation would be facilitated by the construction of new roads and movement of vehicles and equipment. These incremental effects of the proposed project would be mitigated through implementation of staff's proposed conditions of certification, particularly **BIO-7**, **BIO-18**, and **BIO-19**; therefore, the proposed project's impacts would not be cumulatively considerable and impacts would be less than significant.

Overall Conclusion

In consideration of the proposed project, these past, present, and reasonably foreseeable future projects contribute to the cumulative loss and degradation of vegetation communities, wildlife habitat, and special-status species in the Harper Valley and west Mojave Desert. The majority of habitat within the project area is degraded and comprises developed, disturbed, fallow or active agricultural land. Staff considers the incremental effects of habitat degradation attributable to the AMS project to be less than cumulatively considerable with implementation of staff's proposed conditions of certification, particularly **BIO-7**, **BIO-18**, and **BIO-19**. The 1,765-acre proposed project was reconfigured to avoid high-quality habitat to the extent possible and would result in the loss of 430 acres of marginally suitable habitat for desert tortoise, MGS, and other special-status species. The AMS project's incremental effect of the loss of marginal habitat, when combined with habitat loss from other past, present, and reasonably foreseeable future projects would be less than significant with acquisition of compensatory habitat, as described in staff's proposed Condition of Certification **BIO-15**.

COMPLIANCE WITH LORS

The proposed project must comply with state and federal LORS that address state and federally listed species, as well as other sensitive species and their habitats. Applicable LORS are presented in **Biological Resources Table 1**.

FEDERAL LORS

Endangered Species Act (ESA; 16 USC Section 1531 et seq.)

Potential take of federally-listed species (i.e., federally threatened desert tortoise) requires compliance with the federal Endangered Species Act. "Take" of a federally-listed species is prohibited without a permit, which may be obtained through Section 7 consultation if there is a federal nexus (i.e., involvement of a federal agency other than USFWS that would fund, permit, or authorize the proposed project). The applicant submitted an application to the U.S. Department of Energy (DOE) for a federal loan guarantee to finance the AMS project and was selected by the DOE Loan Guarantee Program Office for due diligence review, including NEPA compliance and ESA consultation. DOE funding is the proposed project's federal nexus, triggering Section 7 as the appropriate consultation process for ESA compliance. Federal ESA compliance under Section 7 requires the DOE to determine whether the proposed action will affect any federally listed species. Because the proposed project would affect desert tortoise, the DOE is obligated to initiate consultation with the USFWS. Formal consultation is initiated by submitting a Biological Assessment (BA) to USFWS. The BA, which is jointly prepared by the applicant and DOE, presents the proposed project's effects analysis and measures to avoid, minimize and mitigate impacts to federally listed species. The timeline for section 7 consultation allows for a 90-day consultation period followed by 45 days of analysis for a total review time of 135 days. After 135 days, the USFWS is required to issue a Biological Opinion, which analyzes the impact of the proposed project and presents avoidance and minimization measures. The Biological Opinion may also include an incidental take statement, if USFWS determines that the impacts of the project do not jeopardize the recovery of the listed species. The applicant submitted a draft BA to DOE and USFWS for preliminary review in April 2010; however, only a final (i.e., not Draft) BA starts the aforementioned 135-day timeline. Assuming the final BA is determined by USFWS to be complete by June, it is anticipated that a Biological Opinion could be issued by USFWS in October 2010. A Biological Opinion is required prior to site mobilization (refer to Condition of Certification **BIO-21** (USFWS Biological Opinion)).

Staff's proposed conditions of certification were developed in coordination with USFWS and are likely to be consistent with the terms and conditions required in the Biological Opinion. Therefore, implementation of the conditions pertaining to federally listed species as well as acquisition of a Biological Opinion and implementation of the measures therein would ensure compliance with the federal ESA.

Waters of the U.S. (Clean Water Act Section 404)

Discharge or fill into water of the U.S, including wetlands requires a permit from the USACE. Project design features (i.e., exclusion fencing) would avoid impacts to 1.59 acres of potentially jurisdictional waters of the U.S (tamarisk scrub). The applicant submitted a Jurisdictional Letter Report and a request for concurrence that a Clean Water Act Section 404 permit was not required for the AMS project (EDAW 2009b). The USACE has determined that all aquatic features occurring within the proposed project area are isolated and therefore not under their jurisdiction. A permit is not required for the AMS Project under Section 404 of the Clean Water Act (Estes 2010).

Bald and Golden Eagle Protection Act (Title 16, United States Code, Sections 668-668c)

A recently issued Final Rule (September 2009) provides for a regulatory mechanism under the Bald and Golden Eagle Protection Act (Eagle Act) to permit take of bald or golden eagles comparable to incidental take permits under the ESA. This rule adds a new section at 50 CFR 22.26 to authorize the issuance of permits to take bald eagles and golden eagles on a limited basis. The Eagle Act defines the ''take'' of an eagle to include a broad range of actions, including disturbance. ''Disturb'' is defined in regulations at 50 CFR 22.3 as: ''to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.''

The proposed project may result in "take" of the golden eagle from disturbance to nesting pairs as well as loss of foraging habitat, which may result in loss of productivity for this species. However, implementation of a USFWS-approved Golden Eagle

Territory-specific Management Plan (Condition of Certification **BIO-9**) may reduce the likelihood of take and documentation from USFWS (i.e., a letter stating that take would not occur or a take permit) is recommended by staff to ensure compliance with the Eagle Act (Condition of Certification **BIO-10**). With implementation of staff's proposed Conditions of Certification **BIO-9** and **BIO-10**, the proposed project would be in compliance with the Eagle Act.

STATE LORS

Under the Warren-Alquist Act (Pub. Resources Code § 25500), the Energy Commission's certificate for thermal power plants rated 50 MW or more is "in lieu of" other state, local, and regional permits Staff has incorporated all required terms and conditions that might otherwise be included in state permits into the Energy Commission's certification process. Staff's proposed conditions of certification would satisfy the following state LORS and take the place of terms and conditions that, but for the Commission's exclusive authority, would have been included in the following state permits:

Incidental Take Permit: California Endangered Species Act (Fish and Game Code Section 2050 et seq.)

The California Endangered Species Act (CESA) prohibits the "take" (defined as "to hunt, pursue, catch, capture, or kill") of state-listed species except as otherwise provided in state law. Staff coordinated closely with CDFG regarding impacts to state-threatened desert tortoise, state-threatened Swainson's hawk, and state-threatened MGS in order to capture any measures that would be required in an Incidental Take Permit (ITP) under section 2081(b) of CESA. To facilitate this, the applicant submitted a draft ITP application to the Energy Commission and CDFG. Staff's proposed conditions of certification were developed in coordination with CDFG and are likely to be consistent with the terms and conditions required in the ITP, if it were issued. Therefore, implementation of the conditions pertaining to state-listed species would ensure compliance with CESA.

Streambed Alteration Agreement: Fish and Game Code Sections 1600-1607

CDFG regulates any changes to the natural flow, bed, or bank, of any river, stream, or lake that supports fish or wildlife resources. As described above, construction and operation of the proposed project would result in direct impacts to 11.18 acres of waters of the state (1.74 acres of tamarisk scrub and 9.44 acres of dry lakebed). CDFG does not typically exert jurisdiction over these habitat types as waters of the state. The applicant submitted an application for a Streambed Alteration Agreement (SAA) in February 2010, which provided information in a format familiar to CDFG. But for the Commission's exclusive authority, CDFG would otherwise issue a SAA (1600 permit) that requires removal of tamarisk as mitigation for impacts to waters of the state. In addition, the terms and conditions of CDFG's SAA would require a five year monitoring and reporting program to ensure complete eradication of tamarisk; this has been incorporated into staff's proposed Condition of Certification **BIO-16**. With implementation of this condition, staff and CDFG conclude that the proposed project would be in compliance with LORS protective of waters of the state.

NOTEWORTHY PUBLIC BENEFITS

Construction and operation of the proposed project would not result in any noteworthy public benefits with regard to biological resources.

RESPONSES TO COMMENTS

Staff received comments on the Biological Resources section of the Staff Assessment for the proposed AMS Project from the Defenders of Wildlife (DOW 2010a) and the applicant (ESH 2010m). Following provides a summary of pertinent comments and staff's response to each.

DEFENDERS OF WILDLIFE

April 15, 2010 (DOW 2010a)

Defenders of Wildlife (Defenders) provided comments on the Biological Resource section of the Staff Assessment regarding the use of groundwater, evaporation ponds and the proximity of the proposed AMS Project to the existing Harper Lake ACEC. Comments provided on the Staff Assessment referenced scoping comments (DOW 2009a) submitted on the AFC.

Comment: Defenders recommends that staff address opportunities for overall water conservation in the basin, and consider that existing groundwater supplies will need to support existing and proposed renewable energy projects in the Harper Lake Basin. Defenders recommends that such conservation be linked to a goal of partial recovery of the wetland at Harper Dry Lake through groundwater connectivity rather than relying exclusively on delivering pumped groundwater to the marsh via pipeline.

> **Response:** Please refer to the **SOIL AND WATER RESOURCES** Response to Comment section of the Supplemental Staff Assessment regarding water conservation.

Comment: In the event that evaporation ponds are required as part of the proposed facility, Defenders supports the requirement that they be fenced and netted to preclude avian and other wildlife use. The dry cooling alternative would negate the need for any evaporation ponds and this alternative merits strong consideration in the final document.

> **Response:** Detailed analysis is warranted for those alternatives that would reduce or eliminate significant impacts. To avoid significant impacts to wildlife, staff recommends excluding and/or deterring wildlife from the evaporation ponds (refer to Condition of Certification **BIO-19**). Soil and Water Resources staff concluded that impacts to water resources are also less than significant with mitigation. Because significant impacts to biological and water resources would not occur with implementation of staff's proposed conditions of certification, additional consideration of the dry cooling alternative beyond the analysis presented in the Staff Assessment is not provided.

Comment: Defenders does not consider staff's proposed conditions of certification (i.e., **BIO-7**, **BIO-10**, **VIS-3** and **BIO-14** in the Staff Assessment) adequate to mitigate impacts to the Harper Lake ACEC below the level of significance. Due to the proximity of the proposed project to the ACEC, Defenders recommends that staff develop an alternative that incorporates a buffer between the project and the ACEC within the common boundary of the proposed Beta unit (i.e., SW ¼ of Section 28, T.11 N., R. 4 W).

> **Response:** Given the proposed development of the entire Section 33, T. 11 N., R. 4 W. and the proposed location of the drainage outlet, excluding development from the SW ¼ of Section 28, T.11 N., R. 4 W. to provide a buffer would not benefit the ACEC. With implementation of staff's proposed conditions of certification, the ACEC and biological resources therein would not be significantly impacted by the AMS project, including stormwater discharge from the proposed drainage outlet.

ABENGOA MOJAVE SOLAR, LLC (APPLICANT)

April 21, 2010

The applicant submitted comments on the Staff Assessment that focused primarily on the proposed transmission line interconnection, habitat quality and species use of the proposed site, burrowing owl monitoring, raven subsidies, compensatory mitigation details, and the conditions of certification pertaining to these issues.

Comment: The proposed project was recently revised to move the transmission interconnection area from within the Superior-Cronese DWMA, which would require 8 acres of temporary disturbance, to be located entirely within the proposed project footprint. Accordingly, the applicant requests that **BIO-8**, (Rare Plant Pre-Construction Surveys and Impact Avoidance) and **BIO-9** (Rehabilitation of Temporarily Disturbed Areas), and any mention that the proposed location of the transmission interconnection area would be within the DWMA be deleted from the Staff Assessment.

> **Response:** The DWMA and the area with high potential to support rare plants would not be directly affected and there would be no temporary disturbance; therefore, staff deleted **BIO-8** and **BIO-9** and associated references. In addition, staff revised the Staff Assessment to be consistent with the new proposed location of the temporary interconnection area.

Comment: The applicant would like to clarify that the entire project site acreage is not considered special-status species habitat, as indicated by biological studies conducted on and surrounding the project site. Potential adverse effects of the loss of access to habitat in the project area are uncertain, as they relate to reproductive success.

> **Response:** Staff modified the introduction to **Construction Impacts to Special-Status Wildlife** to clarify that the entire project site is not suitable habitat for special-status wildlife and to note the potentiality of effects to reproductive success from habitat loss and fragmentation.

Comment: The applicant disagrees that the desert tortoise sign observed at the eastern edge of the proposed project boundary suggests that tortoise may be attempting to move into the disturbed areas of the project that are re-establishing saltbush scrub vegetation. Instead, the sign observed along the edge of the project boundary likely indicates that tortoises stopped at the boundary of non-habitat rather than trying to move into non-habitat.

Response: It cannot be determined with certainty whether tortoises are stopping at the boundary of non-habitat or are moving into re-establishing habitat. If the boundary of non-habitat and the concomitant tortoise sign is within the project site (not the edge), it follows that suitable habitat may be re-establishing between the project site boundary and the boundary of non-habitat. Regardless, it is expected that suitable habitat would re-establish within the proposed project area over time and tortoises could follow. Further, tortoises are known to utilize fallow agricultural land with adequate vegetation, including within the AMS project area.

Comment: The applicant states that although 1,644 acres of the project site have habitat variables that are conducive to foraging by burrowing owls, project surveys indicate that owls do not consistently use the project area as foraging habitat. The applicant requests that the Staff Assessment be revised to clarify this, and to further clarify that the mitigation requirements for impacts to burrowing owl nesting and foraging habitat is to be based on the CBOC/CDFG guidelines.

Response: It is noted that burrowing owls may not consistently use the project site for foraging; however, the Staff Assessment accurately states that suitable foraging habitat would be lost from development of the proposed project. Staff clarified the CDFG/CBOC methodology for calculating compensatory habitat for burrowing owls in the **Western Burrowing Owl** impact section of the Supplemental Staff Assessment.

Comment: The applicant requests that compensation lands to mitigate impacts to MGS and desert tortoise also be considered as mitigation for impacts to western burrowing owl.

Response: If compensation lands required to mitigate impacts to desert tortoise and MGS also satisfy the habitat suitability criteria for burrowing owl (CBOC 1993), then additional compensation habitat acreage for burrowing owl would not be required. The **Habitat Compensation** section of the Staff Assessment has been revised accordingly.

Comment: The applicant requests addition of the following in the Supplemental Staff Assessment: “If upon final analysis the entire mitigation requirement cannot be satisfied with the proposed compensation lands site, the mitigation requirement will be satisfied either with additional lands or with the payment of an in-lieu fee to be agreed upon by all applicable parties”.

Response: Ensuring adequate acreage of compensation lands is included in the Verification of Condition of Certification **BIO-15** and no change is necessary. A new subsection was added to the Supplemental Staff Assessment under the **Habitat Compensation** section to address the option of paying a fee in-lieu of acquiring compensatory habitat. As noted in that subsection, it is staff, USFWS, and CDFG’s preference to satisfy compensatory mitigation requirements with the applicant’s proposed compensation adjacent to the proposed project area rather than through the opportunities afforded by Senate Bill 34.

Comment: The applicant states that the project will remove high-quality raven subsidies that currently exist as a result of active agriculture. The applicant requests that payment amount to be submitted to the regional raven monitoring plan be consistent with the level of new raven subsidies as well as the elimination of existing raven subsidies from active agriculture within the proposed project area. The applicant would also like this revision to apply to **BIO-18** (Common Raven Monitoring, Management, and Control).

> **Response:** Staff agrees that the retirement of active agriculture would remove the associated raven subsidies. However, the proposed project would introduce new food, water, and nesting resources for ravens. Staff, CDFG, and USFWS disagree with the applicant's assertion that there would be a net decrease in raven subsidies from construction of the proposed project.
>
> According to the Renewable Energy Action Team Agencies, the amount of money submitted to the regional raven program is based on the number of acres permanently disturbed by the project. Staff considers the entire project to provide some level of raven subsidies; therefore, the per-acre fee is applied to the total number of acres of permanent disturbance. The fee is based on the estimated cost to implement the activities identified in the USFWS *Environmental Assessment to Implement a Desert Tortoise Recovery Plan Task: Reduce Common Raven Predation on the Desert Tortoise* (USFWS 2008b), including reduction of human-provided subsidies (e.g., food, water, sheltering and nesting sites), education and outreach, common raven nest removal, common raven removal, and evaluation of effectiveness and adaptive management.

Comment: The applicant requests that the statement "adaptive management of the evaporation pond exclusion technology will be based on the monitoring data collected and analyzed on a routine basis" be added to the **Evaporation Ponds** section of the Supplemental Staff Assessment.

> **Response:** Staff added a sentence to the **Evaporation Ponds** section that is consistent with the intent of the applicant's request.

Comment: The applicant requests that the timeframe for submittal of required documents to the Compliance Project Manager be reduced. In addition, it was requested that "site (or related facilities) mobilization" be changed to "construction-related ground disturbance" in several condition of certification verifications. The applicant requested this change be made to **BIO-1**, **BIO-3**, **BIO-5**, **BIO-6**, **BIO-11**, **BIO-13**, **BIO-17**, **BIO-18** and **BIO-21**.

> **Response:** The timeframes proposed in the Staff Assessment reflect the amount of time required for the CPM and agencies to review project plans and other required information submitted by the project owner. For example, the applicant requested that the submittal of the Designated Biologists Qualification (**BIO-1**) be 30 days in advance, but the Compliance Project Manager, CDFG, and USFWS have 30 days to approve or deny the proposed person. Staff reduced the timeframes where possible, but advises the applicant to account in its schedule for the possibility that the CPM and/or agencies may not approve the first submittal of project plans and/or information. Therefore, it may be in the best interest of the applicant to meet the originally proposed timeframes or exceed the revised timeframes presented in the Supplemental Staff Assessment. Because all plans and permits would be incorporated into the Biological Resources Mitigation Implementation and Monitoring Program (BRMIMP), the due dates for the plans and permits need to be prior to the BRMIMP, which has a 30-day agency review period. Also note that the Desert

Tortoise Plan must be finalized before the Biological Opinion is issued; the conditions in the Biological Opinion must also be incorporated into the BRMIMP.

"Site (or related facilities) mobilization" was changed to "pre-construction site mobilization" to be consistent with the definitions presented in the **Compliance** section of the Staff Assessment. Pre-construction site mobilization includes limited preconstruction activities at the site to allow for the installation of fencing, construction trailers, construction trailer utilities, and construction trailer parking at the site. Limited ground disturbance, grading, and trenching associated with these pre-construction activities is considered part of pre-construction site mobilization. Therefore, installation of desert tortoise exclusion fencing is considered pre-construction site mobilization and Conditions of Certification **BIO-1, BIO-3, BIO-5, BIO-6, BIO-11, BIO-13**, **BIO-18**, and **BIO-21** must be satisfied (at least in part for some) prior to fence installation. "Site (or related facilities) mobilization" was changed to "construction-related ground disturbance" in **BIO-17**, as requested.

Comment: The applicant requested that Condition of Certification **BIO-7** (Impact Avoidance and Minimization Measures) be revised as follows: 1) apply a designated speed limit of 25 mph within fenced areas that have been cleared of tortoises and 15 mph in unfenced habitat on unpaved roads; 2) the monitor should not walk immediately ahead of equipment but should observe vegetation removal (not grading) activities; and 3) excavations should also be checked at the beginning of each day.

Response: 1) Staff revised the condition, consistent with the applicant's request. 2) Staff revised the condition to clarify that the monitor shall closely monitor vegetation removal and grading activities to prevent wildlife injury or mortality. Staff recognizes the safety concern of walking immediately ahead of equipment. 3) Staff made the change, as requested.

Comment: With regard to Condition of Certification **BIO-11** (Desert Tortoise Exclusion Fencing, Clearance Surveys, and Translocation Plan), the applicant requests that the requirement to install cattle grating at gates be removed because cattle grating has not been proven to be effective in discouraging tortoise movement and may create a hazard for desert tortoises. The applicant is amenable to installing cattle grating if data can be shown that it is both safe and effective for tortoises.

Response: The use of cattle grates or other exclusion measures at gates will be negotiated as the Desert Tortoise Plan is finalized.

Comment: With regard to Condition of Certification **BIO-11**, the applicant requests that the use of offset transects be allowed as an alternate to perpendicular transects during clearance surveys.

Response: The use of offset transects or other alternatives to perpendicular transects will be negotiated as the Desert Tortoise Plan is finalized.

Comment: The applicant requests that reference be made to the final Desert Tortoise Plan throughout Condition of Certification **BIO-11**.

Response: Staff included the reference in **BIO-11**, as appropriate. It should be noted that the final Desert Tortoise Plan shall be consistent with the USFWS *Desert* Tortoise *Field Manual* (www.fws.gov/ventura/speciesinfo/protocols_guidelines), as stated in **BIO-11**.

Comment: The applicant requests that **BIO-13** (Burrowing Owl Impact Avoidance and Minimization Measures) be revised to allow for initiating construction outside of the nesting season and into the nesting season, under the stipulation that all burrows would be collapsed prior to construction.

Response: Staff revised **BIO-13**, consistent with the applicant's request.

Comment: The applicant requests that color banding and monitoring requirements of passively relocated burrowing owls be deleted from **BIO-13**.

Response: Post-relocation monitoring is required to assess relocation success. Staff recognizes the likelihood that excluded owls could relocate to available suitable habitat that is closer to the project area than the compensatory mitigation site. Accordingly, staff revised the condition to require monitoring within areas of suitable habitat within 600 meters of the project site in addition to the proposed compensatory mitigation area. This distance encompasses the range within which owls are likely to forage from their nest and the distance owls are likely to establish a nest from the previous year's nest (Rosenberg and Haley 2004). Color-banding is necessary to identify during monitoring which owls were relocated.

Comment: The applicant requests that **BIO-14** (American Badger and Desert Kit Fox Impact Avoidance and Minimization Measures) be revised to clarify that badger and kit fox pre-construction surveys occur within 250 feet of the project site, eliminating "all project facilities, utility corridors, and access roads." In addition, the applicant requests that surveys be concurrent with burrowing owl, desert tortoise, and/or nesting bird surveys.

Response: Staff revised **BIO-14** to clarify that surveys would only be conducted within and surrounding the proposed project site. There are no offsite access roads or utility corridors. Pre-construction surveys for American badger and desert kit fox may be conducted at the same time as most other pre-construction biological surveys; however, specialized attention should be paid to each survey target. For example, American badger and desert kit fox surveys should not be conducted concurrent with nesting bird surveys by the same surveyor. No change to the condition is warranted because the existing language does not preclude concurrent surveys.

Comment: The applicant would also like to revise **BIO-14** to include implementation of passive hazing for burrow exclusion and to allow badgers and foxes to be trapped in live traps and removed.

Response: Take, including catch and capture, of desert kit fox is prohibited under California Code of Regulations Title 14 Section 460. Setting traps for badgers could inadvertently trap desert kit fox. Passive hazing methods may be allowed if approved by CDFG. Staff revised **BIO-14** to allow for CDFG-approved passive hazing to exclude American badgers and desert kit foxes from their burrows within the project area.

Comment: The applicant requests that **BIO-15** (Compensatory Mitigation) be revised to include western burrowing owl.

Response: Staff modified **BIO-15** as requested by the applicant. Detailed information regarding compensatory mitigation for burrowing owl is presented in **BIO-13**.

Comment: Under **BIO-15**, the applicant would like revisions to include the applicant's option to pay a fee, as provided under Senate Bill 34, as an alternative to acquiring compensation lands.

Response: Staff revised **BIO-15**, consistent with the applicant's request.

Comment: The applicant requests that **BIO-16** (Tamarisk Eradication, Monitoring, and Reporting Program) include that the absence of nesting raptors and other birds prior to tree removal will be verified.

Response: Staff modified **BIO-16** as requested by the applicant.

Comment: The applicant requests that several revisions be made to **BIO-19** including consideration of alternative deterrent technology to netting and implementation of an adaptive management program. The applicant would like to submit reports that compare and contrast the success of each exclusion technology implemented in the adaptive management program.

Response: Staff, CDFG, and USFWS are willing to consider alternatives to netting the evaporation ponds provided that the technology effectively excludes or deters birds and other wildlife from the ponds ***and*** does not result in noise impacts or otherwise disturb or harass wildlife at the adjacent Harper Lake ACEC. To this end, staff, CDFG, and USFWS have developed stringent performance standards for alternative technologies, as presented in revised Condition of Certification **BIO-19**. It may ultimately prove to be most economical (and it is staff, USFWS, and CDFG preference) to reduce the size (and potentially increase the number) of the ponds or otherwise engineer dividing structures in order to effectively net the ponds prior to project operation.

With their comments on the Staff Assessment, the applicant submitted information on a radar-activated on-demand deterrence system for potential use in the proposed AMS evaporation ponds. The efficacy of these deterrent systems is based on loud noise (Johansson 1994; Stevens et al. 2000; Ronconi et al. 2004; Ronconi and St. Clair 2006; Ramirez 2010), and therefore would not be appropriate for use near the Harper Lake ACEC.

CONCLUSIONS

The proposed Abengoa Mojave Solar (AMS) Project would occupy approximately 1,765 acres in the West Mojave Desert adjacent to the western margin of Harper Dry Lake in unincorporated San Bernardino County. The proposed project footprint and size were iteratively modified to avoid continuous stands of undisturbed native vegetation, conservation areas, and high quality wildlife habitat. As a result approximately 90% of the habitat within the project area is developed, disturbed, fallow or active agricultural lands. Overall, the proposed project area is composed of degraded habitat, which is of marginal suitability for special-status species and does not support a diverse assemblage of native plants and wildlife. However, the proposed project area is adjacent to the Harper Dry Lake Area of Critical Environmental Concern (ACEC) and otherwise surrounded by known populations of listed species (e.g., desert tortoise, Mohave ground squirrel [MGS], desert cymopterus), desert tortoise critical habitat/desert wildlife management area (DWMA), and MGS Conservation Area. Therefore, transient individuals may be occasionally present onsite as they move between areas of suitable habitat adjacent to the proposed project and potentially within areas of suitable habitat re-establishing at the edges of the proposed project area. Given the proximity of the proposed project to the aforementioned biological resources, construction and operation of the proposed project would result in the direct and indirect effects presented in **Biological Resources Table 7**. With implementation of staff's proposed conditions of certification, impacts to biological resources would be mitigated to less than significant levels.

Biological Resources Table 7
Summary of Impacts to Biological Resources from the AMS Project

Impact	Condition of Certification	Significance Determination
CONSTRUCTION IMPACTS		
General vegetation: disturbance of native vegetation	•**BIO-7** confines work to delineated areas;	Less than significant
Special-status plants: direct mortality of plants adjacent to project area; permanent degradation of habitat; damage from dust	•**BIO-7** confines work to delineated areas; •**AQ-SC3** and **AQ-SC4** require dust abatement	Less than significant with COCs
Migratory/special-status birds: loss of active bird nests or young; loss of foraging habitat	•**BIO-8** requires pre-construction nest surveys and impact avoidance	**Nesting**: Less than significant with COC **Foraging**: Less than significant
Golden eagle: disturbance (50 CFR 22.3)	•**BIO-9** requires development and implementation of a territory-specific management plan to avoid disturbance based on eagle inventory and monitoring results.	**Nesting**: Likely less than significant with COC **Foraging**: Likely less than significant
Desert tortoise: direct mortality, injury, harassment; constrained population connectivity; habitat loss and degradation	•**BIO-7** requires control of standing water, reduced speed limits, other impact avoidance; •**BIO-11** requires pre-construction clearance surveys, exclusion fencing, translocation; •**BIO-15** requires habitat compensation	Less than significant with COCs
Mohave ground squirrel: direct mortality, injury, harassment; constrained population connectivity; habitat loss and degradation	•**BIO-7** requires monitors ahead of grading equipment, removal of MGS attractants, other impact avoidance; •**BIO-12** requires pre-construction clearance surveys, relocation; •**BIO-15** requires habitat compensation	Less than significant with COCs
Western burrowing owl: direct mortality, injury, harassment; habitat loss and degradation	•**BIO-13** requires pre-construction clearance surveys, passive relocation, burrow construction, habitat compensation;	Less than significant with COC
American badger and desert kit fox: direct mortality, injury, harassment	•**BIO-14** requires pre-construction clearance surveys, passive relocation;	Less than significant with COC

Impact	Condition of Certification	Significance Determination
Construction traffic: special-status wildlife mortality	• **BIO-5** requires worker awareness training to identify animals in road; • **BIO-7** requires reduced speed limits, monitoring along roads, wildlife checks beneath parked vehicles, road kill reporting	Less than significant with COCs
Jurisdictional waters: direct impacts to isolated wetlands and waters of the U.S. and state (tamarisk and dry lakebed)	• **BIO-16** requires tamarisk eradication monitoring (per CDFG requirements);	Less than significant
Construction noise: disruption of wildlife nesting, roosting, and/or foraging activities, especially at Harper Lake ACEC	• **BIO-8** requires pre-construction nest surveys and monitoring areas louder than 60 dBA	Less than significant with COC
Construction lighting: disruption of wildlife nesting, roosting, and/or foraging activities, especially at Harper Lake ACEC	• **BIO-7** and **VIS-3** requires minimization of side-cast lighting • **BIO-14** requires nocturnal mammals to be cleared from the project area before construction	Less than significant with COCs
Spread of noxious weeds	• **BIO-7** requires inspection and cleaning of construction equipment, eradication and monitoring of weed populations, quick re-vegetation	Less than significant with COC
OPERATION IMPACTS		
Avian collision: blinding/confusion by glare or reflection resulting in collision	• **BIO-17** requires monitoring impacts of technology birds and adaptive management if impact is identified	Unknown (likely less than significant with COC)
Avian electrocution	• **BIO-7** requires transmission lines to be in conformance with APLIC guidelines	Less than significant with COC
Glare: ocular injury from beam intensity	• **VIS-4** requires 10-foot high slatted perimeter fencing	Less than significant with COC
Operation noise	N/A	Less than significant
Desert tortoise: entrapment/injury from drainage channel	• **BIO-11** requires exclusion fencing to be reinforced and monitored around drainage channel	Less than significant with COC

Impact	Condition of Certification	Significance Determination
Desert tortoise: raven predation	• **BIO-7** requires minimization of raven subsidies • **BIO-18** requires implementation of a project Raven Plan and contribution of payment toward the USFWS-coordinated regional raven management plan	Less than significant with COCs
Operation traffic: special-status wildlife mortality	• **BIO-5** requires worker awareness training to identify animals in road; • **BIO-7** requires reduced speed limits, monitoring along roads, wildlife checks beneath parked vehicles, road kill reporting	Less than significant with COCs
Evaporation ponds: injury or mortality to wildlife from exposure to toxic levels of salt and selenium	• **BIO-19** requires implementation of wildlife deterrent/exclusion technologies as well as monitoring and adaptive management to ensure effectiveness	Less than significant with COC
Harper Dry Lake ACEC: reduction in amount or quality of surface flow reaching the marsh	• **SOIL&WATER-1** requires implementation of sediment controls in drainage channel discharge outlet at ACEC	**Quantity**: Less than significant **Quality**: Less than significant with COC
Harper Dry Lake ACEC: reduction in amount or quality of groundwater pumped to the marsh	• **BIO-20** ensures that the wetland well is not decommissioned until an alternate well is able to convey water to the marsh and requires implementation of a groundwater quality monitoring program as described in **SOIL & WATER-6** and **7**	Less than significant with COCs

Cumulative Impacts

The incremental effects of the proposed project as listed above would contribute to the cumulative loss and degradation of vegetation communities, wildlife habitat, and special-status species in the Harper Valley and west Mojave Desert. However, staff considers the incremental effects of habitat loss and degradation attributable to the AMS project to be less than cumulatively considerable with implementation of staff's proposed conditions of certification, particularly **BIO-7**, **BIO-15**, **BIO-18**, and **BIO-19**.

LORS Compliance

Staff's proposed conditions of certification were developed in coordination with the California Department of Fish and Game (CDFG) and USFWS and are likely to be consistent with the terms and conditions required in the Biological Opinion (Condition of Certification **BIO-21**), Incidental Take Permit, and Streambed Alteration Agreement (if these were issued by CDFG). In addition, USFWS agrees that with implementation of staff's proposed conditions of certification, take of golden eagle is not likely to occur. Therefore, implementation of the conditions pertaining to federally and listed species would ensure compliance with the federal Endangered Species Act (ESA), Bald and Golden Eagle Protection Act, California ESA, and Fish and Game Code §1600.

The U.S. Army Corps of Engineers (USACE) has determined that all aquatic features occurring within the proposed project area are isolated and therefore not under their jurisdiction. A permit is not required for the AMS Project under Section 404 of the Clean Water Act.

Overall Conclusion

It is staff's determination that with implementation of proposed conditions of certification, compliance with laws, ordinances, regulations, and standards (LORS) pertaining to protection of biological resources 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 Conditions of Certification.

DESIGNATED BIOLOGIST SELECTION

BIO-1 The project owner shall assign a 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), CDFG, and USFWS 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; and

2. Three years of experience in field biology or current certification of a nationally recognized biological society, such as The Ecological Society of America or The Wildlife Society;

3. At least one year of field experience with biological resources found in or near the project area;

4. Meet current USFWS Authorized Biologist criteria[2] and demonstrate familiarity with protocols and guidelines for the desert tortoise; and

[2] USFWS designates biologists who are approved to handle tortoises as "Authorized Biologists." Such biologists have demonstrated to USFWS that they possess sufficient desert tortoise knowledge and experience to handle and move tortoises appropriately, and have received USFWS approval. Authorized Biologists are permitted to then approve specific monitors to handle tortoises, at their discretion. CDFG must also approve such biologists, potentially including individual approvals for monitors approved by the

5. Possess a recovery permit for desert tortoise and a California ESA Memorandum of Understanding pursuant to Section 2081(a) for desert tortoise and Mohave ground squirrel or have adequate experience and qualifications to obtain these authorizations. It is possible that two biologists may be utilized – each with an MOU for desert tortoise or MGS.

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 60 days prior to the start of any pre-construction site mobilization. The CPM, CDFG, and USFWS have 30 days to approve or deny proposed Designated Biologist(s). No site or related facility activities shall commence until an approved Designated Biologist is available to be on site.

If a Designated Biologist needs to be replaced, the specified information of the proposed replacement must be submitted to the CPM at least 10 working days prior to the termination or release of the preceding Designated Biologist. In an emergency, the project owner shall immediately notify the 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, construction, operation, and closure activities. The Designated Biologist may be assisted by the approved Biological Monitor(s), but remains the contact for the project owner and CPM.

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. Halt any and all activities in any area when determined that there would be an unauthorized adverse impact to biological resources if the activities continued or a violation of federal or state environmental laws or a

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Authorized Biologist. Designated Biologists are the equivalent of Authorized Biologists. Only Designated Biologists and certain Biological Monitors who have been approved by the Designated Biologist would be allowed to handle desert tortoises.

violation of any environmental agreements/conditions made between the applicant and the CPM and/or the regulatory agencies;

5. Clearly mark sensitive biological resource areas, if present and inspect these areas at appropriate intervals for compliance with regulatory terms and conditions;

6. Inspect active construction areas where animals may have become trapped prior to construction commencing each day. At the end of the day, inspect for the installation of structures that prevent entrapment or allow escape during periods of construction inactivity. Periodically inspect areas with high vehicle activity (i.e. parking lots) for animals in harm's way;

7. Notify the project owner and the CPM of any non-compliance with any biological resources condition of certification;

8. Respond directly to inquiries of the CPM regarding biological resource issues;

9. Maintain written records of the tasks specified above and those included in the BRMIMP. Summaries of these records shall be submitted in the Monthly Compliance Report and the Annual Report; and

10. Train the Biological Monitors as appropriate, and ensure their familiarity with the BRMIMP, Worker Environmental Awareness Program (WEAP) training and all permits.

Verification: The Designated Biologist shall submit in the Monthly Compliance Report to the CPM copies of all written reports and summaries that document biological resource compliance activities, including those conducted by Biological Monitors.

If actions may affect biological resources during operation, a Designated Biologist or Biological Monitor under the supervision of the Designated Biologist shall be available for monitoring and reporting.

During project operation, the Designated Biologist shall submit record summaries in the Annual Compliance Report unless their duties are ceased as approved by the CPM. Monthly and Annual Compliance Reports shall be also be submitted to CDFG and USFWS.

BIOLOGICAL MONITOR SELECTION, QUALIFICATIONS, AND DUTIES

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 Monitors to the CPM, CDFG, and USFWS for approval. The resume shall demonstrate to the satisfaction of the CPM, the appropriate education and experience to accomplish the assigned biological resource tasks, including:

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

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

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

Verification: The project owner shall submit the specified information to the CPM, CDFG, and USFWS for approval at least 60 days prior to the start of any pre-construction site mobilization. The CPM, CDFG, and USFWS have 30 days to approve or deny proposed Biological Monitor(s).

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

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

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 and Biological Monitor(s) the project owner's Construction/Operation Manager shall halt all site mobilization, ground disturbance, grading, construction, and operation activities in areas specified by the Designated Biologist.

The Designated Biologist shall:

1. Halt any and all activities in any area when determined that there would be an unauthorized adverse impact to biological resources if the activities continued or a violation of federal or state environmental laws or a violation of any environmental agreements/conditions made between the applicant and the CPM and/or the regulatory agencies;

2. Inform the project owner and the Construction/Operation Manager when to resume activities; and

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 will be instituted, as a result of the work stoppage.

4. If the Designated Biologist is unavailable for direct consultation, the Biological Monitor shall act on behalf of the Designated Biologist. It is expected that the Designated Biologist will be onsite during construction or otherwise available by phone.

Verification: The project owner shall ensure that the Designated Biologist or Biological Monitor notifies the CPM immediately (and no later than the following morning of 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.

Whenever corrective action is taken by the project owner, a determination of success or failure will be made by the CPM within five working days after receipt of notice that corrective action is completed, or the project owner will be notified by the CPM that coordination with other agencies will require additional time before a determination can be made.

WORKER ENVIRONMENTAL AWARENESS PROGRAM

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

The WEAP must:

1. Be developed by or in consultation with the Designated Biologist and consist of an on-site or training center presentation in which supporting written material and electronic media is made available to all participants;

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

3. Present the reasons for protecting these resources;

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

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

6. Identify whom to contact if there are further comments and questions about the material discussed in the program; and

7. Include a training acknowledgment form to be signed by each worker indicating that they received training and shall abide by the guidelines.

The specific program can be administered by a competent individual(s) acceptable to the Designated Biologist.

Verification: At least 45 days prior to the start of any pre-construction site mobilization, the project owner shall provide to the CPM the proposed WEAP and all supporting written materials and electronic media prepared or reviewed by the Designated Biologist and a resume of the person(s) administering the program.

The project owner shall provide in the Monthly Compliance Report the number of persons who have completed the training in the prior month and a running total of all persons who have completed the training to date. At least 10 days prior to site and related facilities mobilization submit two copies of the CPM-approved materials.

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

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

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

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

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

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

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

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

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

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

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

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

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

9. All locations on a map, at an approved scale, of sensitive biological resource areas subject to disturbance and areas requiring temporary protection and avoidance during construction;

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

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

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

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

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

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

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

The CPM, in consultation with other appropriate agencies, will determine the BRMIMP’s acceptability within 30 days of receipt. If there are any permits that have not yet been received when the BRMIMP is first submitted, these permits shall be submitted to the CPM within 5 days of their receipt, and the BRMIMP shall be revised or supplemented to reflect the permit condition within 10 days of their receipt by the project owner. Ten days prior to pre-construction site mobilization the revised BRMIMP shall be resubmitted to the CPM. Site mobilization will not occur without an approved BRMIMP.

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

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

Implementation of BRMIMP measures will be reported in the Monthly Compliance Reports by the Designated Biologist (i.e., survey results, construction activities that were monitored, species observed). Within 30 days after completion of project construction, the project owner shall provide to the CPM, for review and approval, a written construction closure report identifying which items of the BRMIMP have been completed, a summary of all modifications to mitigation measures made during the project's site mobilization, ground disturbance, grading, and construction phases, and which mitigation and monitoring items are still outstanding.

IMPACT AVOIDANCE AND MINIMIZATION MEASURES

BIO-7 The project owner shall implement the following measures during construction and operation to manage their project site and related facilities in a manner to avoid or minimize impacts to the local biological resources:

1. Limit Disturbance Area. 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 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. Minimize Road Impacts. New and existing roads that are planned for construction, widening, or other improvements shall not extend beyond the flagged impact area as described above. All vehicles passing or turning around will do so within the planned impact area or in previously disturbed areas. Where new access is required outside of existing roads (e.g. new spur roads) or the construction zone, the route will be clearly marked (i.e., flagged and/or staked) prior to the onset of construction.

3. Minimize Traffic Impacts. Vehicular traffic during project construction and operation shall be confined to existing routes of travel to and from the project site, and cross country vehicle and equipment use outside designated work areas shall be prohibited. The speed limit shall not exceed 25 miles per hour on Harper Lake Road and within fenced areas that have been cleared of tortoises and other wildlife. The speed limit shall not exceed 15 miles per hour within unfenced areas and secondary unpaved access roads.

4. Monitor During Construction. The Designated Biologist or Biological Monitor shall be present at the construction site during all project

activities that have potential to disturb soil, vegetation, and wildlife. The USFWS-approved Designated Biologist or Biological Monitor shall closely monitor vegetation removal and grading activities to prevent wildlife injury or mortality.

5. Minimize Impacts of Transmission/Pipeline Alignments, Roads, Staging Areas. Staging areas for construction on the plant site shall be within the area that has been fenced with desert tortoise exclusion fencing and cleared. Temporary disturbance areas, if necessary, shall occur within the project site and shall be designed, installed, and maintained with the goal of minimizing disturbance. Transmission lines and all electrical components shall be designed, installed, and maintained in accordance with the Avian Power Line Interaction Committee's (APLIC's) *Suggested Practices for Avian Protection on Power Lines* (APLIC 2006) and *Mitigating Bird Collisions with Power Lines* (APLIC 2004) to reduce the likelihood of bird electrocutions and collisions.

6. Avoid Use of Toxic Substances. Road surfacing and sealants as well as soil bonding and weighting agents used on unpaved surfaces shall be non-toxic to wildlife and plants.

7. Minimize Lighting Impacts. Facility lighting shall be designed, installed, and maintained to prevent side casting of light towards the project boundaries and the Harper Dry Lake marsh. Lighting shall be shielded, directional, and at the lowest intensity required for activity.

8. Avoid Vehicle Impacts to Desert Tortoise. Parking and storage shall occur within desert tortoise exclusion fencing to the extent feasible. No vehicles or construction equipment parked outside the fenced area shall be moved prior to an inspection of the ground beneath the vehicle for the presence of desert tortoise. During construction, a Biological Monitor shall drive along project access roads, particularly Harper Lake Road at least every three hours during the desert tortoise active period (April through May and September through October) looking for desert tortoise or other vulnerable wildlife within the roadway. Outside of the active period, roads shall be monitored at least twice a day in advance of peak AM and PM traffic periods. During operation, employees shall report any desert tortoise sightings along roadways to the Biological Monitor. If a desert tortoise is observed in the roadway or beneath a parked vehicle, it will be left to move on its own or a Biological Monitor may remove and transfer the animal to a safe location if temperatures are within the appropriate range as identified in the Final Desert Tortoise Clearing and Translocation Plan.

9. Avoid Wildlife Pitfalls. At the end of each work day, the Designated Biologist shall ensure that all potential wildlife pitfalls (trenches, bores, and other excavations) outside the permanently fenced area have been backfilled. If backfilling is not feasible, all trenches, bores, and other excavations shall be sloped at a 3:1 ratio at the ends to provide wildlife

escape ramps, or covered completely to prevent wildlife access, or fully enclosed with tortoise-exclusion fencing. All trenches, bores, and other excavations outside the areas permanently fenced with desert tortoise exclusion fencing shall be inspected at the beginning of each workday, periodically throughout, and at the end of each workday by the Designated Biologist or a Biological Monitor. Should a tortoise or other wildlife become trapped, the Designated Biologist or Biological Monitor shall remove and relocate the individual to a safe location. Any wildlife encountered during the course of construction shall be allowed to leave the construction area unharmed.

10. Avoid Entrapment of Wildlife. Any construction pipe, culvert, or similar structure with a diameter greater than three inches, stored less than eight inches above ground for one or more days/nights, shall be inspected for wildlife before the material is moved, buried, or capped. As an alternative, all such structures may be capped before being stored, or placed on pipe racks.

11. Report Wildlife Injury and Mortality. Report all inadvertent deaths of sensitive 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. Injured animals shall be reported to CDFG or USFWS and the CPM and the project owner shall follow instructions that are provided by CDFG or USFWS. If CDFG or USFWS cannot be immediately reached, consideration should be given to taking the animal to a veterinary hospital. If any golden eagles are recovered dead, they shall be sent to the National Eagle Repository after cause of death has been investigated.

12. Minimize Standing Water. 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 in an effort to prevent the formation of puddles, which could attract desert tortoises, common ravens, and other wildlife to construction sites. A Biological Monitor shall patrol these areas to ensure water does not puddle and attract desert tortoise, common ravens, and other wildlife to the site and shall take appropriate action to reduce water application where necessary.

13. Minimize Spills of Hazardous Materials. All vehicles and equipment shall be maintained in proper working condition to minimize the potential for fugitive emissions of motor oil, antifreeze, hydraulic fluid, grease, or other hazardous materials. The Designated Biologist shall be informed of any hazardous spills immediately as directed in the project Hazardous Materials Plan. Hazardous spills shall be immediately cleaned up and the contaminated soil properly disposed of at a licensed facility. Servicing of

construction equipment shall take place only at a designated area. Service/maintenance vehicles shall carry a bucket and pads to absorb leaks or spills.

14. Worker Guidelines. During construction all trash and food-related waste shall be placed in self-closing containers and removed daily from the site. Workers shall not feed wildlife or bring pets to the project site. Except for law enforcement personnel, no workers or visitors to the site shall bring firearms or weapons.

15. Avoid Spread of Noxious Weeds. The project owner shall implement the following Best Management Practices during construction and operation to prevent the spread and propagation of noxious weeds:

    A. Limit the size of any vegetation and/or ground disturbance to the absolute minimum and limit ingress and egress to defined routes;

    B. Reestablish vegetation quickly on disturbed sites temporarily disturbed areas, including pipelines, transmission lines, and staging areas (see **BIO-9**);

    C. Prevent spread of non-native plants via vehicular sources by implementing Trackclean™ or other methods of vehicle cleaning for vehicles coming and going from construction sites. Earth-moving equipment and construction vehicles shall be cleaned within an approved area or commercial facility prior to transport to the construction site. The number of cleaning stations shall be limited and weed control/herbicide application shall be used at the cleaning station(s);

    D. Use only weed-free straw, hay bales, and seed for erosion control and sediment barrier installations;

    E. Invasive non-native species shall not be used in landscaping plans and erosion control; and

    F. Monitor and rapidly implement control measures to ensure early detection and eradication of weed invasions.

16. Implement Erosion Control Measures. Standard erosion control measures shall be implemented for all phases of construction and operation. All disturbed soils and roads within the project site shall be stabilized to reduce erosion potential, both during and following construction. Areas of disturbed soils (access and staging areas) with slopes toward an ephemeral drainage or Harper Dry Lake shall be stabilized to reduce erosion potential.

17. Monitor Ground Disturbing Activities Prior to Site Mobilization. If ground disturbing activities are required prior to site mobilization, such as for geotechnical borings or hazardous waste evaluations, a Designated

Biologist or Biological Monitor shall be present to monitor any actions that could disturb soil, vegetation, or wildlife. Actions not included in the project description are prohibited.

Verification: All mitigation measures and their implementation methods shall be included in the BRMIMP. Implementation of the measures will be reported in the Monthly Compliance Reports by the Designated Biologist. Within 30 days after completion of project construction, the project owner shall provide to the CPM, for review and approval, a written construction termination report identifying how measures have been completed. Additional copies shall be provided to CDFG and USFWS.

PRE-CONSTRUCTION NEST SURVEYS AND IMPACT AVOIDANCE AND MINIMIZATION MEASURES FOR MIGRATORY BIRDS

BIO-8 Pre-construction nest surveys shall be conducted if construction activities will occur from February 1 through August 1. At all times of the year, noise generating activities shall be limited during early morning and evening to avoid impacts to birds protected under the Migratory Bird Treaty Act. The Designated Biologist or Biological Monitor shall perform surveys in accordance with the following guidelines:

1. Surveys shall cover all potential nesting habitat in the project site and within 500 feet of the boundaries of the plant site as well as any areas potentially exposed to noise levels above 60 dBA;

2. At least two pre-construction surveys shall be conducted, separated by a minimum 10-day interval. One of the surveys needs to be conducted within the 10-day period preceding initiation of construction activity. Additional follow-up surveys may be required if periods of construction inactivity exceed three weeks 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, the size of which is to be determined by the Designated Biologist in consultation with CDFG and USFWS) and monitoring plan shall be developed. Nest locations shall be mapped using GPS technology and submitted, along with a weekly report stating the survey results, to the CPM; and

4. The Designated Biologist or Biological Monitor shall monitor the nest until he or she determines that nestlings have fledged and dispersed; activities that might, in the opinion of the Designated Biologist in consultation with the CPM, disturb nesting activities (e.g., excessive noise above 60 dBA), shall be prohibited within the buffer zone until such a determination is made.

Verification: At least 10 days prior to the start of any pre-construction site-mobilization, the project owner shall provide the CPM a letter-report describing the findings of the pre-construction nest surveys, including the time, date, and duration of the survey; identity and qualifications of the surveyor(s); and a list of species observed.

If active nests are detected during the survey, the report shall include a map or aerial photo identifying the location of the nest and shall depict the boundaries of the no-disturbance buffer zone around the nest. Additional copies shall be provided to CDFG and USFWS.

GOLDEN EAGLE TERRITORY-SPECIFIC MANAGEMENT PLAN

BIO-9 In addition to the breeding season golden eagle inventory conducted in spring 2010 (per USFWS protocol [Pagel et al. 2010]), a non-breeding season golden eagle inventory survey shall be conducted in late-summer/early-winter 2010 (USFWS, in prep).

If an occupied golden eagle territory is identified within 10 miles of the project site (except for the territory identified at Black Mountain in April 2010) during breeding or non-breeding inventory surveys for the AMS project, the project owner shall prepare and implement a Golden Eagle Territory-Specific Management Plan. This plan shall:

1. Include measures to avoid and minimize disturbance (as defined in 50 CFR 22.3) to golden eagles during project construction and operation activities. Measures may include limited operating periods or no-disturbance buffers within which certain potentially disruptive project activities shall not be conducted, or modification of certain project activities to reduce the potential for disturbance to eagles.

2. Identify monitoring actions and schedule for their implementation to ensure avoidance and minimization of disturbance. Monitoring and reporting shall be conducted pre- and post-activity per Interim Golden Eagle Inventory and Monitoring Protocols (Pagel et al. 2010).

Verification: The project owner shall submit a report to the CPM, CDFG, and USFWS within 30 days of completion of breeding-season golden eagle surveys. This report shall document the results of the inventory and monitoring as described in Pagel et al. 2010.

The project owner shall submit a report to the CPM, CDFG, and USFWS within 30 days of completion of non-breeding season golden eagle surveys. This report shall document the results of the protocol surveys as described in Pagel et al. 2010 or more recent guidance by USFWS (e.g., Pagel et al, in prep).

At least 30 days prior to the start of any pre-construction site mobilization, the project owner shall provide the CPM, CDFG, and USFWS with the final version of the Golden Eagle Territory-Specific Management Plan, based on breeding-season inventory results. This final Plan shall have been reviewed and approved by the CPM in consultation with USFWS. If disturbance to eagles would not occur and a Plan is not warranted, a letter from USFWS documenting this determination shall be submitted to the CPM at least 10 days prior to the start of any pre-construction site mobilization.

An addendum to the Plan may be required by USFWS based on non-breeding season survey results. If required, a final addendum, which has been reviewed and approved by the CPM in consultation with USFWS, shall be submitted to the CPM within 90 days of completion of non-breeding season golden eagle surveys.

DOCUMENTATION OF BALD AND GOLDEN EAGLE ACT COMPLIANCE

BIO-10 The project owner shall provide documentation to the CPM that the project is in compliance with the Bald and Golden Eagle Protection Act (Title 16, United States Code, sections 668-668d).

Verification: No less than 10 days prior to the start of any pre-construction site mobilization, the project owner shall submit to the CPM documentation that the project is in compliance with the Bald and Golden Eagle Protection Act (Title 16, United States Code, sections 668-668d). This shall include documentation from the USFWS in the form of written or electronic transmittal indicating the status of the permit, if required, and any follow up actions required by the project owner. Any additional actions shall be added to the BRMIMP and implemented.

DESERT TORTOISE EXCLUSION FENCING, CLEARANCE SURVEYS, AND TRANSLOCATION PLAN

BIO-11 A Desert Tortoise Exclusion Fencing, Clearance Surveys, and Translocation Plan (Desert Tortoise Plan) shall be developed in consultation with the CPM, CDFG, and USFWS. This plan shall include detailed measures to avoid and minimize impacts to desert tortoise in and near the construction areas as well as methods for clearance surveys, fence installation, tortoise handling, artificial burrow construction, egg handling and other procedures, which shall be consistent with those described in the USFWS Desert Tortoise Field Manual (www.fws.gov/ventura/speciesinfo/protocols_guidelines) or more current guidance provided by CDFG and USFWS. At a minimum, the following measures shall be included in the plan and implemented by the project owner to manage their construction site, and related facilities, in a manner to avoid, minimize, or mitigate impacts to desert tortoise.

1. Fence Installation. Prior to ground disturbance, the entire project site shall be fenced with desert tortoise exclusion fence. To avoid impacts to desert tortoise during fence construction, the proposed fence alignment shall be flagged and the alignment surveyed within 24 hours prior to fence construction. Surveys shall be conducted by the Designated Biologist using techniques approved by the USFWS and CDFG. Biological Monitors may assist the Designated Biologist under his or her supervision. These surveys shall provide 100% coverage of all areas to be disturbed during fence construction and an additional transect along both sides of the proposed fence line. This fence line transect shall cover an area approximately 90 feet wide centered on the fence alignment. Transects shall be no greater than 30 feet apart. All desert tortoise burrows, and burrows constructed by other species that might be used by desert

tortoises, shall be examined to assess occupancy of each burrow by desert tortoises and handled in accordance with USFWS-approved protocol.

A. Timing and Supervision of Fence Installation. The exclusion fencing shall be installed prior to site clearing and grubbing. The fence installation shall be supervised by the Designated Biologist and monitored by the Biological Monitors to ensure the safety of any tortoise present.

B. Fence Material and Installation. The permanent tortoise exclusionary fencing shall consist of galvanized hard wire cloth 1 by 2 inch mesh sunk 12 inches into the ground, and 24 inches above ground (refer to parameters for USFWS-approved tortoise exclusion fencing at www.fws.gov/ventura/speciesinfo/protocols_guidelines). For temporary exclusion fencing, a “folded bottom” technique shall be implemented. This method follows the same guidelines as installation of permanent fencing except instead of burying the bottom 12 inches of the fencing, it is bent at a approximately 90 degree angle (to follow the contour of the ground) and spikes or other retaining methods are driven into the ground every two linear feet in such a manner as to “anchor” the bottom of the fence. This method eliminates the need for trenching, which for short-term temporary impacts may be more beneficial to the recovery of the landscape, and thus the species.

C. Security Gates. Security gates shall be designed with minimal ground clearance to deter ingress by tortoises. The gates shall remain closed except during vehicle passage and may be electronically activated to open and close immediately after vehicle(s) have entered or exited to prevent extended periods with open gates, which might lead to a tortoise entering.

D. Stormwater Drainage Fencing. The onsite stormwater drainage channels, including the headwalls, outlet, and road crossings, shall be permanently fenced to ensure exclusion of desert tortoise during AMS operation.

E. Fence Inspections. Following installation of the desert tortoise exclusion fencing for the permanent site and stormwater drainage fencing and temporary fencing (if required), the fencing shall be regularly inspected. Permanent fencing shall be inspected monthly and during/immediately following all major rainfall events. Any damage to the fencing shall be temporarily repaired immediately to keep tortoises out of the site, and permanently repaired within two days of observing damage. Inspections of permanent site fencing shall occur for the life of the project. Temporary fencing must be inspected immediately following major rainfall events. All temporary fencing shall be repaired immediately upon discovery and, if the fence may have permitted tortoise entry while damaged, the Designated Biologist shall inspect the area enclosed by the fence for tortoise.

2. Desert Tortoise Clearance Surveys. Following construction of the tortoise exclusionary fencing around the Plant Site, all fenced areas shall be cleared of tortoises by the Designated Biologist, who may be assisted by Biological Monitors. A minimum of two, 100 percent coverage protocol clearance surveys with negative results must be completed and these must coincide with heightened desert tortoise activity from April through May and September through October. Non-protocol clearance surveys may be conducted in areas of certainly unsuitable habitat (e.g., developed) with prior approval of specific areas by USFWS and CDFG (these proposed areas shall be identified in the draft Desert Tortoise Plan). Clearance survey transects shall be followed as described in the Final Desert Tortoise plan. Additional clearance survey guidelines area provided in the USFWS *Desert Tortoise Field Manual* (www.fws.gov/ventura/speciesinfo/protocols_guidelines).

   Translocation of Desert Tortoise. If desert tortoises are detected during clearance surveys within the project impact area, the Designated Biologist shall safely translocate the tortoise the shortest possible distance to the nearest suitable habitat. Any handling efforts shall be in accordance with techniques described in the final Desert Tortoise Plan, which shall be consistent with the USFWS *Desert Tortoise Field Manual* (www.fws.gov/ventura/speciesinfo/protocols_guidelines). If a visibly diseased tortoise is encountered onsite, procedures shall be implemented in accordance with the approved final Desert Tortoise Plan.

3. Burrow Inspection. All potential desert tortoise burrows within the fenced area shall be searched for presence. To prevent reentry by a tortoise or other wildlife, all burrows shall be collapsed once absence has been determined, in accordance with the final Desert Tortoise Plan. Immediately following excavation and if environmental conditions warrant immediate translocation, tortoises excavated from burrows shall be translocated to unoccupied natural or artificial burrows within the location approved by USFWS and CDFG per the final Desert Tortoise Plan.

4. Burrow Excavation. Burrows inhabited by tortoises shall be excavated by the Designated Biologist using hand tools, and then collapsed or blocked to prevent re-occupation, in accordance with the final Desert Tortoise Plan. If excavated during May through July, the Designated Biologist shall search for desert tortoise nests/eggs. All desert tortoise handling and removal, and burrow excavations, including nests, shall be conducted by the Designated Biologist in accordance with the USFWS *Desert Tortoise Field Manual* (www.fws.gov/ventura/speciesinfo/protocols_guidelines).

5. Monitoring During Clearing. Following the installation of exclusionary fencing and after ensuring desert tortoises are absent from the project site, heavy equipment shall be allowed to enter the project site to perform earth work such as clearing, grubbing, leveling, and trenching. A Biological Monitor shall be onsite at all times during initial clearing and grading

activities. Should a tortoise be discovered, it shall be relocated as described above in accordance with the final Desert Tortoise Plan.

6. Reporting. The Designated Biologist shall record the following information for any desert tortoises handled: a) the locations (narrative and maps) and dates of observation; b) general condition and health, including injuries, state of healing and whether desert tortoise voided their bladders; c) location moved from and location moved to (using GPS technology); d) gender, carapace length, and diagnostic markings (i.e., identification numbers or marked lateral scutes); e) ambient temperature when handled and released; and f) digital photograph of each handled desert tortoise as described in the paragraph below. Desert tortoise moved from within project areas shall be marked for future identification as described in USFWS *Desert Tortoise Field Manual* (www.fws.gov/ventura/speciesinfo/protocols_guidelines). Digital photographs of the carapace, plastron, and fourth costal scute shall be taken. Scutes shall not be notched for identification.

Verification: At least 45 days prior to start of any pre-construction site mobilization, the project owner shall provide the CPM with the final version of the Desert Tortoise Translocation Plan that has been approved by Energy Commission staff, USFWS, and CDFG. The CPM will determine the plan's acceptability within 15 working days of receipt of the final plan. All modifications to the approved final Desert Tortoise Translocation Plan must be made only after approval by the Energy Commission staff, USFWS, and CDFG. The project owner shall notify the CPM no fewer than five working days before implementing any CPM-approved modifications to the Translocation Plan.

Within 30 days of completing of desert tortoise clearance surveys the Designated Biologist shall submit a report to the CPM, USFWS, and CDFG describing how each of the mitigation measures described above has been satisfied. The report shall include the desert tortoise survey results, capture and release locations of any translocated desert tortoises, and any other information needed to demonstrate compliance with the measures described above.

MOHAVE GROUND SQUIRREL CLEARANCE SURVEYS

BIO-12 The project owner shall implement the following measures to manage their construction site, and related facilities, in a manner to avoid or minimize impacts to Mohave ground squirrels (MGS):

1. Clearance Survey. After the installation of the desert tortoise exclusion fence and immediately prior to any ground disturbance, the Designated Biologist(s) shall examine the construction disturbance area for MGS and their burrows. The survey shall provide 100% coverage of suitable habitat within the project site (undisturbed desert saltbush scrub, disturbed desert saltbush scrub, disturbed desert saltbush scrub regrowth, fallow agriculture-saltbush scrub regrowth).

    A. If potentially occupied burrows are identified, an attempt shall be made to trap and relocate the individual(s). Potentially occupied burrows shall be fully excavated by hand.

B. Trapping, relocation, and MGS burrow excavation shall only be conducted by individual(s) possessing an MOU with CDFG for such activities.

2. Records of Capture. If MGS are captured via trapping or burrow excavation, the Designated Biologist shall maintain a record of each Mohave ground squirrels handled, including: a) the locations (Global Positioning System [GPS] coordinates and maps) and time of capture and/or observation as well as release; b) sex; c) approximate age (adult/juvenile); d) weight; e) general condition and health, noting all visible conditions including gait and behavior, diarrhea, emaciation, salivation, hair loss, ectoparasites, and injuries; and f) ambient temperature when handled and released.

3. Relocation. Any MGS captured via trapping or burrow excavation shall be relocated to suitable habitat adjacent to the project site, which provides conditions suitable for the long-term survival of relocated MGS.

Verification: Within 30 days of completion of MGS clearance surveys, the Designated Biologist shall submit a report to the CPM and CDFG describing how the measures described above were implemented. The report shall include the MGS survey results, capture and release locations of any relocated squirrels, and any other information needed to demonstrate compliance with the measures described above.

BURROWING OWL IMPACT AVOIDANCE, MINIMIZATION AND MITIGATION MEASURES

BIO-13 Prior to preconstruction surveys, a Burrowing Owl Monitoring and Mitigation Plan (Burrowing Owl Plan) shall be developed by the project owner in consultation with the CPM and CDFG. This plan shall include detailed measures to avoid and minimize impacts to burrowing owls in and near the construction areas (if indentified during surveys) and shall be consistent with CDFG guidance (CDFG 1995). In addition, the plan shall identify the optimal time to concurrently relocate both desert tortoise and burrowing owl. At a minimum, the following measures shall be included in the plan and implemented by the project owner to manage their construction site, and related facilities, in a manner to avoid, minimize, or mitigate impacts to breeding and foraging burrowing owls.

1. Pre-Construction Surveys and Nest Avoidance. The Designated Biologist shall conduct pre-construction surveys for burrowing owls within the project site and a 160-foot buffer. These surveys shall be conducted concurrent with desert tortoise clearance surveys, to the maximum extent possible. The following shall be included in the Plan and implemented to avoid and minimize impacts to burrowing owls onsite:

A. Pre-construction surveys shall be conducted prior to the nesting season (February 1 through August 31) and all burrowing owls will be passively relocated using one-way trap doors. Once the Designated

Biologist has verified that all burrowing owls have vacated an occupied burrow, the Designated Biologist shall collapse the burrow, preventing re-occupation.

B. If ground disturbance cannot be avoided in areas where nesting burrowing owls are active, a 250-foot exclusion area around occupied burrows will be flagged and this area will not be disturbed during the nesting season (February 1 through August 31) unless a qualified biologist verifies through non-invasive methods that either: (1) the birds have not begun egg-laying and incubation; or (2) that juveniles from the occupied burrows are foraging independently and are capable of independent survival. The exclusion area shall remain connected to natural area(s) to the extent possible, to avoid completely surrounding the owl with construction activities and/or equipment.

2. <u>Artificial Burrow Installation.</u> Prior to any ground-disturbing activities, the project owner shall install five artificial burrows for each identified burrowing owl burrow in the project area that would be destroyed, within in the approved compensatory habitat area. The Designated Biologist shall survey the site selected for artificial burrow construction to verify that such construction will not affect desert tortoise or Mohave ground squirrel or existing burrowing owl colonies in the relocation area. Installation of the artificial burrows shall occur after baseline surveys of the relocation area and prior to ground disturbance or heavy equipment staging. Design of the artificial burrows shall be consistent with CDFG guidelines (CDFG 1995) and shall be approved by the CPM in consultation with CDFG.

3. <u>Passive Relocation.</u> Prior to passive relocation, any owls that will be relocated shall be color banded with air-craft aluminum bands in accordance with the guidance provided by USGS bird banding lab (http://www.pwrc.usgs.gov/bbl) to monitor relocation success. Color banding shall not be conducted during the breeding season. During the non-breeding season, owls would be given a minimum of three weeks to become familiar with the new artificial burrows, after which eviction of owls within the project site could begin. Use of one-way doors described by Trulio (1995) and Clark and Plumpton (2005) would be used to facilitate passive relocation of owls.

   A. <u>Monitoring and Success Criteria.</u> The Designated Biologist shall survey the compensatory mitigation area and a suitable habitat within a 600 meter radius from the project site to assess use of the artificial burrows by owls and relocation success after exclusion from the project area. Surveys shall be conducted using methods consistent with Phase II and Phase III California Burrowing Owl Consortium guidelines (CBOC 1993). Surveys shall be conducted two times in the spring and two times in the winter following eviction. The second survey within a season shall be conducted within 30 days of the first. Surveys shall continue for a period of two years to encompass a total of two spring seasons (4 total spring surveys) and two winter seasons (4 total winter surveys).

Surveys and monitoring shall be conducted using non-invasive methods (i.e., high-powered binoculars, spotting scope, or camera). Owls shall not be trapped or otherwise handled to read the color band.

If survey results indicate burrowing owls are not nesting within the surveyed area, remedial actions may be developed and implemented in consultation with the CPM, CDFG and USFWS to correct conditions at the site that might be preventing owls from nesting there. A report describing survey results and any remedial actions taken shall be submitted to the CPM, CDFG and USFWS no later than January 31 of each year for two years.

4. <u>Preserve and Manage Compensatory Habitat.</u> For each individual owl or pair identified on the project site during pre-construction surveys, off-site mitigation shall be required as described in the California Burrowing Owl Consortium guidelines (CBOC 1993). Determining which ratio to apply depends on whether the proposed compensatory habitat is occupied or unoccupied.

    A. Replacement of occupied habitat with occupied habitat: 1.5 times 6.5 (9.75) acres per pair of single bird

    B. Replacement of occupied habitat with suitable unoccupied habitat: 3 times 6.5 (19.5) acres per pair of single bird.

Compensatory habitat shall be suitable for occupation by burrowing owls and preserved and managed in perpetuity for this purpose. Compensatory mitigation may be within the 118.2 acres proposed for desert tortoise and MGS (refer to **BIO-15**), provided that it also meets the criteria for suitable burrowing owl habitat. The compensatory habitat shall be managed for the benefit of burrowing owls, with the specific goals of:

A. Maintaining the functionality of artificial and natural burrows; and

B. Minimizing the occurrence of weeds (species considered “moderate” or “high” threat to California wildlands as defined by CAL-IPC [2006] and noxious weeds rated “A” or “B” by the California Department of Food and Agriculture and any federal-rated pest plants [CDFA 2009]) at less than 10% cover of the shrub and herb layers.

    The Burrowing Owl Plan shall also include monitoring and maintenance requirements for the compensatory habitat, details on methods for measuring compliance goals, and remedial actions to be taken if management goals are not met.

The final Burrowing Owl Plan is due before preconstruction surveys begin to ensure that an approved relocation methodology will be followed for any owls occurring within the project area. Therefore, it is understood that the compensatory mitigation acreage (if required) may not be identified in the Burrowing Owl Plan. However, the Plan shall propose a location for compensatory mitigation land and the acreage required, quantified according to the CBOC methods outlined above. If owls are identified during the pre-construction survey, the project owner shall submit an addendum to the Burrowing Owl Plan, which identifies the number of owls identified and the exact acreage to be preserved and managed in perpetuity for burrowing owl based on the results of the preconstruction survey and as agreed to in consultation with CDFG.

Verification: At least 45 days prior to start of any pre-construction site mobilization, the project owner shall provide the CPM and CDFG with the final version of the Burrowing Owl Monitoring and Mitigation Plan that has been reviewed and approved by the CPM in consultation with CDFG. An addendum to the plan, which includes the pre-construction survey results, (e.g., number of owls identified onsite) and the CDFG-approved amount of compensatory mitigation, shall be submitted within 10 days of completing the burrowing owl pre-construction surveys. The CPM will determine the acceptability of the Plan and addendum within 15 days of their receipt. All modifications to the approved Plan may be made by the CPM after consultation with CDFG. The project owner shall notify the CPM no less than five working days before implementing any CPM-approved modifications to the Burrowing Owl Monitoring and Mitigation Plan.

AMERICAN BADGER AND DESERT KIT FOX IMPACT AVOIDANCE AND MINIMIZATION MEASURES

BIO-14 To avoid direct impacts to American badgers and desert kit fox, preconstruction surveys shall be conducted for these species concurrent with the desert tortoise surveys. Surveys shall be conducted as described below:

Biological Monitors shall perform pre-construction surveys for badger setts and kit fox burrows in the project area, including areas within 250 feet of the project site. If burrows are detected, each burrow shall be classified as inactive, potentially active, or definitely active.

Inactive burrows and setts that would be directly impacted by construction activities shall be excavated by hand and backfilled to prevent reuse by badgers or kit fox.

Potentially and definitely active burrows and setts shall not be disturbed during the whelping/pupping season (February 1 – September 30). Potentially and definitely active dens that would be directly impacted by construction activities shall be monitored by the Biological Monitor for three consecutive nights using a tracking medium (such as diatomaceous earth or fire clay) and/or infrared camera stations at the entrance. If no tracks are observed in the tracking medium or no photos of the target species are captured after three nights, the den shall be excavated and backfilled by hand. If tracks are observed, the Biological Monitor shall directly observe the burrow or sett and block the entrance after the animal exits and the Biological Monitor has verified that there are no animals in the burrow or sett. The burrow or den shall be blocked with natural materials (e.g., rocks, dirt, sticks, and vegetation piled in front of the entrance) or passive hazing methods shall be employed for the next three to five nights to discourage the badger or kit fox from continued use. Passive hazing methods shall be approved by CDFG. Live or other traps shall not be used (CCR Title 14 Section 460). A kit fox or badger shall never be trapped in its burrow/sett. After verification that the den is unoccupied it shall then be excavated and backfilled by hand to ensure that no badgers or kit fox are trapped in the den.

Verification: The project owner shall submit a report to the CPM and CDFG within 30 days of completion of badger and kit fox surveys. The report shall describe survey methods, results, measures implemented, and the results of the measures.

COMPENSATORY MITIGATION

BIO-15 To fully mitigate for habitat loss and incidental take of desert tortoise and Mohave ground squirrel as well as burrowing owl, the project owner shall acquire, prior to ground-disturbing activities, in fee or in easement, no less than 118.2 acres of land suitable for these species and shall provide funding for the enhancement and long-term management of these compensation lands. The responsibilities for management of the compensation lands may be delegated by written agreement to CDFG or to a third party, such as a non-governmental organization dedicated to habitat conservation, subject to approval by the CPM, in consultation with CDFG and USFWS prior to land acquisition or management activities. If habitat disturbance exceeds that described in this analysis, the project owner shall be responsible for acquisition and management of additional compensation lands and/or additional funds required to compensate for any additional habitat disturbances. Additional funds shall be based on the adjusted market value of compensation lands at the time of construction to acquire and manage habitat. Agreements to delegate land acquisition or management shall be implemented within 12 months of the Energy Commission's decision. The acquisition and management of compensation lands shall include, but is not limited to, the following elements:

1. Selection Criteria for Compensation Lands. The compensation lands selected for acquisition or title/easement transfer shall:

   A. have substantial capacity to support resident and dispersing desert tortoise, MGS, and burrowing owl;

   B. be a contiguous block of land (preferably) or located so that parcel(s) result in a contiguous block of protected habitat;

   C. not be encumbered by easements or uses that would preclude fencing of the site or preclude management of the site for the primary benefit of the species for which mitigation lands were secured; and

   D. include mineral/water rights or ensure that those rights may not be evoked in a manner to negate the value of the compensation lands.

2. Review and Approval of Compensation Lands Prior to Acquisition or Title/Easement Transfer. A minimum of three months prior to acquisition or transfer of the property title and/or easement, the project owner, or a third-party approved by the CPM, in consultation with CDFG and USFWS,

shall submit a proposal to the CPM, CDFG, and USFWS describing the parcel(s) intended for purchase or title/easement transfer. This proposal shall discuss the suitability of the proposed parcel(s) as compensation lands for desert tortoise, MGS, and burrowing owl in relation to the criteria listed above. Approval from the CPM, in consultation with USFWS and CDFG, shall be required for acquisition of all parcels comprising no less than 118.2 acres in advance of purchase or title/easement transfer.

3. Review and Approval of Compensation Lands Management Plan. Within six months of the land or easement purchase or transfer, as determined by the date on the title, the project owner, or a third-party approved by the CPM, in consultation with CDFG and USFWS, shall submit a compensation lands management plan to the CPM, CDFG, and USFWS. The plan shall include, but not be limited to proposed measures to enhance habitat (e.g., removal of structures and other human attractants); maintenance procedures; general maintenance provisions (e.g., trash dumping, trespass, pesticide use avoidance, etc.).

4. Mitigation Security for Compensation Lands and Avoidance/Minimization Measures. The project owner shall provide financial assurances to the CPM, with copies of the document(s) to CDFG and USFWS, to guarantee that an adequate level of funding is available to implement all biological avoidance, minimization, and compensation measures described in the conditions of certification**.** These funds shall be used solely for implementation of the measures associated with the project.

   The project owner or an approved third party shall complete acquisition of the proposed compensation lands prior to initiating ground-disturbing project activities.

5. Conditions for Acquisition of Compensation Lands. The project owner shall comply with the following conditions relating to acquisition of compensation lands or transfer of the property's title and/or easement after the CPM, in consultation with CDFG and USFWS, has approved the proposed compensation lands as described above.

   A. Preliminary Report: The project owner, or approved third party, shall provide a recent preliminary title report (no more than six months old), hazardous materials survey report (i.e., Phase I ESA), biological analysis, and other necessary documents for the proposed 118.2 acres. All documents conveying or conserving compensation lands and all conditions of title/easement are subject to a field review and approval by the CPM, in consultation with CDFG and USFWS, California Department of General Services and, if applicable, the Fish and Game Commission and/or Wildlife Conservation Board.

   B. Title/Conveyance: The project owner shall transfer fee title/deed or a conservation easement for the 118.2 acres of compensation lands to CDFG under terms approved by CDFG. Alternatively, a CPM-approved, in consultation with CDFG and USFWS, non-profit organization qualified pursuant to California Government Code section 65965 may hold fee title or a conservation easement over the compensation lands. In the event an approved non-profit holds title, a conservation easement shall be recorded in favor of CDFG in a form approved by CDFG and USFWS; in the event an approved non-profit holds a conservation easement over the compensation lands, CDFG shall be named a third party beneficiary. USFWS shall be named a third party beneficiary regardless of who holds the easement. The project owner shall also provide a property assessment and warranty.

C. Enhancement Fund. The project owner shall fund the initial protection and enhancement of the 118.2 acres by providing the enhancement fund to the CDFG. Alternatively, a CPM-approved, in consultation with CDFG and USFWS, non-profit organization qualified pursuant to California Government Code section 65965 to manage the compensation lands may hold the enhancement funds. If CDFG takes fee title to the compensation lands, the enhancement fund must go to CDFG.

D. Endowment Fund: Prior to ground-disturbing project activities, the project owner shall provide to CDFG a capital endowment in the amount determined through the Property Analysis Record (PAR) or PAR-like analysis that will be conducted for the 118.2 acres of compensation lands. Alternatively, a CPM-approved, in consultation with CDFG and USFWS, non-profit organization qualified pursuant to California Government Code section 65965 may hold the endowment fees. If CDFG takes fee title to the compensation lands, the endowment must go to CDFG, where it will likely be held in the special deposit fund established pursuant to Government Code section 16370. If the special deposit fund is not used to manage the endowment, the California Wildlife Foundation will manage the endowment for CDFG and with CDFG guidance.

The project owner and the CPM shall ensure that an agreement is in place with the endowment holder/manager to ensure the following:

- Interest. Interest generated from the initial capital endowment shall be available for reinvestment into the principal and for the long-term operation, management, and protection of the approved compensation lands, including reasonable administrative overhead, biological monitoring, improvements to carrying capacity, law enforcement measures, and any other action designed to protect or improve the habitat values of the compensation lands.
- Withdrawal of Principal. The endowment principal shall not be drawn upon unless such withdrawal is deemed necessary by the CDFG or the approved third-party endowment manager to ensure the continued viability of the species on the 118.2 acres. If CDFG takes fee title to the compensation lands, monies received by CDFG pursuant to this provision will likely be deposited in a special

deposit fund established pursuant to Government Code section 16370. If the special deposit fund is not used to manage the endowment, the California Wildlife Foundation will manage the endowment for CDFG and with CDFG guidance.

- Pooling Endowment Funds. CDFG, or a CPM-approved, in consultation with CDFG and USFWS, non-profit organization qualified pursuant to California Government Code section 65965 to hold endowments may pool the endowment with other endowments for the operation, management, and protection of the 118.2 acres for local populations of desert tortoise and MGS. However, for reporting purposes, the endowment fund must be tracked and reported individually.

E. Security Deposit. The project owner may proceed with ground disturbing activities before fully performing its compensatory mitigation duties and obligations as set forth above only if the project owner secures its performance by providing funding to CDFG (Security Deposit), or if CDFG approves, administrative proof of funding, necessary to cover easement costs, fencing/cleanup costs, and as necessary, initial protection and enhancement of the compensation lands. If the Security is provided to allow the commencement of project disturbance prior to completion of compensation actions, the project owner, CDFG, or a third-party entity approved by the CPM, in consultation with CDFG and USFWS, may draw on the principle sum if it is determined that the project owner has failed to comply with the conditions of certification. The security will be returned to the project owner upon completion of the legal transfer of the compensation lands to CDFG or approved third-party entity, or upon completion of an implementation agreement with a third party mitigation banking entity acceptable to the CPM and CDFG, to acquire and/or manage the compensation lands.

The Security is calculated as follows:

- Costs of enhancing compensation lands are estimated at $250 per acre.
- Costs of establishing an endowment for long-term management of compensation lands are estimated at $1,300 per acre.

F. Reimbursement Fund. The project owner shall provide reimbursement to the CDFG or approved third party for reasonable expenses incurred during title, easement, and documentation review; expenses incurred from other state agency reviews; and overhead related to providing compensation lands.

The project owner is responsible for all compensation lands acquisition/easement costs, including but not limited to, title and document review costs, as well as expenses incurred from other state agency reviews and overhead related to providing compensation lands to the department or approved third party; escrow fees or costs; environmental contaminants clearance; and other site cleanup measures.

The project owner may choose to satisfy its mitigation obligations by paying an in-lieu fee instead of acquiring compensation lands to mitigate for 118 acres of habitat, pursuant to California Senate Bill 34 (enacting CESA § 2069 and 2099) or other applicable in-lieu fee provision, to the extent the in-lieu fee provision is found by the Energy Commission to be in compliance with CEQA and CESA requirements.

Verification: No less than 90 days prior to acquisition of the property, the project owner, or a third-party approved by the CPM, in consultation with CDFG and USFWS, shall submit a formal acquisition proposal to the CPM, CDFG, and USFWS describing the parcel(s) intended for purchase or title/easement transfer. At least 30 days prior to construction-related ground disturbance (or as allowed under 5(e), above), the project owner shall provide written verification to the CPM that the compensation lands or conservation easements have been acquired and recorded in favor of the approved recipient(s). Within six months of the land or easement purchase, as determined by the date on the title, the project owner shall provide the CPM with a management plan for review and approval, in consultation with CDFG, for the compensation lands and associated funds.

Within 90 days after completion of project construction, the project owner shall provide to the CPM verification that disturbance to desert tortoise and MGS habitat did not exceed 430 acres, and that construction activities did not result in impacts to desert tortoise, MGS, and burrowing owl habitat adjacent to work areas. If habitat disturbance exceeds that described in this analysis, the CPM shall notify the project owner of any additional funds required or lands that must be purchased to compensate for any additional habitat disturbances at the adjusted market value at the time of construction to acquire and manage habitat.

If electing to use an in-lieu fee provision, the project owner shall request from the Energy Commission a determination that the project's in-lieu fee proposal meets CEQA and CESA requirements.

TAMARISK ERADICATION, MONITORING, AND REPORTING PROGRAM

BIO-16 The project owner shall ensure effective removal of tamarisk by designing and implementing a monitoring and reporting plan. The plan shall include proposed methods for tamarisk removal and treatment, monitoring and maintenance procedures/timeline, irrigation, success standards and contingency measures, and monitoring and maintenance objectives to prevent the re-invasion of undesirable weeds and/or invasive wildlife species for a minimum of five years. The plan shall include identification on a map of each location and size of non-native vegetation to be removed, and the methods proposed to remove and dispose of invasive wildlife species. Exotic, non-native, and invasive species removal shall be conducted throughout the monitoring and maintenance period. Prior to any tree removal, it will be verified that there are no nesting raptors or other MBTA-protected birds.

For the CPM and CDFG to deem eradication successful:

- The site shall not contain more than 5% exotic plant species for the CPM and CDFG to deem the tamarisk removal successful.
- All plant species with rates of dispersal and establishment listed as “High” or “Moderate” on the California Invasive Plant Inventory shall have documented absence, or have been removed from the site for at least three years for the CPM and CDFG to deem the site successful.
- The site shall not contain invasive wildlife species for the CPM and CDFG to deem the site successful.

Monitoring and maintenance of the site shall be conducted for five years unless less monitoring can be justified. Following the first year of monitoring, if the project owner petitions to terminate the monitoring program, staff and CDFG will determine whether more years are of monitoring are needed.

Verification: At least 30 days prior to any construction-related ground disturbance, the project owner shall submit to the CPM a copy of the Energy Commission staff- and CDFG-approved Tamarisk Eradication Monitoring and Reporting Plan, including success criteria.

The Designated Biologist shall submit annual reports to the CPM and CDFG describing the dates, durations and results of monitoring. The reports shall fully describe the status of the tamarisk at the eradication site, and shall describe any actions taken to remedy regrowth.

The CPM and CDFG shall 1) verify compliance with protective measures to ensure the accuracy of the project owner’s mitigation, monitoring and reporting efforts; and 2) review relevant documents maintained by the project owner, interview the project owner’s employees and agents, inspect the work site, and take other actions as necessary to assess compliance with or effectiveness of protective measures.

MONITORING IMPACTS OF SOLAR COLLECTION TECHNOLOGY ON BIRDS

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

Verification: At least 60 days prior to any construction-related ground disturbance, the project owner shall submit to the CPM, USFWS, and CDFG a draft Bird Monitoring Study. At least 30 days prior to start of any construction-related ground disturbance activities, the project owner shall provide the CPM with the final version of the Bird

Monitoring Plan that has been reviewed and approved by the CPM, in consultation with CDFG and USFWS. All modifications to the Bird Monitoring Study shall be made only after approval from the CPM.

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

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

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

COMMON RAVEN MONITORING, MANAGEMENT, AND CONTROL

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

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

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

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

   C. Describe control practices for ravens;

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

   E. And discuss reporting requirements.

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

Verification: At least 45 days prior to start of any construction-related ground disturbance activities, the project owner shall provide the CPM, USFWS, and CDFG with the final version of the Raven Plan that has been reviewed and approved by USFWS and CDFG. The CPM shall determine the plan's acceptability within 15 days of receipt of the final plan. All modifications to the approved Raven Plan must be made only after consultation with the Energy Commission staff, USFWS, and CDFG. The project owner shall notify the CPM no less than five working days before implementing any CPM-approved modifications to the Raven Plan.

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

Within 30 days after completion of project construction, the project owner shall provide to the CPM for review and approval a report identifying which items of the Raven Plan have been completed, a summary of all modifications to mitigation measures made during the project's construction phase, and which items are still outstanding.

Evaporation Pond Monitoring and Adaptive Management Plan

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

- A description of evaporation pond design features such as side slope specifications, freeboard and depth requirements, which will prevent use by wildlife;
- A detailed description of the wildlife monitoring procedures and schedule. For the initial implementation of a new technology, daily monitoring shall be conducted both at the project evaporation ponds and the wetlands within the Harper Lake ACEC. Monitoring may be reduced to weekly and potentially bi-weekly or monthly depending on the results of initial monitoring period.
- A detailed description of the water quality and water level monitoring procedures and schedule. Water quality and water level monitoring shall coincide with wildlife monitoring to provide a basis for comparative analysis.

- A description of wildlife exclusion/deterrent technologies and adaptive management strategies. Technologies shall include, but are not limited to netting, and shall not disturb or harass non-target wildlife adjacent to the project area.
- Triggers for adaptive management (i.e., modifications to existing technology or replacement with new technology). Adaptive management shall be necessary if: 1) more than one dead bird per quarter is discovered at the evaporation ponds; or 2) one special-status animal is discovered at the evaporation ponds; or 3) noise levels attributable to the technology exceed 60dB at the Harper Lake ACEC wetlands. After three failed attempts at new technology or modification of existing technology, the ponds shall be netted;
- Reporting requirements, to include monthly reporting for the first year if a technology other than netting is used. Reporting may be reduced to monthly or quarterly thereafter if no bird or wildlife deaths are reported during the first year. If wildlife mortality occurs at the ponds or if birds are disturbed at the marsh as described above, the CPM shall be notified within 10 days of the incident and the accompanying adaptive management action to be implemented.

Evaporation pond monitoring and reporting shall continue for the life of the project. The draft Plan submitted by the Applicant (AS 2009d) shall provide the basis for the final plan, subject to review and revisions from the CPM in coordination with USFWS, CDFG, and RWQCB.

Verification: At least 120 days prior to operation of the evaporation ponds, the project owner shall provide the CPM, USFWS, RWQCB, and CDFG with the final version of the Plan that has been reviewed and approved by the CPM in consultation with USFWS, RWQCB, and CDFG. The CPM will determine the plan's acceptability within 60 days of receipt of the final plan. All modifications to the approved Plan may be made by the CPM after consultation with USFWS, RWQCB, and CDFG. The project owner shall notify the CPM no less than five working days before implementing any CPM-approved modifications to the Evaporation Pond Plan.

HARPER DRY LAKE MARSH WATER DELIVERY

BIO-20 To ensure continuity of water delivery to the Harper Dry Lake ACEC the project owner shall not decommission the existing well on Mojave Solar, LLC-owned property that currently serves the Harper Dry Lake marsh (wetland well) until an alternate well is able to effectively convey a minimum of 75 acre feet per year to the Harper Dry Lake marsh.

This condition of certification does not transfer to Mojave Solar, LLC the obligation of Luz Solar Partners Ltd. to allow BLM to pump 75 acre feet of water per year to the marsh, under SEGS IX Condition of Certification **BIO-11.k**.

Verification: At least 15 days prior to decommissioning the wetland well, the project owner shall provide proof, to the satisfaction of the CPM, that the alternate well is completed and able to effectively convey a minimum of 75 acre feet per year to the Harper Dry Lake marsh. Proof shall include, but not be limited to, a description of the well parameters, as constructed.

USFWS BIOLOGICAL OPINION

BIO-21 The project owner shall provide a copy of the Biological Opinion per Section 7 of the federal Endangered Species Act written by the U. S. Fish and Wildlife Service in consultation with U.S. Department of Energy. The terms and conditions contained in the Biological Opinion shall be incorporated into the project's BRMIMP and implemented by the project owner.

Verification: For the Biological Opinion to effectively provide guidance on pre-construction actions for listed species (e.g., desert tortoise clearance surveys and translocation), the project owner shall submit to the CPM a copy of the USFWS's Biological Opinion at least 45 days prior to the start of any pre-construction site mobilization. At this time the project owner shall also verify that the permit terms and conditions of the Biological Opinion are incorporated into the BRMIMP and will be implemented.

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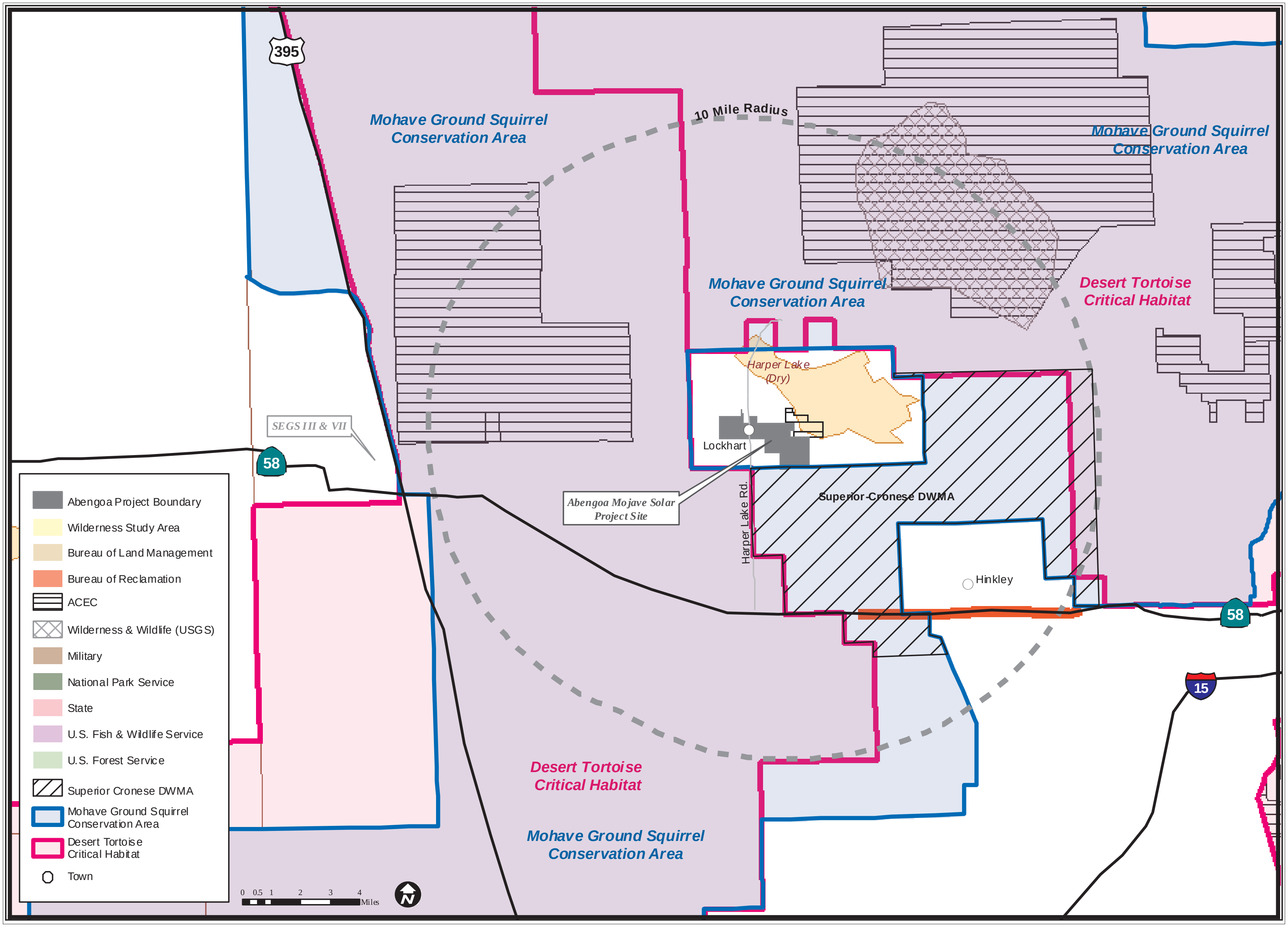
BIOLOGICAL RESOURCES - FIGURE 1

Abengoa Mojave Solar Project -Land Management Areas and Project Vicinity

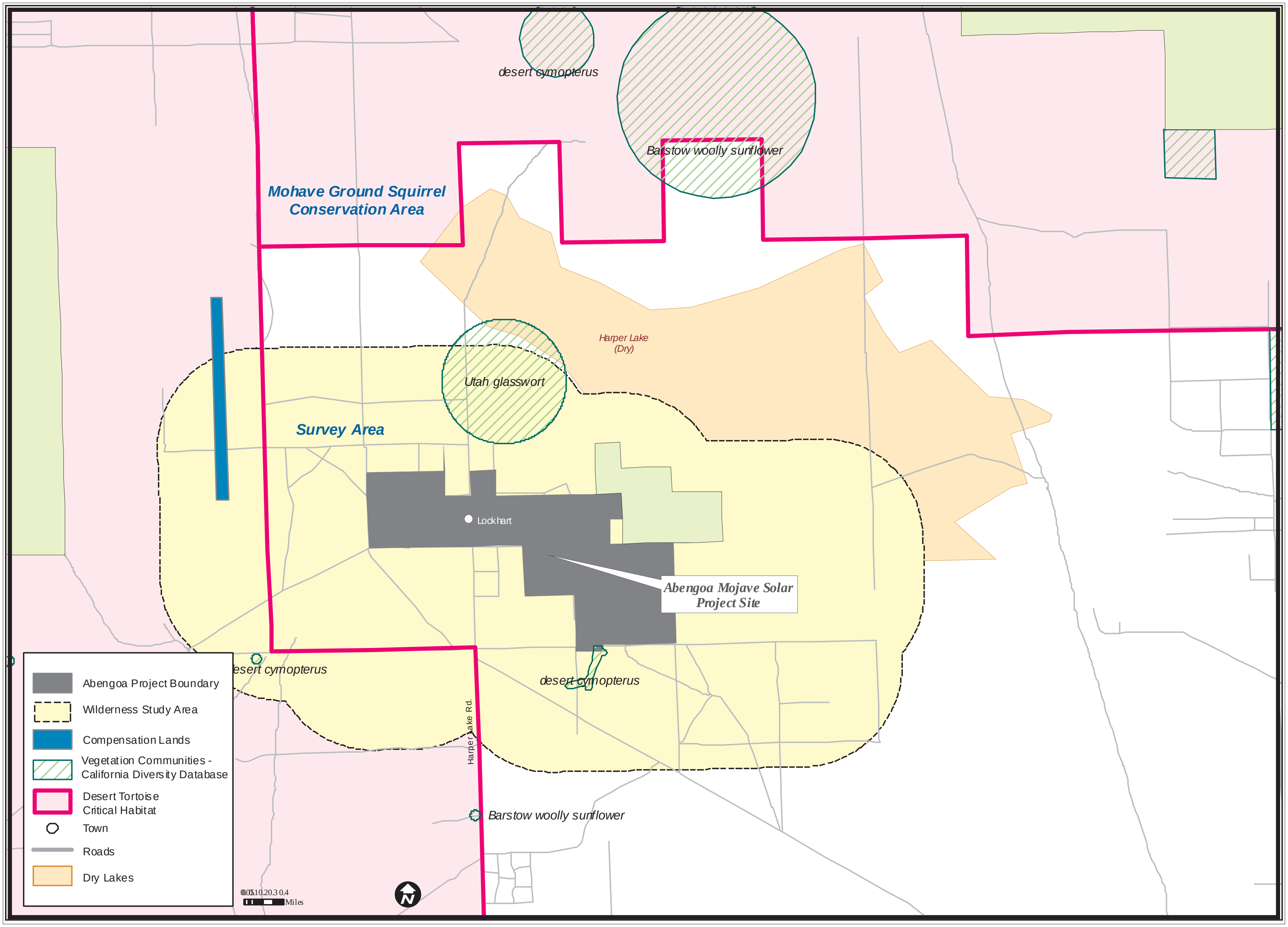


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MAY 2010

SOURCE: California Energy Commission, Bureau of Land Management

BIOLOGICAL RESOURCES - FIGURE 2

Abengoa Mojave Solar Projet - Compensation Lands and Project Vicinity



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MAY 2010

SOURCE: California Energy Commission, Bureau of Land Management

CULTURAL RESOURCES

Testimony of Kathleen A. Forrest

SUMMARY OF CONCLUSIONS

Staff concludes that the Abengoa Mojave Solar (AMS) project has a moderate to high potential to have significant direct impacts on unknown buried prehistoric archaeological deposits. Site P-36-006553, previously included in staff's project area of analysis, has been removed as the applicant submitted data showing the site was outside the area of analysis defined below and therefore would not be impacted by the project. As such, Condition of Certification **CUL-8**, which pertained to the treatment of P-36-006553, has also been removed from this analysis.

Staff recommends that the Commission adopt the following cultural resources Conditions of Certification, **CUL-1** through **CUL-7**. These measures are intended to facilitate the identification and assessment of inadvertent discoveries of archaeological resources during construction and to mitigate any significant impacts from the project on these resources should they be determined significant. To accomplish this, the conditions provide for the hiring of a Cultural Resources Specialist and archaeological monitors, for cultural resources awareness training for construction workers, for the archaeological and Native American monitoring of ground-disturbing activities, for the recovery of data from significant discovered archaeological deposits, for the writing of a technical archaeological report on all archaeological activities and findings, and for the curation of recovered artifacts and other data. When properly implemented and enforced, staff believes that these conditions of certification would reduce to less than significant any impacts to inadvertent discoveries during construction or operation that are determined to be significant archaeological resources. Additionally, with the adoption and implementation of these conditions, the AMS would be in conformity with all applicable laws, ordinances, regulations, and standards (LORS).

INTRODUCTION

This cultural resources assessment provides an assessment of the potential impacts of the AMS to cultural resources. Cultural resources are defined under state law as buildings, sites, structures, objects, and historic districts. Three kinds of cultural resources are considered in this assessment: prehistoric, historic, and ethnographic.

Prehistoric archaeological resources are those materials relating to prehistoric human occupation and use of an area. These resources may include sites and deposits, structures, artifacts, rock art, trails, and other traces of Native American human behavior. In California, the prehistoric period began over 12,000 years ago and extended through the eighteenth century until 1769, when the first Europeans settled in California.

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 ways, artifacts, or other evidence of human activity. Under federal and state requirements, historical cultural resources must be greater than fifty years old to be considered of potential historic importance. A resource less than fifty years of age may be historically important if the resource is of exceptional importance.

Ethnographic resources are those materials important to the heritage of a particular ethnic or cultural group, such as Native Americans or African, European, or Asian immigrants. They may include traditional resource collecting areas, ceremonial sites, topographic features, cemeteries, shrines, or ethnic neighborhoods and structures.

For the AMS project, staff provides an overview of the environmental setting and history of the project area, an inventory of the cultural resources identified in the project vicinity, and an analysis of the potential impacts from the proposed project using criteria from the CEQA.

If cultural resources are identified, staff determines which are significant and whether there could be an AMS project-related significant impact to those. If significant project impacts to significant cultural resources cannot be avoided, staff recommends mitigation measures to reduce impacts to significant cultural resources to below the level of significance.

Staff's primary concern is to ensure that all potentially significant historical resources are identified, that all potential impacts are identified, and that conditions are set forth that ensure that all significant impacts are mitigated to a less-than-significant level.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Projects licensed by the Energy Commission are reviewed to ensure compliance with all applicable laws. For this project, which has no federal involvement, the applicable laws are primarily state laws, in particular, the California Environmental Quality Act (CEQA). Although the Energy Commission has pre-emptive authority over local laws, it typically ensures compliance with local laws, ordinances, regulations, standards, plans, and policies.

Cultural Resources Table 1
Laws, Ordinances, Regulations, and Standards

Applicable Law	Description
State	
Public Resources Code, section 21083.2 (CEQA)	The lead agency may require reasonable steps to preserve a unique archaeological resource in place. Otherwise, the project applicant is required to fund mitigation measures to the extent prescribed in this section. This section also allows a lead agency to make provisions for archaeological resources unexpectedly encountered during construction, which may require the project applicant to fund mitigation and delay construction in the area of the find.
Health and Safety Code, section 7050.5	Makes it a misdemeanor to disturb or remove human remains found outside a cemetery; also requires a project owner to halt construction if human remains are discovered and to contact the county coroner.
Public Resources Code 5097.98 (b) and (e)	Requires a landowner on whose property Native American human remains are found to limit further development activity in the vicinity until he/she confers with the Native American Heritage Commission's(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.
Local	
San Bernardino County General Plan, Section V.4-Conservation Element	Provides that the County will preserve and promote its historic and prehistoric cultural heritage.

SETTING

REGIONAL SETTING

The proposed Abengoa Mojave Solar project (AMS) would be located near Harper Dry Lake in San Bernardino County, in the western Mojave Desert. The project site is located approximately 15 miles northwest of Barstow and nine miles northwest of Hinkley in an unincorporated area of San Bernardino County. The proposed project would be located southwest of Harper Dry Lake, and the site has a relatively flat topography with elevations ranging from approximately 2,100 feet at the southwest corner of the site and descending to approximately 2,030 feet at the northwest corner.

PROJECT, SITE, AND VICINITY DESCRIPTION

The proposed AMS project is a solar thermal electric generating facility to be located on approximately 1,765 acres. The proposed project site is located approximately nine miles northwest of the Town of Hinkley in unincorporated San Bernardino County, approximately halfway between the City of Barstow and Kramer Junction (US Highway 395/State Route 58 junction). Project site access is provided by Harper Lake Road, which is located approximately twenty miles west of Barstow along the State Route 58 corridor. The project site is approximately six miles north of where Harper Lake Road intersects with State Route 58. Existing Solar Electric Generating Stations VIII and IX facilities, now owned by NextEra™ Energy Resources, are located adjacent to the project site.

The project site is comprised of private property that was historically used as the Lockhart Ranch complex. The property has served as an agricultural and cattle center for over sixty years and, in that capacity, has utilized water from ground wells. Farming activities have included flood irrigation and the pivot system of irrigation of quarter section areas. Currently there are no ranching or residential activities on the property, and there is only one active pivot irrigation field in production on the site. The structures associated with the Lockhart Ranch and the town of Lockhart are abandoned or have been demolished.

Harper Dry Lake, located northeast of the proposed project site, was a Pleistocene-era pluvial lake and is now a dry playa. Evidence suggests that the lake once served as the terminal lake of the Mojave River, until the river's course was shifted southward. The Mojave River is now located approximately 12 miles from the proposed project site. The last wet sections of the lake dried up in the 1990s (AS 2009a, p. 5.4-13).

The project will have a combined nominal electrical output of 250 MW from twin 125-MW parabolic trough power blocks. Solar thermal technology will provide 100% of the power generated by the plant. No supplementary energy source, such as natural gas to generate electricity at night, is proposed to be used for electricity generation. Each power block will have an auxiliary boiler fueled by natural gas to reduce startup time and for heat transfer fluid freeze protection. Each power block will also have a diesel powered firewater pump for fire protection and a diesel powered backup generator for power plant essentials.

The power blocks will connect to the Southern California Edison (SCE) Kramer Coolwater 230-kV transmission line to form one full-output transmission interconnection. The interconnection is located at the southern border of the project site. The on-ground improvements associated with the interconnection were permitted in an outside process led by SCE. All project-related transmission facilities are located within the project site boundaries.

Natural gas for the project's auxiliary purposes will be supplied by a SoCal Gas-owned pipeline that runs to the project boundary. No additional offsite project facilities are proposed as part of the AMS (EDAW 2009a, p 5-6).

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 AMS is located, the Mojave Desert, 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 vicinity of the project site. 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.

Paleoclimate

The climate in the Mojave Desert has fluctuated between the dry climate familiar today and a wetter climate in the past. The late Pleistocene data shows that the Laurentide ice sheet forced a moisture-laden jet stream directly over the Mojave region, and the Eastern Pacific Ocean received consistent El Nino-like weather patterns during full glacial climate regimes. The high albedo (reflective) rates of Laurentide ice sheet allowed for a continued southerly jet stream even in summer. The combination of the above factors allowed California to received moisture-laden air annually. In the Mojave, data indicates that during the late Pleistocene epoch pinyon-juniper woodlands occurred at elevations as low as 1000 meters, indicating a significantly wetter environment (SWCA 2009c, p. 3-4).

The Pleistocene-Holocene transition was one of extreme climate change and massive deglaciation, including the collapse of the Laurentide ice sheet. The effect on the Mojave was change from pinyon-juniper woodland to more familiar modern desert scrub. The Middle Holocene saw increased rainfall leading to the enlargement of lakes. The Late Holocene brought a reduction in precipitation leading to drought conditions (SWCA 2009c, p. 3-4).

Early research in the area indicated a paleolake likely existed in the Harper Basin. This was confirmed in later research, which also determined the highest paleoshoreline was located near 2,150-2,160 feet above mean sea level (amsl). The likely source for lake was the Mojave River, which probably flowed or terminated into the Harper Basin until it was diverted away as a result of tectonic forces (SWCA 2009c, p. 3-4).

Geology

The project site is located in the western region of the Mojave Desert Geomorphic Province. It is bounded by the Transverse Ranges to the northwest; the Colorado Desert to the southwest; the Colorado River to the east; and the Sierra Nevada and Basin and Range provinces to the north. The Mojave is an elevated alluvial plain on a wedge-shaped fault, bounded by the San Andreas and Garlock fault zones. The project area is “underlain by Quaternary alluvial and lake bed deposits ranging from Pleistocene (1.8 million years old [Ma] to 10,000 BP) to Holocene (10,000 BP to Recent) in age” (SWCA 2009c, p. 5). The surface of the project area is mapped to a large extent as “made land,” or artificial fill resulting from extensive agricultural disturbance (SWCA 2009c, p. 4-5).

Geomorphology

Geomorphology is the study of landforms and the forces that shape them (Waters 1996, p. 3-4). The AMS project site is located in the western portion of the Mojave Desert Geomorphic Province. It is a large depressional, wedge-shaped block bounded by faults. There are numerous parallel strike-slip faults within the block, which has resulted in the formation of a series of isolated and contorted ridges and basins. Harper Lake is a basin formed by the Lockhart fault to the north and the Harper fault to the northeast. The basin received a thick sequence of sediments in the form of coalescing alluvial fans during the Pliocene, Pleistocene and Holocene epochs. The base of the depression formed a lake in cool climates, fed by the Mojave River until it was diverted in the late Pleistocene epoch. After the river was diverted the lake levels dropped and fluctuated over time (SWCA 2009c, p. 8).

Prehistoric Setting

The prehistory of the western Mojave Desert is the narrative of how human populations have adapted to marked fluctuations in the local environment over the course of at least the last 12,000 years. The archaeological remains of the region’s prehistory are relatively scarce. Sparse scatters of stone tools and chipped stone tool manufacturing debris, and isolated artifacts, resources that typically yield information of marginal value, account for 40-60% of the archaeological remains found in the Mojave and Colorado deserts. A relative paucity of intact buried archaeological deposits contributes further to the dearth of information on the prehistory of the region (Lyneis and Macko 1986, p. 52). The availability of water and the location of high-value resource patches in otherwise unproductive habitats appear to influence the distribution of the archaeological sites that are on the desert landscape (Lyneis and Macko 1986, p. 57; Sutton, et al., 2007, p. 230). The broad trajectory of cultural development in the Mojave Desert appears to be a steady decline in residential mobility as local populations came to occupy increasingly larger valley or basin-bottom base camps, in a few preferred locations, over longer periods of time, rather than working out of temporary camps in particularly productive environmental zones (Bamforth 1990, p. 74).

Over the past seven decades, Mojave Desert archaeologists have developed and refined a broad sequence of approximately six artifact groups or assemblages, each with distinctive types of stone projectiles, that represent the material record of the peoples who once lived in the proposed project area (Bamforth 1990, p. 72; Campbell 1936; Lyneis 1982; Rogers 1939; Sutton, et al., 2007; Warren 1984; Warren and Crabtree 1986).

Terminal Pleistocene Period (Prior to 10,000 B.C.)

Evidence for a Paleo-Indian occupation in the western Mojave Desert has come in the form of fluted points, generally considered to represent the Clovis complex (Sutton, et al., 2007, pp. 233–234). It should be noted, however, that not every fluted point can necessarily be attributed to Clovis, and that the western Mojave Desert finds could be associated with later cultures using a similar technology. Work in the China Lake basin drainage, located in Indian Wells Valley to the north; and in the Lake Thompson basin drainage, located in the Antelope Valley to the south, have yielded these points. Glennan discovered an obsidian isolate on the slope of the El Paso Mountains, described as “a lanceolate-shaped point with a concave base.” He noted, however, that he considered the point to be “a Folsom-like type” (Glennan 1987; Rondeau, et al., 2007).

During this period, it has been suggested that highly mobile groups relied considerably upon lacustrine resources (Apple and Glenny 2008, p. 15). These patterns of subsistence and settlement have been collectively described as the Western Pluvial Lakes Tradition (WPLT) (Moratto 1984, pp. 90–103). This pattern has also been demonstrated throughout the western Great Basin, continuing briefly into the Early Holocene.

Early Holocene

The Lake Mojave complex is the pattern characteristic of this period, dating from approximately 8,000–6,000 cal (calibrated radiocarbon years) B.C. (Sutton, et al., 2007, p. 234). This complex is marked by projectile points of the Lake Mojave and Silver Lake types. The assemblages can also generally contain bifaces, steep-edged unifaces, and crescents in quantity, with some cobble-core tools and ground stone tools also represented.

During the Early Holocene, the pluvial lakes began to slowly recede, with groups adapting to the changing environment (Sutton, et al., 2007). Archaeological evidence indicates that lacustrine resources around these lake basins continued to be exploited, but evidence of groups obtaining other resources from beyond the lake basins, such as the procurement of lagomorphs, rodents, and certain reptiles, has also been reported from work at Fort Irwin (Sutton, et al., 2007; Basgall 1993; Douglas, et al., 1988).

Middle Holocene

For the Middle Holocene, the Pinto complex has become the widely accepted cultural complex for this region (Sutton, et al., 2007, p. 238). Archaeologists have generally accepted that the Pinto complex began just after the Lake Mojave complex and ended at approximately 3,000 cal B.C. Some, however, argue that the Lake Mojave and the Pinto complexes overlap, with the Pinto complex being introduced toward the end of the Early Holocene.

Artifacts identified with this complex include stemmed, indented-base Pinto series projectile points, probably used as thrusting spears rather than darts (Sutton, et al., 2007, p. 238). There is a dramatic increase in the presence of ground stone tools during this time period, with evidence of these implements in almost every Pinto site that has been identified. The procurement of faunal resources appears to be much the same in the Middle Holocene as in the Early Holocene, with a slight increase in small fauna, and with artiodactyls (deer and mountain sheep) decreasing (Sutton, et al., 2007, p. 238). Pinto complex sites have been found in varying topographic and environmental zones, including pluvial lake basins, springs/seeps, streams, and within upland areas (Sutton, et al., 2007, p. 238). The dramatic increase in ground stone implements suggests that access to plant foodstuffs was probably of high importance for the selection of habitation.

The scarcity of sites in the western Mojave Desert representing the period ca. 3,000–2,000 cal B.C. indicates that there may have been “an occupational hiatus” at this time (Sutton, et al., 2007, p. 241), or that population density in the region was low. This may have been due to the climate being much hotter and drier towards the end of the Middle Holocene.

Late Holocene

The Gypsum complex appeared during the earliest part of this period, from 2,000 cal B.C.–cal A.D. 200 (Sutton, et al., 2007, p. 241). During this time, the climate became wetter and cooler than during the previous period. Artifacts from the Gypsum complex are represented by Elko series corner-notched points; Humboldt series, concave base points; and well-shouldered, contracting-stemmed, Gypsum series points (Sutton, et al., 2007, p. 241).

The Rose Spring complex followed the Gypsum complex, appearing in the period cal A.D. 200–1100, the time during which the bow and arrow were introduced. Archaeological evidence from this complex suggests demonstrates a drastic change in artifact assemblages and suggests a dramatic increase in the population, evidenced by more substantial middens (Sutton, et al., 2007, p. 241). Artifacts from this complex include Eastgate and Rose Spring series projectile points, drills, bone awls, milling implements, marine shell and other ornaments, and evidence the heavy exploitation of obsidian during this period. The Medieval Climatic Anomaly (MCA) occurred sometime within the middle of the Rose Spring complex (Sutton, et al., 2007, p. 242). Lakes began to desiccate, with settlement patterns changing, as a result.

The Late Prehistoric began in 1000 A.D. and ended at European contact. During this period, populations decreased; however, new technologies were developing and several new cultural complexes appeared, most likely developing into the ethnographic groups of the region (Sutton, et al., 2007, p. 242). The marker artifacts of this period include Desert series projectile points (Desert Side-notched and Cottonwood points), ceramics, shell beads, and mortars and pestles (Warren and Crabtree, 1986; Apple and Glenny 2008, p. 17; Sutton 1991, p. 19). The prolific use of obsidian, seen during the Rose Spring complex, declined in this period (Sutton, et al., 2007, p. 242).

Ethnographic Setting

Ethnographic evidence suggests that the Vanyume, a subgroup of the Serrano Indians, occupied the region in prehistoric times. Several small Vanyume villages were encountered by Father Francisco Garces as early as 1776 along the Mojave River and further west. This portion of the Mojave Desert was also visited by several other native groups, including the Serrano, the Kitanemuk and the Desert Kawaiisu. The Central Mojave Desert was exploited by a variety of groups as well, including the Chemehuevi/Southern Paiute, the Mojave and possibly the Desert Kawaiisu (EDAW 2009a, p. 21-22).

The Vanyume-speaking people, also known as the Desert Serrano, were extensively disrupted by Spanish missionaries, and subsequently very little is known of them. The Serrano occupied the area in and around the San Bernardino Mountains, their territory extending north past Victorville; south to the Yucaipa Valley; east to Twentynine Palms;

and west to Cajon Pass. This area was a trade nexus between inland tribes and coastal tribes, and the Serrano controlled significant travel corridors in the area (SWCA 2009c, p. 14).

The Vanyume spoke either a dialect of Serrano or a closely related language. The Serrano language "is part of the Serran division of a branch of the Takic family of Uto-Aztecan linguistic stock," and closely related to the Kitanemuk language (SWCA 2009c, p. 14). The Serrano practiced a subsistence economy consisting of hunting and collecting plant goods. Faunal resources also included mountain sheep, deer, antelope, rabbits, small rodents, fish and various birds. They also collected seeds, acorns, pinon, bulbs, tubers, shoots, blooms and roots of a variety of plants. Intervillage trade supplemented the diet and communal food procurement events facilitated the distribution of resources (SWCA 2009c, p. 15).

Funerary rituals involved cremation of the dead and distribution of their possessions, and a week-long ceremony that included burning an effigy depicting the deceased (SWCA 2009c, p. 15)

Historic Setting

Spanish Period (1769 to 1821)

The Spanish focused their efforts in Alta California on building missions and presidios, and assimilating the Native American population into Christianity. Early Spanish explorations of inland Alta California did not begin until the late 18th century. Pedro Fages passed through the area near the Cajon Pass as early as 1772, but Father Francisco Garces was the first to enter what would become San Bernardino County. Using an ancient trade route known as the Mojave Trail, Fr. Garces traveled from the Colorado River to the Pacific Coast in 1776 (SWCA 2009c, p. 16-17). The San Bernardino Valley was named by Francisco Dumetz in 1810 who, in observance of the Feast of St. Bernadine of Siena, led a party from the San Gabriel Mission into the valley (SWCA 2009c, p. 17).

Mexican Period (1821 to 1848)

New Spain won independence from Spain in 1821 and ended the Spanish isolationist policies, opening the California ports to foreign merchants. American trappers and explorers came west during this time (SWCA 2009c, p. 17). Jedediah Smith was the first American known to cross the Mojave while it was still under the Mexican flag in 1826, via the Mojave River (Swanson 1988, p. 3).

As the influence of the missions diminished through the 1830s, their land holdings were privatized. The mission lands were initially intended to be redistributed to the Native Americans who helped build the missions, however as part of the Secularization Act of 1833 the lands were distributed to private ranchers. The resulting ranchos, which primarily focused on cattle grazing, were important social and economic centers. Twenty ranchos were granted in northwestern Riverside and southwestern San Bernardino counties, covering almost 500,000 acres. The rancho industries, including cattle grazing and hides, helped spur a population influx to California (SWCA 2009c, p. 17).

American Period (1848 to the present)

California became part of the United States in 1848, with the end of the Mexican-American War and the Treaty of Guadalupe Hidalgo. It became a state in 1850, along with Utah, New Mexico and present-day Arizona. San Bernardino County was established in 1853 from parts of Los Angeles and San Diego counties and, despite parts of it being used to help create Riverside County in 1893, remains the largest county in the United States (SWCA 2009c, p. 18).

The southeastern desert region of California has always been a heavily traveled transportation corridor in and out of the state. Thousands of people traveled west through the Colorado and Mojave deserts during the Gold Rush on their way to the gold fields via Los Angeles or San Diego. The Mojave River Trail, also known as the Old Spanish Trail, began in Santa Fe, New Mexico and traveled through Utah and Arizona, crossing the Mojave finally reaching the Mission San Gabriel Arcangel and Pueblo de Los Angeles. The Gold Rush changed the nature of the rancho cattle industry, placing more emphasis on the use of cattle for meat and other goods, rather than their hides. The influx of people created a cattle boom in the state, which lasted until the operation of the ranchos became increasingly difficult and neighbor states drove cattle to California at reduced prices (SWCA 2009c., p. 18).

A transcontinental route through the southern United States was considered in the 1850s, with land purchased and surveys performed. The start of the Civil War in 1861 halted work on this route. There were many wagon routes and regional railroads in southern California constructed across the Colorado and Mojave deserts from the 1840s through the 1870s, connecting the California coast with the rest of the country, carrying mail, people, supplies, livestock, and other necessities (SWCA 2009c, p. 18). The route to and from Los Angeles went through Barstow, a link that was reinforced when Southern Pacific tracks reached Barstow in 1882. Route 66 also came through Barstow, continuing to bring visitors through the region via automobile as the railroads declined (EDAW 2009a, p. 22).

These trails became integrated into permanent roadways with the introduction of the automobile in the twentieth century. The first highways across the Mojave Desert followed the Cajon Pass-Barstow-Needles route, and the Ocean-to-Ocean Highway was established in 1912 following the Mojave River Trail through Needles and Barstow to San Bernardino. Route 66, established in 1926, followed the Ocean-to-Ocean Highway through Barstow (SWCA 2009c, p. 19).

Agriculture has always played a major role in California, and large-scale agriculture has had greatest impact, both on the landscape and the economy. The Gold Rush brought a wave of entrepreneurial settlers. The subdivision of the Mexican-era ranchos was facilitated by both the end of the Mexican-American War in 1849 and the Homestead Act of 1862, which spurred increased land ownership. Those that took part in this program became known as "homesteaders." As development spread into more arid regions, mass irrigation was necessary to sustain the crops required to be planted by the Homestead Act. The Wright Act was passed in 1887, prompting the establishment of irrigation districts in the Central Valley and Southern California. Gravity fed systems however, were more common in the San Bernardino County area. Dry conditions and geographic isolation made commercial agriculture in Southern California more challenging than in places such as the Central Valley, but the arrival of the railroad and discovery of agricultural potential of citrus in Los Angeles and Orange counties allowed the region to thrive. Agriculture was particularly challenging in the Mojave Desert, as the climate and geomorphology limited access to water. The region became a primary alfalfa producer regardless of these limitations (EDAW 2009a, p. 22-24).

The Harper Lake area has been well-documented in Mark T. Swanson's *History of the Harper Lake Community* (1988), and other studies by Greenwood and Associates. San Bernardino County surveyors measured section lines of rectangular grid system for Harper Lake area in 1856, shortly after California attained statehood. United States Army engineers had also surveyed the area looking for the best transcontinental railroad routes, and one of the recommended routes passed 10 miles south of Harper Dry Lake. This route was ultimately used by the Santa Fe Railroad (Swanson 1988, p. 3)

The 1856 survey did not record any land improvements in the Harper Lake area. The first cattle ranch was established east of Harper Lake by C.S. Black in 1872. The Black Ranch became a frequent stop on the San Bernardino-Panamint Road, which was established following the discovery of borate deposits at Searles Lake and the Panamint Valley, north of Harper Dry Lake. The San Bernardino-Panamint Road became less traveled following the discovery of larger borate deposits in Death Valley (Swanson 1988, p. 4).

The first settlers on the west side of Harper Lake, in the project area, were Henry and Emma Spenker, who arrived in 1911. The Spenkers came to the area hoping to create an irrigation-based farming community, and built irrigation ditches and a reservoir to grow alfalfa, raise chickens and turkeys, and plant orchards (EDAW 2009a, p. 24).

Eleven more land patents were issued for the Harper Lake area by the Bureau of Land Management (BLM) between 1921 and 1929. The first was issued to James M. Maclachlan, the original homesteader on the Lockhart Ranch property. Underground water was more accessible at lower elevations near the lake bed, and each homestead had to install its own well and construct irrigation ditches. Many homestead claims were not year-round inhabitants, but weekenders who lived in urban areas. The Harper Lake residents were officially listed as living in Hinkley, approximately 10 miles southeast, but full-time residents considered themselves a separate community (Swanson 1988, p. 9-11).

The only Desert Land Entry (DLE) permit issued in the Harper Dry Lake area was to Victor York and L.M. Lockhart in 1925, for land which became the York Ranch. York and Lockhart were wealthy business partners with the York-Smullin Oil Company, and invested in the ranch as a side venture. The ranch grew a variety of crops, including alfalfa and cashews, demanding an enormous quantity of water that necessitated the drilling of special deep wells. Hugh Evans, whose alfalfa farm was south of the project area, also installed deep wells with diesel-powered pumps in the 1930s. The deep wells on the Evans and York properties contributed to a significant drop in the water table, below the reach of the initial wells, which limited the production of alfalfa to only Evans and York. The limited accessibility to water combined with the Great Depression spelled the end for the original homesteads. Many of the remaining local residents went to work for York and Lockhart. The population had dropped so low by 1937 that the schoolhouse was closed, and Lockhart had become the sole owner of both the York and Evans ranches by the end of the decade (Swanson 1988, p. 11-13).

California Electric constructed a substation and introduced electricity to the valley in 1947. This brought new residents, many of whom also ended up working for the Lockhart Ranch, which was dedicated to raising high-quality beef and farming alfalfa to feed ranch cattle. The ranch eventually became one of the largest farming concerns in the Mojave Desert (Hampson and Swanson 1990, p. 14-15). Forrest Most and his family arrived in the area in 1946 and purchased 480 acres of what was the York Ranch, and would become the second largest landholders in the area (Swanson 1988, p. 13-14).

Lockhart began to invest a substantial amount of money into the ranch and to develop a community in the 1950s, building a grocery store, butcher, a gas station, café and 16 employee houses (Swanson 1988, p. 14-15). Originally conceived of as a small general store, the General Merchandise Store was one of the largest structures in the area. It was constructed at a cost of $365,000 and opened in 1953. It carried all manner of provisions and also housed a post office. People came from all over the area to buy Lockhart Ranch meat, which was considered the best in the Mojave Desert. The Lockhart community at that time numbered approximately 200 people, most of whom were Lockhart Ranch employees and their families (Hampson and Swanson 1990, p. 22).

The Most Ranch was also becoming profitable at this time, concentrating on sheep, corn, oats and wheat rather than alfalfa. By the late 1950s both ranches had incorporated a new pivot irrigation system that entailed a giant arm making a circular sweep of a quarter section, which proved much more efficient than the standing pipe method as it was largely automatic and required less manpower (Swanson 1988, p. 14-15). The Mosts sold their ranch back to Lockhart in 1955 (Hampson and Swanson 1990, p. 14).

The implementation of the pivot irrigation system may have contributed to the decline of the community of Lockhart, as it took significantly less manpower to operate. Additionally, Lockhart suffered a series of financial losses in the mid-1950s, and the ranch was a secondary interest. These losses may have caused him to reevaluate his financial priorities, and the ranch had not been a profitable investment (Hampson and Swanson 1990, p. 23). People began to leave the town of Lockhart around 1959, and the grocery store and gas station were converted into a mechanic shop. The post office was closed in 1958 (Swanson 1988, p. 14-15),and the ranch changed hands several times until it was finally sold to Orita Land and Cattle Company around 1962 (Hampson and Swanson 1990, p. 24).

Milton Most, the son of Forrest Most, was the ranch manager for Orita. Most demolished many of the ranch buildings constructed by Lockhart. In 1977 Orita sold the ranch to Al Cotton, who went bankrupt within two years. The southern half of the ranch, south of Hoffman Road, was purchased in 1979 by Milton Most. The Luz Development and Finance Corporation bought the ranch from Milton Most in 1988, and immediately leased the land back to him until the early 1990s (Hampson and Swanson 1990,

p. 24-27). Luz installed solar energy panels within Sections 19 and 24 of the former ranch, and Abengoa Solar, Inc. purchased the remainder of the ranch in 2008 (EDAW 2009a, p. 26).

The town of Lockhart was recorded as part of a cultural resources survey in 1990, at which time there were 41 standing buildings and structures associated with the complex. Since then, the majority of the buildings have been demolished (AS 2009a, p. 5.4-27).

Cultural Resources Inventory

A project-specific cultural resources inventory is a necessary step in staff's effort to determine whether the proposed project may cause significant impacts to CRHR-eligible cultural resources and would therefore, under CEQA, have an adverse effect on the environment.

The development of a cultural resources inventory entails working through a sequence of investigatory phases. The first step is to establish an appropriate area of analysis for the inventory. Generally the research process proceeds from the known to the unknown. These phases typically involve doing background research to identify known cultural resources, conducting fieldwork to collect requisite primary data on not-yet-identified cultural resources in the vicinity of the proposed project, assessing the results of any geotechnical studies or environmental assessments completed for the proposed project site, and compiling determinations of historical significance for any cultural resources that are identified.

This subsection describes the research procedures used by the applicant and Energy Commission staff for each phase and provides the results of the research, including literature and records searches (California Historical Resources Information System (CHRIS) and local records), Native American consultation, and field investigations. Staff provides a description of each identified cultural resource, its historical significance, and the basis for its significance evaluation. Assessments of the project's impacts on significant cultural resources, potential impacts on previously unidentified, buried archaeological resources, and proposed mitigation measures for all significant impacts are presented in a separate subsection below.

Project Area of Analysis

The inventorying of cultural resources within what staff defines as the appropriate area for the analysis of a project's potential impacts is the first step in the assessment of whether the proposed project may cause a significant impact to a CRHR-eligible cultural resource and therefore have an adverse effect on the environment. The area that staff considers when identifying and assessing impacts to historical resources, called the "area of analysis" for the project, is usually defined as the area within and surrounding the project site and associated linear facility corridors. The area varies in extent depending on whether the cultural resource is archaeological, ethnographic, or built-environment:

- For archaeological resources, the area of analysis is minimally defined as the project site footprint, plus a buffer of 200 feet, and the project linear facilities routes, plus 50 feet to either side of the routes.

- For ethnographic resources, the area of analysis is expanded to take into account traditional use areas and traditional cultural properties which may be far-ranging, including views that contribute to the significance of the property. These resources are often identified in consultation with Native Americans and other ethnic groups, and issues that are raised by these groups may define the area of analysis.
- For built-environment resources, the area of analysis is confined to one parcel deep from the project site footprint in urban areas, but in rural areas is expanded to include a half-mile buffer from the project site and above-ground linear facilities to encompass resources whose setting could be adversely affected by industrial development. For this project, the area is established at that minimum.
- For a historic district or a cultural landscape, staff defines the area of analysis based on the particulars of each siting case.

For the purposes of this analysis, the project area of analysis consists of the project site, the 200-foot archaeological buffer, and the one-half mile built environment buffer. There are no linear facilities associated with the project.

Background Inventory Research

CHRIS Record Search

EDAW requested a records search at the San Bernardino County Archaeological Information Center on August 15, 2006 to identify any previous cultural resources studies and recorded historical resources within a 1-mile radius around the project area, and an additional 5-mile radius for the focus of the project's regional historic context. Within the records search area there were 15 previous studies, 30 known cultural resources and 121 isolated archaeological finds within 1-mile of the project vicinity. An updated records search was requested on April 27, 2009. New records or reports for the area had not been received since the 2006 records search (EDAW 2009a, p. 29-32).

Three previously recorded archaeological resources fall within the project area of analysis: a historic refuse scatter, cement slab and wood and cement-lined well (P-36-006553); and two small historic refuse scatters (P-36-007429 and P-36-007430) (EDAW 2009a, p. 29-32).

The records search also identified eleven previously recorded architectural resources, five of which have been demolished (4) or were unable to be relocated (1). The six remaining previously recorded sites are listed in the table below.

Cultural Resources Table 2
Previously Recorded Architectural Resources in the Project Area of Analysis

Resource Designation	Resource Type	Resource Age
P-36-001025/P-36-002084-99H	Farming and residential complex and adobe structure	Historic
P-36-006555	Farming and residential complex	Historic
P-36-006556	Farming and residential complex	Historic
P-36-006557	Farming and residential complex	Historic
P-36-006558	Ranching, farming, commercial and residential complex (Town of Lockhart)	Historic
P-36-006882	Residential buildings	Historic

Local Records Search

EDAW reviewed maps, literature and historical collections related to the project area. They also sent letters to historical societies and other potentially interested parties on June 1, 2009 to request any pertinent information regarding historic or cultural resources within the records search boundary, including the San Bernardino County Museum, the Mojave River Valley Museum, the Mojave Desert Heritage and Cultural Association, and the City of San Bernardino Historical and Pioneer Society. Responses were not provided to EDAW. EDAW also visited the Upper Mojave Historical Society in May 2009. A reference library was not available (EDAW 2009a, p. 34).

Native American Coordination

EDAW initiated contact with local Native American groups and interested parties. A letter requesting information on sacred lands, traditional cultural properties, and a list of Native American individuals and organizations affiliated with the project area was sent to the Native American Heritage Commission on June 1, 2009. The Sacred Lands File search did not reveal any specific site information for the project area or 1-mile buffer. Letters were sent to 13 Native American representatives on July 14, 2009. The letters were followed up with phone calls on July 22, 27 and 28. The Historic Preservation Officer for the Kern Valley Indian Council expressed concern that the project area and project buffer were not large enough to determine the effect the project would have on the area. The representative affiliated with the Tebatulabal, Kawaiisu, Koso and Yokut tribes was contacted and stated he had no comment at the time. Responses were not received from the eleven remaining groups (EDAW 2009a, p. 33-34).

Field Inventory Investigations

Geoarchaeological Research

In its ongoing effort to improve its methods for identifying cultural resources in project impact areas, to stay aware of the evolving practice of cultural resources management, and to provide a more factual basis for considering the potential presence of buried prehistoric archaeological deposits on the proposed project site, Energy Commission staff requested in Data Request 1B, numbers 18-20, that Abengoa Solar, Inc., provide geoarchaeological information about the project site.

Geoarchaeology is a subfield of archaeology that uses the concepts and methods of the earth sciences to conduct archaeological research. The broader goal of geoarchaeology is to firmly establish the most basic elements of archaeological interpretation, which are the physical contexts of archaeological sites and the human material residues that are a part of them. Geoarchaeology provides information on the structure, the origin, and the development of archaeological deposits. Geoarchaeological research typically draws on a suite of concepts and methods from geomorphology (the study of landform development and history), stratigraphy (the study of the character and age of sequences of geologic deposits), pedology (the study of soils and soil development), and sedimentology (the study of the composition, character, and age of geologic sediments). Geoarchaeological research is essential to the analysis of the potential impacts of a proposed project on buried archaeological deposits, where a proposed project involves deep (greater than one meter) ground disturbance, because it provides a factual assessment of the likelihood that such deposits may be present in a project area and establishes the likely character of any such deposits.

Staff felt that the AMS's pedestrian archaeological survey was not adequate for assessing the potential for subsurface archaeological deposits for two reasons. First, the site was previously used for agricultural purposes, making it unlikely that intact buried archaeological deposits would be found in the uppermost three feet of sediments; second, the proposed mass grading and excavation of the site has the potential to inadvertently impact previously unknown subsurface resources during construction; and third, prehistoric archaeological deposits that lie more than approximately one meter below the surface often do not produce visible surface evidence. A geoarchaeological study can address the above limitations of a pedestrian survey.

The Energy Commission's Data Request Set 1B, numbers 18 -20 asked the applicant to provide Quaternary science information pertinent to the project area from published sources, if such were available, and to conduct a geoarchaeology field study of the development of the landforms and their depositional regimes since the Late Pleistocene epoch. The Energy Commission recommended that the field study consist of:

- A map or series of maps of the present landforms in the project area;
- A sampling strategy to document the stratigraphy of the portions of the landforms in the project areas where construction would involve disturbance at depths greater than three feet;

- Data collection necessary for determinations of the physical character, the ages, and the depositional rates of the various sedimentary deposits and paleosols that may be beneath the surface of the project area to the proposed maximum depth of ground disturbance, including:
    - A measured profile drawing and profile photograph;
    - Screening of a small sample of sediment from the major sedimentary deposits in each profile through ¼-inch hardware cloth; and
    - Collection and assaying of enough soil humate samples to reliably radiocarbon date a master stratigraphic column for each sampled landform; and
- Analysis of the collected field data and an assessment, based on the collected data, of the likelihood of the presence of buried archaeological deposits in the project area, and, to the extent possible, the likely age and character of such deposits.

SWCA reviewed the available literature relating to the project site, including the geology, geomorphology and soils of San Bernardino County and the Mojave Desert region, and previous geoarchaeological studies. The goal of this review was to understand "the natural and anthropogenic formation processes affecting the sediments located within the proposed project area" (SWCA 2009c, p. 19).

Following staff's review of a field research design, SWCA also conducted geoarchaeological field investigations on the proposed 1,765 acre project site to assess the potential for buried archaeological deposits within the project footprint, focusing in areas where disturbance is expected to go deeper than one meter. Twenty trenches were excavated using a backhoe and examined to identify characteristics of the depositional environment. Samples of the sediments were also screened (SWCA 2009c, p. 20-21).

There had not been any previous subsurface archaeological research in the project area (SWCA 2009c, p. 28).The testing determined that the project site is covered by a "consistent and rather thick veneer of agriculturally disturbed sediments underlain by thick Holocene and Pleistocene age alluvial fan sediments with interdigitations of lacustrine sediments" (SWCA 2009c, p. 24). The area is overlain by predominantly Cajon soils that have been extensively disturbed by agricultural activities; these soils overlie deep alluvial fan sediments dating to the Pleistocene and Holocene (SWCA 2009c, p. 28).

The geoarchaeological fieldwork did not recover any evidence of buried cultural deposits or artifacts. It did record, however, a sequence of buried lacustrine deposits indicative of a previously high lake stand, possible extending to 2,050 feet in elevation. These lacustrine deposits, found in the northeast portion of the site and which would be impacted by construction, imply that the potential for buried archaeological deposits is high between 2,050 and 2,025 feet in elevation (SWCA 2009c, p. 29).

Thus the consultant recommended that, due to the high potential for buried archaeological deposits, that the project retain an archaeologist meeting the Secretary of the Interior's Professional Qualification Standards to serve as a full-time monitor for all ground-disturbing activity below the elevation of 2,050 feet in the northeast portion of the site (SWCA 2009c, p. 29).

Archaeological survey

A pedestrian survey of the project area was conducted by EDAW between May 27 and June 22, 2009. The project area and 200-foot buffer was surveyed by walking 15-to-20 meter transects. Archaeological sites were flagged and the locations documented using handheld GPS units and sites and isolates were recorded on the appropriate California State Parks DPR 523 series forms. Resource boundaries, features and artifacts were recorded with handheld GPS units. Previously recorded sites were updated on DPR 523 Continuation Sheets (EDAW 2009a, p. 36).

Twenty four new sites were identified in the course of the survey and are listed in the table below. Twenty three of the sites are historical archaeological sites, twenty one of which are refuse scatters. Two historical archaeological sites contain the remains of built structures. One prehistoric lithic scatter was identified.

Cultural Resources Table 3
Newly Recorded Archaeological Resources in the Project Area of Analysis

Resource Designation	Resource Type	Resource Age
P-36-020985	Historic/modern refuse scatter	Historic
P-36-020986	Historic refuse scatter with modern materials	Historic
P-36-020987	Two historic/modern refuse piles and sparse scatter	Historic
P-36-020988	Historic/modern refuse scatter	Historic
P-36-020989	Historic/modern refuse scatter	Historic
P-36-020990	Refuse pile and adjacent historic scatter	Historic
P-36-020991	Historic/modern refuse scatter	Historic
P-36-020992	Historic/modern refuse scatter	Historic
P-36-020993	Historic/modern refuse scatter	Historic
P-36-021096	Historic/modern refuse scatter	Historic
P-36-020994	Cement lined reservoir, well, pump, three cement foundations, five cement stand pipes	Historic
P-36-020995	Historic/modern refuse scatter	Historic
P-36-020996	Historic/modern refuse scatter	Historic
P-36-020997	Historic/modern refuse scatter	Historic
P-36-020998	Historic/modern refuse scatter	Historic
P-36-020999	Historic/modern refuse scatter	Historic
P-36-021000	Historic/modern refuse scatter	Historic
P-36-021001	Historic/modern refuse scatter	Historic
P-36-021002	Multi-component site: Historic/modern refuse scatter and single prehistoric obsidian flake	Prehistoric/Historic
P-36-021003	Historic/modern refuse scatter	Historic
P-36-021004	Historic/modern refuse scatter	Historic
P-36-021005	Historic refuse scatter, possible remnants of adjacent structure and corral	Historic
P-36-021006	Prehistoric lithic scatter	Prehistoric
P-36-021007	Historic/modern refuse scatter	Historic

Built Environment Survey

EDAW also conducted the built environment survey between May 27 and June 22, 2009 within the project area and a 0.5 mile buffer area. Previously recorded and newly identified resources were recorded on the appropriate DPR forms (EDAW 2009a, p. 36).

Because of changes to the setting of the town of Lockhart (P-36-006558) due to the demolition of many of the structures recorded in 1990, and the proposed demolition of the Hays Farm (P-06-006556), staff requested additional information in Data Requests 1 and 2 of Data Request Set 1B in order to further evaluate the significance of those resources within their historic contexts and provide a justification for their significance under CRHR criteria (ESH 2009b, Attachments 1 and 2).

Eight newly recorded resources were identified in the course of the survey and are listed in the table below. Seven of the sites are modest residential sites and one is the extensive irrigation system associated with the farming activities in the project area.

Cultural Resources Table 4
Newly Recorded Architectural Resources in the Project Area of Analysis

Resource Designation	Resource Type	Resource Age
P-36-021008	Residence	Historic
P-36-021009	Residence	Historic
P-36-021010	Irrigation system	Historic
P-36-021011	Residence	Historic
P-36-021012	Residence	Historic
P-36-021013	Residence	Historic
P-36-021014	Residence	Historic
MS-B-1008	Residence	Historic

In total, 40 resources have been identified in the project area of analysis—26 archaeological sites and 14 built environment resources. One of the archaeological resources was prehistoric and the remaining 25 were from the historic period.

Determining the Historical Significance of Cultural Resources

CEQA requires the Energy Commission, as a lead agency, to evaluate the historical significance of cultural resources by determining whether they meet several sets of specified criteria. Under CEQA, the definition of a historically significant cultural resource is that it is eligible for listing in the CRHR, and such a cultural resource is referred to as a "historical resource," which is 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)). The term, "historical resource," therefore, indicates a cultural resource that is historically significant and eligible for the CRHR.

Consequently, under the CEQA Guidelines, to be historically significant, a cultural resource must meet 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,[1] a resource 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 a master, or possesses high artistic values; or
- Criterion 4, has yielded, or may be likely to yield, information important to history or prehistory.

In addition, historical resources must also possess integrity of location, design, setting, materials, workmanship, feeling, and association (Cal. Code Regs., tit. 14, § 4852(c)).

Additionally, cultural resources listed in or formally determined eligible for the National Register of Historical Places (NRHP) and California Registered Historical Landmarks numbered No. 770 and up are automatically listed in the CRHR and are therefore also historical resources (Pub. Resources Code, § 5024.1(d)). Even if a cultural resource is not listed or determined to be eligible for listing in the CRHR, CEQA allows a lead agency to make a determination as to whether it is a historical resource (Pub. Resources Code, § 21084.1).

The assessment of potentially significant impacts to historical resources and the mitigation that may be required of a proposed project to ameliorate any such impacts depend on CRHR-eligibility evaluations.

CRHR Evaluations

Under CEQA, only CRHR-eligible cultural resources that the proposed project could potentially impact need be considered in staff's recommendations for mitigation measures for project impacts. Consequently staff seeks CRHR eligibility recommendations for those cultural resources subject to possible project impacts. The existing documentation for previously known cultural resources may include CRHR eligibility recommendations, and the applicant's cultural resources specialists often make CRHR eligibility recommendations for newly identified cultural resources they

[1] The Office of Historic Preservation's Instructions for Recording Historical Resources (1995) endorses recording and evaluating resources over 45 years of age to accommodate a potential five-year lag in the planning process.

discover and record in their project-related surveys. Staff considers these prior CRHR eligibility evaluations and may accept them or conclude that additional information is needed before making its own recommendations.

When the available information on known or newly identified resources that could be impacted by the proposed project is not sufficient for staff to make a recommendation on CRHR eligibility, staff may ask an applicant to conduct additional research to gather the information needed to make such a recommendation, or staff may gather the additional information. For an archaeological resource, the additional research usually entails some degree of field excavation, called a "Phase II" investigation. For an ethnographic resource, the additional research may be an ethnographic study. For built-environment resources, the additional research would probably be archival. The object of this additional research is to obtain sufficient information to enable staff to validate or make a recommendation of CRHR eligibility for each cultural resource that the proposed project could impact.

Fifteen resources were identified within the project site that could be impacted by the project. These resources, eight archaeological sites and seven built environment resources are summarized in the table below and followed by formal staff recommendations on their eligibility for listing in the CRHR.

Cultural Resources Table 5
Cultural Resources Subject to Project Effects

Resource Designation	Resource Type	Staff Recommendation on CRHR eligibility
P-36-021006	Prehistoric lithic scatter	CRHR-ineligible
P-36-021096	Historic/modern refuse scatter	CRHR-ineligible
P-36-021005	Historic refuse scatter, possible remnants of adjacent structure and corral	CRHR-ineligible
P-36-007429	Historic refuse scatter	CRHR-ineligible
P-36-020990	Refuse pile and adjacent historic scatter	CRHR-ineligible
P-36-020994	Cement lined reservoir, well, pump, three cement foundations, five cement stand pipes	CRHR-ineligible
P-36-021001	Historic/modern refuse scatter	CRHR-ineligible
P-36-021007	Historic/modern refuse scatter	CRHR-ineligible
P-36-006556	Farming and residential complex	CRHR-ineligible
P-36-006558	Ranching, farming, commercial and residential complex (Town of Lockhart)	CRHR-ineligible
P-36-006557	Farming and residential complex	CRHR-ineligible
P-36-021009	Residence	CRHR-ineligible
P-36-021011	Residence	CRHR-ineligible

Archaeological Resource Evaluations

Three of the identified archaeological sites (P-36-021006, P-36-021096, and P-36-021005) are on the project site and were proposed by EDAW as potentially significant. Staff requested that a field investigation be designed to determine if subsurface deposits were present and, if so, to acquire sufficient data to make recommendations of eligibility for these sites and to provide the appropriate DPR forms (CEC 2009n, p.5). The Phase II research design included reexamination of the surface of the site, excavation of shovel test pits (STPs) at each of the sites and, depending on the results of the STPs, the excavation of 1-meter by 1-meter pits at the sites. All of the excavated material was screened through 1/8 inch mesh hardware cloth. Fieldwork was conducted in December of 2009 to determine if intact deposits were present and, if so, to determine the extent, age, affiliation, and eligibility of those deposits (ESH 2010a, p. 1).

P-36-021006

P-36-021006 is a sparse prehistoric lithic scatter consisting of four cryptocrystalline silicate flakes adjacent to the dry lake shoreline in the northeast corner of the project site, north of the Alpha Solar Field (East). The surrounding vegetation consists of marsh grasses and adjacent salt brush. Three of the pieces are complete flakes and one is a flake fragment. Two of the flakes appeared to originate from rodent burrow backdirt piles which could be indicative of a subsurface deposit (EDAW 2009a, p. 63). Potential for a subsurface deposit was assumed based on the location of the scatter, adjacent to the dry lake bed.

The Phase II investigation placed four STPs throughout the site and reexamined the surface of the site. STPs were excavated to a depth of 80 centimeters below the present surface, the deepest extent possible. Soils were noted to be non-organic, sandy, silty alluvium. None of the STPs revealed any cultural materials, and further testing was not pursued (ESH 2010a, p. 3-4). Additionally the geoarchaeology study also excavated test trenches in the northeastern corner of the project site, to an average depth of 1.7 meters. The results of the geoarchaeology testing, discussed fully in the “Field Inventory Investigation” subsection above, noted that, while the geoarchaeological testing did not record any cultural deposits, the presence of lacustrine deposits in this area of the project site have the potential to contain subsurface archaeological deposits (SWCA 2009c, p. 29).

The site does not qualify under CRHR Criteria 1, 2 or 3. Based on the results of the Phase II archaeological testing, staff recommends that P-36-021006 does not meet the criteria for listing on the CRHR under Criteria 4, as there is no evidence of a subsurface deposit and the site does not have the potential to yield information important to history or prehistory.

P-36-021096

P-36-021096 is a cluster of extensive historic and modern refuse dumps and an associated scatter, situated along the southern side of Lockhart Road and western side of Lockhart Ranch Road, and the southwestern boundary of the Alpha Solar Field (West), within the project buffer. P-36-021096 is located directly across Lockhart Road from a historic farmstead site, and may be associated with it. Seven concentrations were noted in the site, with a less dense scatter surrounding them. Due to the large amount of material present, during the initial field investigation a one-meter-by-one-meter area of each concentration was inventoried to obtain a representative sample of the contents of the site. The majority of items inventoried were cans and bottles, including those associated with food, beverage, condensed milk, coffee, fuel, cleansers and soap. Also present were building and construction materials and automotive items. Items noted outside of the sample areas included butchered animal bones, kitchen ware, a motorcycle seat, furniture parts and other domestic items. The survey notes that a comparatively larger proportion of the materials located in this site are modern than in other nearby refuse sites. Also noted was that some of the concentrations show evidence of burning, which is indicative of purposeful dumping and trash elimination. The possibility of significant quantities of older materials warranted further investigation (EDAW 2009a, p. 54-55).

As part of the Phase II investigation, four STPs at 10 meter intervals were excavated to a depth of 30 centimeters. Soils were noted to be non-organic, sandy, silty alluvium. None of the STPs revealed any cultural materials, and further testing was not pursued (ESH 2010a, p. 6-7). The site was initially assumed to extend into the project site; however, the Phase II testing took place within the project site and did not discover any subsurface cultural materials north of Lockhart Road or east of Lockhart Ranch Road. Should cultural materials be discovered within the project site, they would not contribute to the significance of the site, if it were ever determined to be significant. The portion of the site within the project site does not appear to be significant under any of the CRHR criteria, and therefore staff recommends that the resource is not eligible for listing on the CRHR.

P-36-021005

The initial site record described P-36-021005 as a dense historic refuse dump and the remnants of a possible adjacent wooden structure and corral located at the northeast section of the project site, adjacent to the dry lake shoreline and north of the Alpha Solar Field (East). The site contains several in-situ posts and milled wooden structural debris. The refuse dump may have begun as a pit, and shows evidence of burning. Historic materials in the dump include domestic refuse such as beverage cans; sanitary food and condensed milk cans; crockery shards; and a variety of bottles and jars including soda, liquor, ketchup and bleach. The deposit does not contain any clearly modern materials, suggesting it was not in use after the 1950s. The posts may represent the remains of a livestock coral, and the posts and milled wooden debris on the west side appear to be the remains of a shed or small residence. The refuse dump has been disturbed by bottle hunters, erosion, past farming activity, and use for target practice (EDAW 2009a, p. 61).

As part of the Phase II investigation, four STPs were placed within the area of the possible structure, ranging from 35 to 80 centimeters in depth, and the surface of the site was further examined. The STPs did not indicate the presence of subsurface features such as walls or a foundation. Four additional STPs were placed within the refuse area ranging in depth from 30 to 50 centimeters, and did not indicate the presence of subsurface deposits extending horizontally beyond the visible surface extent (ESH 2010j, p. 36).

Additionally, a one-meter-by-one-meter test pit was excavated into the dump deposit. The pit revealed a dense deposit of refuse extending to a depth of approximately 40 centimeters. The majority of items recovered were building materials and consumer goods, including a variety of tin cans (fragments), glass bottles (fragments), crockery shards, automotive parts, domesticated animal bone and pieces of iron. The site may also have been used as a butchering site for domesticated animals, as evidenced by the bone found on site, and the in situ posts may indicate a holding pen or chute used for the animals (ESH 2010j, p. 39-40).

The Phase II investigation concluded that the site was likely a discrete dump site for household and commercial goods, used by a small number of people over a prolonged period of time, rather than a communal dump site. The site may have also been used as a butchering site for cattle or other animals as evidenced by the butchered bone on the site, and the structural remains may represent a holding pen or chute. The maker's marks of the bottles found were analyzed to provide information on the potential dates of use, and it appears likely that the dump was in use between the 1940s and the 1960s (ESH 2010j, p. 57-58).

The entire site showed evidence of significant disturbance, including several pits created by looters (ESH 2010a, p. 7-8). The site does not qualify for the CRHR under Criteria 1, 2 or 3. Based on the archival information, Phase II investigation that did not reveal an association for the site, and the extensive disturbance of the site, the site does not appear to be significant under any of the CRHR criteria, and therefore staff recommends that the resource is not eligible for listing on the CRHR.

P-36-007429

P-36-007429 is a previously recorded sparse historic refuse scatter on the project site in the southwestern corner of the proposed Beta Solar Field. It consists of twelve refuse items. Historic refuse items include sun-colored amethyst glass shards; aqua glass shards; hole-in-cap cans; and knife-opened cans. Modern materials include a metal round bar; milled wood; pieces of wooden crate(s); concrete block; and a metal band. The site has been disturbed by farming activities and has likely been used for target practice (EDAW 2009a, p. 47). Staff recommends, due to the disturbance of the site and the lack of association that the site does not appear to be significant under any of the CRHR criteria, and therefore staff recommends that the resource is not eligible for listing on the CRHR.

P-36-020990

P-36-020990 is a small refuse pile located in the proposed 50-foot wide drainage area at the northeastern corner of the Alpha Solar Field (West), west of Harper Lake Road. All items in the refuse pile are church-key opened beverage cans. The site has been disturbed by farming activities and has likely been used for target practice (EDAW 2009a, p. 51). The site does not appear to be significant under any of the CRHR criteria, and therefore staff recommends that the resource is not eligible for listing on the CRHR.

P-36-020994

P-36-020994 is a cement-lined reservoir and attendant facility structures located at the northwestern corner of Alpha Solar Field (East). Extending north from the project site, it consists of a well, pump, three cement slabs/foundations and five cement stand pipes. The eastern wall of the reservoir has been removed and two large piles of rubble are south of the reservoir, possible the remains of the eastern wall and former structures. The associated refuse scatter consists of crockery, nails, metal and concrete pieces, glass vessel shards, sanitary food and beverage cans, bottles and jars (EDAW 2009a, p. 56). The demolition of the east wall of the reservoir and associated structures has compromised the integrity of the site. The site does not appear to be significant under any of the CRHR criteria, and therefore staff recommends that the resource is not eligible for listing on the CRHR.

P-36-021001

P-36-021001 is located on the western boundary of the Beta Solar Field, south of Lockhart Road. Two concentrations of historic refuse scatter were identified, consisting of church-key opened beverage cans, sanitary food cans, condensed milk cans, and crockery fragments. Also present are sheet metal, butchered bone, round wire, cut nails, coffee cans, milled lumber fragments, window glass, combustion engine parts, and various other items of unknown age. The site has been extensively disturbed by agricultural activities and has also likely been used for target practice (EDAW 2009a, p. 59). The site does not appear to be significant under any of the CRHR criteria, and therefore staff recommends that the resource is not eligible for listing on the CRHR.

P-36-021007

P-36-021007 is located on the southern edge of Beta Solar Field and continues south of the project site. It is a historic refuse scatter consisting of sanitary food cans, pocket tobacco tins, lard buckets, and a baking powder can lid. Items of unknown age include pieces of an alarm clock, wooden crates, sheet metal, a galvanized bucket and a metal thermos casing. The site has been extensively disturbed by agricultural activities and has also likely been used for target practice (EDAW 2009a, p. 63). The site does not appear to be significant under any of the CRHR criteria, and therefore staff recommends that the resource is not eligible for listing on the CRHR.

Built-Environment Resources Evaluations

Five built environment resources were identified within the project site that would be impacted by the project.

Hays Farm (P-36-006556)

The Hays Farm, P-36-006556, was initially identified by EDAW as potentially eligible for the CRHR under Criteria 1 and 4. Located on the project site at the eastern side of the Alpha Solar Field (East), the site was previously recorded as a homestead complex, and consists of a ca. 1950s one-story residence; a two-story unfinished garage; two outbuildings; animal pens; a large reservoir; and the remains of an irrigation system. It is the site of the Spenker homestead, the first homestead in the west Harper Lake area (EDAW 2009a, p. 69-70).

Following the initial eligibility recommendation, staff requested in Data Request Set 1B, Data Requests 1, 3, 4, 5, and 6, that additional information be provided clarifying how the resource was or was not eligible and also that the site be investigated for its historical archaeological potential (CEC 2009n, p. 2-4). The additional investigation concluded that while the site retained significance for its association with the Spenkers, none of the buildings original to that period survive and therefore the site does not retain sufficient integrity to be eligible. The historical archaeological investigation, which consisted of a review of archival information including the previous surveys, historic maps and photographic collections, as well as the current field survey, concluded that there was a low potential for historic archaeological deposits (ESH 2009d, Attachment 3, p. 2). The site does not appear to be significant under any of the CRHR criteria, and therefore staff recommends that the resource is not eligible for listing on the CRHR.

Lockhart General Merchandise Store

The Lockhart General Merchandise Store, a component of the community of Lockhart (P-36-006558), was also initially identified by EDAW as eligible for the CRHR under Criteria 1. There were originally 41 buildings and structures recorded on the Lockhart site, which was described as the central complex of the Lockhart and Most ranches. Those buildings included residential buildings, a water tower, reservoirs, hay sheds, the General Merchandise Store, miscellaneous farm buildings, garages and an airplane hangar. Largely intact when it was recorded in 1990, the site encompassed four broad historical periods: the Davis/Weatherill homesteads c. 1922-1930; the Evans Ranch c.1930-1940; the Lockhart Ranch c. 1940-1962; and the Orita Land and Cattle/Most Ranch c. 1962-1990. The site was one of the earliest locations of permanent occupancy within the Harper Valley study area, and the Davis house was still standing in 1990. When the site was recorded, the town of Lockhart retained architectural integrity and spanned the period of 1919 through the early 1950s, representing the development of the Harper Valley community and the origin of the town of Lockhart (EDAW 2009a, p.72).

The majority of the structures standing in 1990 have since been demolished, with only the concrete foundations remaining. The General Merchandise store is the only remaining building that appears to represent an association with the period. Following the initial consultant eligibility recommendation, staff requested in Data Request Set 1B, Data Requests 2-6, that additional information be provided clarifying how the resource was or was not eligible and also that the site be investigated for its historic archaeological potential (CEC 2009n, p. 2-4).

The archaeological investigation, which consisted of a review of archival information including the previous surveys, historic maps and photographic collections, as well as the current field survey, concluded that there was a low potential for historic archaeological deposits.

Upon further evaluation, the Lockhart General Merchandise Store was described as having been

> *"The iconic building was once the center of a vibrant desert community and it remains one of the largest buildings in the valley…During the 1950s, movies were projected onto the west wall, and the building served as a centerpiece for the community. Attracting visitors from the region and beyond, it has historically been a major landmark in the desert and for the desert community…"* (ESA 2009d, Attachment 2, p. 4)

However, it is noted in a discussion of the social life of the community in the 1990 Cultural Resources survey that while the General Merchandise Store put the town of Lockhart on the map,

> *"At the end of the day, however, the community reverted back to a small settlement of some 200 people, most of whom were Lockhart employees and their families. It was at that time that the general store became just another big building. Throughout the 1950s, it never replaced the cook shack as the nerve center of the community…people sometimes watched outdoor movies projected onto the west wall of the general store—in the 1950s, there were no back additions to the building as there are today"* (Hampson and Swanson, 1990, p. 22).

The cook shack was a frame structure that had an industrial gas grill, a walk-in refrigerator and three long wooden tables with benches, and also served as the commissary until the General Merchandise Store opened. It remained operational for several years after the opening of the General Merchandise Store, although it eventually closed and collapsed sometime in the 1960s. The remains were carted off-site (Hampson and Swanson, 1990, p. 21). This account, based on interviews with some ofthe remaining residents at the time, diminishes the importance of the General Merchandise Store to the community of Lockhart, and also notes that the rear of the building—where movies were shown—has been altered.

Additionally, the majority of the architectural remains of the community of Lockhart are no longer extant, having been demolished since the site was originally recorded in 1990 (EDAW 2009a, p. 73). The building is noted as being the centerpiece of the community, however the community—both people and buildings—are gone. As a result, the integrity of setting, feeling and association of the site has been has been significantly compromised. Staff recommends that the General Merchandise Store is not eligible for the CRHR, due to the loss of integrity to the setting, feeling and association as a result of the demolition of the majority of structures on the site.

P-36-006557

When recorded in 1990 P-36-006557 was an intact homestead site with several structures, including a residence, two outbuildings, a fountain/pool, a well, and the remains of an irrigation system. The site is located in the southwestern corner of the Alpha Solar Field. The property was established by James M. Maclachlan in ca. 1918, one of the first homesteaders in the area. The property eventually became part of the Most ranch. The current survey documented the buildings in ruins (EDAW 2009a, p. 71). The site does not appear to be significant under any of the CRHR criteria, and therefore staff recommends that the resource is not eligible for listing on the CRHR.

P-36-021009

P-36-021009 is located on Lockhart Road at the northwestern corner of the Beta Solar Field, immediately south of the Alpha Solar Field (East). The site includes two residential buildings, a storage structure, well and large standpipe. The residential structures were originally mirror images of each other, but have been altered over time. The construction date of the buildings is unknown, however they are likely associated with the Lockhart/Most ranch and may have housed employees. While associated with the Lockhart ranch and the Harper Lake community, the site does not retain a significant level of association with an event or historical figure. Although they do exhibit Minimal Traditional-style characteristics, the buildings are not distinctive examples of a type or period (EDAW 2009a, p. 77-80). The site does not appear to be significant under any of the CRHR criteria, and therefore staff recommends that the resource is not eligible for listing on the CRHR.

P-36-021011

P-36-021011 is a concrete block structure located at the southern edge of the Beta Solar Field, adjacent to a transmission line. The building does not retain a roof, doors, windows or finished walls. It may have been associated with the Lockhart Ranch, but does not retain sufficient integrity to convey any association or significance (EDAW 2009a, p. 82). The site does not appear to be significant under any of the CRHR criteria, and therefore staff recommends that the resource is not eligible for listing on the CRHR.

Two sites included in the architectural survey area were noted as being potentially eligible under CRHR Criterion 4, P-36-021012 and MS-B-1008. They are outside the archaeological survey area. Both are presumed to be occupied ranches containing multiple buildings, and both are early homestead sites. The structures on both sites are heavily modified or are not 45 years old, and neither was determined eligible under Criterions 1-3. The project would not impact any potential subsurface archaeological deposits on the sites. They are outside of the project boundary and would not be impacted by construction.

Summary of CRHR-Eligible Resources Subject to Potential Project Impacts

There are no CRHR-eligible resources within the AMS project area of analysis.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE OF IMPACTS TO HISTORICAL RESOURCES

Under CEQA, “a project that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment” (Pub. Resources Code, § 21084.1). Thus, staff analyzes whether a proposed project would cause a substantial adverse change in the significance, that is, the CRHR eligibility, of all historical resources identified in the Cultural Resources Inventory as CRHR eligible. The degree of significance of an impact depends on:

- The cultural resource impacted;
- The nature of the resource’s historical significance;
- How the resource’s historical significance is manifested physically and perceptually;
- Appraisals of those aspects of the resource’s integrity that figure importantly in the manifestation of the resource’s historical significance; and

- How much the impact will change those integrity appraisals.

DIRECT/INDIRECT IMPACTS AND MITIGATION

In the abstract, direct impacts to cultural resources are those associated with project development, construction, and co-existence. Construction usually entails surface and subsurface disturbance of the ground, and direct impacts to archaeological resources may result from the immediate disturbance of the deposits, whether from vegetation removal, vehicle travel over the surface, earth-moving activities, excavation, or demolition of overlying structures. Construction can have direct impacts on historic standing structures when those structures must be removed to make way for new structures or when the vibrations of construction impair the stability of historic structures nearby. New structures can have direct impacts on historic structures when the new structures are stylistically incompatible with their neighbors and the setting, and when the new structures produce something harmful to the materials or structural integrity of the historic structures, such as emissions or vibrations.

Generally speaking, indirect impacts to archaeological resources are those which may result from increased erosion due to site clearance and preparation, or from inadvertent damage or outright vandalism to exposed resource components due to improved accessibility. Similarly, historic structures can suffer indirect impacts when project construction creates improved accessibility and vandalism or greater weather exposure becomes possible.

Ground disturbance accompanying construction at a proposed plant site, along proposed linear facilities, and at proposed laydown areas has the potential to directly impact archaeological resources, unidentified at this time. The potential direct, physical impacts of the proposed construction on unknown archaeological resources are commensurate with the extent of ground disturbance entailed in the particular mode of construction. This varies with each component of the proposed project. Placing the proposed plant into this particular setting could have a direct impact on the integrity of association, setting, and feeling of nearby standing historic structures.

Construction Impacts and Mitigation

The assessment of the potential direct impacts of the construction of the proposed project on historical resources is presented below. Mitigation proposals for significant effects to such resources, those effects that staff determines would cause a substantial adverse change in their significance, follow.

Identification and Assessment of Direct Impacts on Archaeological Resources and Recommended Mitigation

The construction of the proposed project would entail subsurface ground disturbance to a depth greater than one meter below the present surface across different portions of the project site. Ground disturbance at depth can affect buried archaeological deposits that are not apparent on the surface and which may be significant under CRHR Criterion 4 ("likely to yield information important in history or prehistory"). More specifically, ground disturbance accompanying grading and construction at the proposed AMS plant site has the potential to directly impact unknown archaeological resources. The risk of potential direct, physical impacts from the proposed AMS construction on unidentified archaeological resources is commensurate with the extent of ground disturbance entailed in the particular mode of construction. This varies with each component of the proposed project. The proposed AMS construction activities which involve ground disturbance entail grading of the site and excavation for foundations of proposed equipment, and trenching for drainage channels. The greatest excavation depths into native soils anticipated for the AMS are up to 10 feet for the foundations for the plant equipment and 26 feet for the drainage canals. Site grading would result in an overall elevation of approximately 2,065 feet amsl; the current site elevation ranges from 2,020 feet amsl to 2,105 feet amsl. Preliminary cut and fill volume is estimated at 4.2 million cubic yards (AMS 2009a, p. 5.17-37).

Staff, in consideration of the available evidence on prehistoric and historic fluctuations in the level of Lake Harper, concludes that the potential for the discovery of buried archaeological deposits is moderate to high across the whole of the project site. The results of the geoarchaeology study for the project site found evidence in the northeastern portion of the project site that indicates a prehistoric high lake stand that may have extended as high as 2,050 feet amsl. The geoarchaeologist for the applicant concluded, on that basis, that the potential for buried archaeological deposits in that portion of the project site is high between 2,050 and 2,025 amsl (SWCA 2009c, p. 29). The applicant also notes high stands for Harper Lake as high as 2,160 amsl in the historic period (AMS 2009a, p. 5.17-18). The sedimentological evidence from the geoarchaeology study and the historic archival evidence, taken together, appear to demonstrate that former shorelines of Harper Lake have traversed the entire breadth of the project site through time. Staff concludes that the prehistoric human use of Harper Lake natural resources and the material remains of that behavior along those multiple former shorelines are plausible across the entire project site.

Because of the possibility that buried prehistoric archaeological deposits could be encountered during construction, CEQA advises a lead agency to provide for such a contingency, and the project owner may be required to train workers to recognize cultural resources, fund mitigation, and delay construction in the area of the find (Pub. Resources Code, § 21083.2; Cal. Code Regs., tit. 14, §§ 15064.5(f) and 15126.4(b)). Consequently, staff proposes that procedures for identifying, evaluating, and possibly mitigating impacts to newly discovered archaeological resources be put in place in conditions of certification to reduce those impacts to a less-than-significant level.

To that end as well, the applicant has suggested a number of measures intended to mitigate potential impacts to archaeological resources that could be discovered during the construction of the proposed AMS project (AS 2009a, p. 5.4-42 – 5.4-43). The applicant's suggested mitigation measures include the following:

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

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

Crew Education. Training would be given to construction personnel by the monitoring archaeologists on procedures for the handling of discovered archaeological resources, including the need to stop work until a qualified archaeologist has assessed the significance of the find and implemented appropriate mitigation measures.

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

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

Although staff concurs with many of the applicant's suggested mitigation measures, staff has added additional proposals or expanded upon the applicant's suggestions to ensure that all impacts to cultural resources are mitigated to below the level of significance. The applicant's suggested mitigation measures and staff's additional proposals are incorporated into the proposed Conditions of Certification **CUL-1** through **CUL-7**, below, intended to provide for the contingency of discovering archaeological resources during AMS construction and related activities. Staff's proposed **CUL-1** requires a Cultural Resources Specialist (CRS) to be retained and available during the AMS's construction-related excavations to evaluate any discovered buried resources and, if necessary, to conduct data recovery as mitigation for the project's unavoidable impacts on them. **CUL-2** would require the applicant to provide the CRS with all relevant cultural resources information and maps. **CUL-3** would require the CRS to write and submit to the Energy Commission Compliance Project Manager (CPM) a Cultural Resources Monitoring and Mitigation Plan (CRMMP). **CUL-4** would require the CRS to write and submit to the CPM a final report on all AMS cultural resources monitoring and mitigation activities. **CUL-5** would require the project owner to train workers to recognize cultural resources and instruct them to halt construction if cultural resources are discovered. **CUL-6** proposes archaeological monitoring, by an archaeologist and, possibly, by a Native American, intended to identify buried prehistoric archaeological deposits. **CUL-7** would require the applicant to halt ground-disturbing activities in the area of an archaeological discovery and to fund data recovery, if the discovery is evaluated as CRHR-eligible.

Staff's proposed mitigation measures for identifying, evaluating, and possibly mitigating impacts to previously unknown archaeological resources discovered during construction ensure that impacts to significant archaeological discoveries would be mitigated to a less than significant level.

Identification and Assessment of Direct Impacts on Ethnographic Resources and Recommended Mitigation

No ethnographic resources, either previously recorded or newly disclosed in the communications with Native American groups conducted by the applicant for the proposed project or by staff, were identified in the vicinity of the project. The proposed project would, therefore, have no significant impact on ethnographic resources, and no mitigation for impacts to this class of cultural resources would be necessary.

Identification and Assessment of Direct Impacts on Historic Standing Structures and Recommended Mitigation

No built-environment resources that qualify as historical resources under CEQA are now known or likely to be found in the project area of analysis. The proposed project would, therefore, have no significant impact on built-environment resources, and no mitigation for impacts to this class of cultural resources would be necessary.

Identification and Assessment of Indirect Impacts and Recommended Mitigation

Neither the applicant nor staff identified any indirect impacts to any identified cultural resources in the impact areas of the proposed AMS project, and so no mitigation measures for indirect impacts would be necessary for any class of cultural resources.

Operation Impacts and Mitigation

During operation of the proposed AMS project, if a leak should develop in the gas or water pipelines supplying any part of the plant, repair of the buried utility could require the excavation of a large hole. Such repairs could impact previously unknown subsurface archaeological resources in areas unaffected by the original excavation. The measures proposed above and below to mitigate impacts to previously unknown archaeological resources found during the construction of the proposed project would also serve to mitigate impacts that occur due to repairs that are made during the operation of the plant.

Cumulative Impacts and Mitigation

A cumulative impact refers to a proposed project's incremental effects considered over time and together with those of other, nearby, past, present, and reasonably foreseeable future projects whose impacts may compound or increase the incremental effect of the proposed project (Pub. Resources Code sec. 21083; Cal. Code Regs., tit. 14, secs. 15064(h), 15065(a)(3), 15130, and 15355). Cumulative impacts to cultural resources in the AMS project vicinity could occur if any other existing or proposed projects, in conjunction with the proposed AMS, 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 the future construction of the AMS 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 AMS and other proposed projects in the vicinity could be cumulatively considerable, but may or may not be a significant impact to cultural resources.

The applicant has reviewed the San Bernardino County Planning Department website and spoken to planning staff, and there are not currently any open applications for development projects within a 6-mile radius of the project. As of the date of the application submission, the nearest energy-related project is 43 miles away. The applicant therefore concluded that the AMS was not expected to result in significant cumulative impacts to cultural resources. (AS 2009a, p. 5.4-41 – 5.4-42).

Staff has proposed conditions of certification that would mitigate AMS's impacts to known CRHR-eligible cultural resources to below the level of significance. Staff has also proposed conditions of certification for the AMS project providing for identification, evaluation, and avoidance or mitigation of impacts to previously unknown CRHR-eligible archaeological resources discovered during the construction of the project.

Proponents of any other future projects in the AMS area could mitigate impacts to unanticipated subsurface archaeological sites to less than significant levels by requiring construction monitoring, evaluation of resources discovered during monitoring, and avoidance or data recovery for resources evaluated as CRHR-eligible. Impacts to human remains can be mitigated by following the protocols established by state law in Public Resources Code, section 5097.98. Since the impacts from the proposed AMS project would be mitigated to a less than significant level by the project's compliance with staff's proposed Conditions of Certification **CUL-1** through **CUL-7**, and since similar protocols can be applied to other projects in the area, staff does not expect any incremental effects on cultural resources of the proposed AMS project to be cumulatively considerable when viewed in conjunction with other projects.

COMPLIANCE WITH LORS

If staff's proposed conditions of certification (below) are properly implemented, the proposed AMS project would result in a less than significant impact on known and newly found cultural resources. The proposed AMS project would therefore be in compliance with applicable state laws, ordinances, regulations, and standards listed in Cultural Resources Table 1.

The County of San Bernardino's General Plan has language promoting the general county-wide preservation of cultural resources, outlining five policies specific to cultural resources. The conditions of certification require specific actions not just to promote but to effect historic preservation and mitigate impacts to all cultural resources in order to ensure CEQA compliance. Consequently, if AMS implements these conditions, its actions would be consistent with the general historic preservation goals of the County of San Bernardino.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

The applicant submitted comments on the staff assessment, including the Cultural Resources section. Staff has incorporated the applicant's comments as appropriate. Staff also received a public comment regarding the eligibility of the Lockhart General Merchandise Store. Mr. Glenn Maclean expressed concern that staff had not sufficiently examined the store's association with the Rio Grande Oil Company and Leslie M.

Lockhart, as well as its significance as an example of gas station architecture and the significance of Harper Lake and Harry Crosby's July 5, 1944 flight of the only manned x-wing rocket powered flight of the secret MX-324.

The Lockhart General Merchandise Store is of a mass and scale that, when seen on site, has an enormous presence. As noted in the original evaluation, it is the largest building in the area. Staff appreciates the commenter's concern with the potential significance of the building, and the property was further evaluated for its potential significance as a result of the association with Rio Grande Oil and Leslie M. Lockhart, as well its ability to represent the gas station as an architectural form.

Response:

National Register Bulletin 15, *How to Apply the National Register Criteria for Evaluation*, provides guidance to those determining the significance of historic properties and lays out the steps in which an evaluation is made:

1. Categorize the property.

2. Determine which prehistoric or historic context(s) the property represents

3. Determine whether the property is significant under the National Register Criteria (Note: This document evaluates the significance of the property using the California Register of Historical Places criteria as required by CEQA. These criteria are identical to the National Register criteria.)

4. Determine if the property represents a type usually excluded from the National Register.

5. Determine whether the property retains integrity.

Staff will follow the steps outlined above to further evaluate the significance of the Lockhart General Store.

1. **Category.** The National Register classifies properties as districts, sites, buildings, structures, or objects. The Lockhart General store is a building.

2. **Context.** As stated in the staff assessment, the history of the Harper Lake community and its evolution into the Lockhart ranching community provides the context for the evaluation of the remaining buildings, in particular the Lockhart General Merchandise Store. San Bernardino County surveyors measured section lines of rectangular grid system for Harper Lake area in 1856, shortly after California attained statehood. United States Army engineers had also surveyed the area looking for the best transcontinental railroad routes, and one of the recommended routes passed 10 miles south of Harper Dry Lake. This route was ultimately used by the Santa Fe Railroad (Swanson 1988, p. 3)

   The 1856 survey did not record any land improvements in the Harper Lake area. The first cattle ranch was established east of Harper Lake by C.S. Black in 1872. The Black Ranch became a frequent stop on the San Bernardino-Panamint Road, which was established following the discovery of borate deposits at

Searles Lake and the Panamint Valley, north of Harper Dry Lake. The San Bernardino-Panamint Road became less traveled following the discovery of larger borate deposits in Death Valley (Swanson 1988, p. 4).

The first settlers on the west side of Harper Lake, in the project area, were Henry and Emma Spenker, who arrived in 1911. The Spenkers came to the area hoping to create an irrigation-based farming community, and built irrigation ditches and a reservoir to grow alfalfa, raise chickens and turkeys, and plant orchards (EDAW 2009a, p. 24).

Eleven more land patents were issued for the Harper Lake area by the Bureau of Land Management (BLM) between 1921 and 1929. The first was issued to James M. Maclachlan, the original homesteader on the Lockhart Ranch property. Underground water was more accessible at lower elevations near the lake bed, and each homestead had to install its own well and construct irrigation ditches. Many homestead claims were not year-round inhabitants, but weekenders who lived in urban areas. The Harper Lake residents were officially listed as living in Hinkley, approximately 10 miles southeast, but full-time residents considered themselves a separate community (Swanson 1988, p.9-11).

The only Desert Land Entry (DLE) permit issued in the Harper Dry Lake area was to Victor York and Leslie M. Lockhart in 1925, for land which became the York Ranch. York and Lockhart were wealthy business partners with the York-Smullin Oil Company, and invested in the ranch as a side venture. The ranch grew a variety of crops, including alfalfa and cashews, demanding an enormous quantity of water that necessitated the drilling of special deep wells. Hugh Evans, whose alfalfa farm was south of the project area, also installed deep wells with diesel-powered pumps in the 1930s. The deep wells on the Evans and York properties contributed to a significant drop in the water table, below the reach of the initial wells, which limited the production of alfalfa to only Evans and York. The limited accessibility to water combined with the Great Depression spelled the end for the original homesteads. Many of the remaining local residents went to work for York and Lockhart. The population had dropped so low by 1937 that the schoolhouse was closed, and Lockhart had become the sole owner of both the York and Evans ranches by the end of the decade (Swanson 1988, p. 11-13).

California Electric constructed a substation and introduced electricity to the valley in 1947. This brought new residents, many of whom also ended up working for the Lockhart Ranch, which was dedicated to raising high-quality beef and farming alfalfa to feed ranch cattle. The ranch eventually became one of the largest farming concerns in the Mojave Desert (Hampson and Swanson 1990, p. 14-15). Forrest Most and his family arrived in the area in 1946 and purchased 480 acres of what was the York Ranch, and would become the second largest landholders in the area (Swanson 1988, p. 13-14).

Lockhart began to invest a substantial amount of money into the ranch and to develop a community in the 1950s, building a grocery store, butcher, a gas station, café and 16 employee houses (Swanson 1988, p. 14-15). Originally conceived of as a small general store, the General Merchandise Store was one of the largest structures in the area. It was constructed at a cost of $365,000 and opened in 1953. It carried all manner of provisions and also housed a post office. People came from all over the area to buy Lockhart Ranch meat, which was considered the best in the Mojave Desert. The Lockhart community at that time numbered approximately 200 people, most of whom were Lockhart Ranch employees and their families (Hampson and Swanson 1990, p.22).

The Most Ranch was also becoming profitable at this time, concentrating on sheep, corn, oats and wheat rather than alfalfa. By the late 1950s both ranches had incorporated a new pivot irrigation system that entailed a giant arm making a circular sweep of a quarter section, which proved much more efficient than the standing pipe method as it was largely automatic and required less manpower (Swanson 1988, p.14-15). The Mosts sold their ranch back to Lockhart in 1955 (Hampson and Swanson 1990, p. 14).

The implementation of the pivot irrigation system may have contributed to the decline of the community of Lockhart, as it took significantly less manpower to operate. Additionally, Lockhart suffered a series of financial losses in the mid-1950s, and the ranch was a secondary interest. These losses may have caused him to reevaluate his financial priorities, and the ranch had not been a profitable investment (Hampson and Swanson 1990, p. 23). People began to leave the town of Lockhart around 1959, and the grocery store and gas station were converted into a mechanic shop. The post office was closed in 1958 (Swanson 1988, p. 14-15),and the ranch changed hands several times until it was finally sold to Orita Land and Cattle Company around 1962 (Hampson and Swanson 1990, p. 24).

Milton Most, the son of Forrest Most, was the ranch manager for Orita. Most demolished many of the ranch buildings constructed by Lockhart. In 1977 Orita sold the ranch to Al Cotton, who went bankrupt within two years. The southern half of the ranch, south of Hoffman Road, was purchased in 1979 by Milton Most. The Luz Development and Finance Corporation bought the ranch from Milton Most in 1988, and immediately leased the land back to him until the early 1990s (Hampson and Swanson 1990, p.24-27). Luz installed solar energy panels within Sections 19 and 24 of the former ranch, and Abengoa Solar, Inc. purchased the remainder of the ranch in 2008 (EDAW 2009a, p. 26).

The town of Lockhart was recorded as part of a cultural resources survey in 1990, at which time there were 41 standing buildings and structures associated with the complex. Since then, the majority of the buildings have been demolished (AS 2009a, p.5.4-27).

3. **Determine whether the property is significant under the National Register Criteria** (Note: This document evaluates the significance of the property using the California Register of Historical Places criteria as required by CEQA. These criteria and the evaluation process are identical to the National Register criteria and evaluation process.)

California Register of Historical Resources Criteria for Designation:

- Criterion 1: Associated with events that have made a significant contribution to the broad patterns of local or regional history or the cultural heritage of California or the United States.
- Criterion 2: Associated with the lives of persons important to local, California or national history.
- Criterion 3: Embodies the distinctive characteristics of a type, period, region or method of construction or represents the work of a master or possesses high artistic values.
- Criterion 4: Has yielded, or has the potential to yield, information important to the prehistory or history of the local area, California or the nation.

Criteria 1

The Rio Grande Oil Company was established in 1915 in El Paso, Texas by Lloyd E. Lockhart (Jones 1972, pp. 3–4). He was joined shortly by his brother Arthur Mills Lockhart (Jones 1972, p. 7). The Lockhart's small company got its first major contract from the United States military as a result of the military effort to capture the Mexican outlaw Pancho Villa (Jones 1972, p. 12). As Rio Grande expanded, the remaining four Lockhart brothers joined the company. Leslie M. Lockhart sold his dry-good business in Chicago and became the company's secretary in 1918 (Jones 1972, pp. 19–20).

Rio Grande continued its expansion west to Phoenix, Arizona in 1920 and California in 1922, moving its headquarters to Los Angeles and constructing a refinery in Vinvale in 1923 (Jones 1972, pp. 30–32). It was Rio Grande, partnering with the Barnsdall Oil Company, that discovered the Elwood Field north of Santa Barbara in 1929 (Jones 1972, pp. 41–43). This fortunate strike propelled Rio Grande from a small, independent company to publically-traded, $80 million dollar enterprise (Jones 1972, p. 54).

Leslie Lockhart does not seem to have played a particularly fundamental role in any of Rio Grande's ventures. He did, however, suffer some financial misfortune at the hands of his investment counselor that nearly bankrupted the company with the stock market crash of 1929 (Jones 1972, pp. 54-57).

Rio Grande Oil merged with Sinclair Consolidated Oil Corporation in September of 1932, and most of the Lockharts retired from the company at this time. Leslie and Lloyd Lockhart remained in the oil business in East Texas and were relatively successful. Rio Grande retained its identity within Sinclair oil and continued to operate (Jones 1972, pp. 63).

As discussed above, the context of the Lockhart General Merchandise Store is the history of the Harper Lake community and its evolution into the Lockhart ranching community. Leslie Lockhart's financial support for the ranch may have come from his affiliation with Rio Grande Oil and subsequent oil investments; however that financial connection would not expand the context of the Lockhart General Merchandise Store to encompass the development of the oil industry in

California. Additionally, Lockhart and his ranch did not make significant contributions to the ranching industry, or any technological advances in ranching.

The Lockhart General Merchandise store was further evaluated under Criteria 1 above in relation to its role within the Harper Lake community; please see that discussion for further information.

Therefore, within the context of ranching in the Mojave Desert, the Lockhart General Merchandise Store is not significant for its association with Rio Grande Oil within the confines of Criteria 1 of the California Register of Historical Resources.

Criteria 2

The history of the Lockhart family, summarized above, is primarily within the context of the development of the oil industry in the southwestern United States in the early 20th century. Their father, Charles H. Lockhart, was involved in the oil industry in Pennsylvania prior to moving to Texas (Jones 1972, p. 4). Leslie Lockhart, the owner of the Lockhart Ranch and Lockhart General Merchandise Store, owned a dry-goods business in the early 20th century, which he sold to join Rio Grande Oil as secretary. It does not appear that Leslie Lockhart played a significant role within the company. He continued to be successful in the oil industry, and was a partner in the York-Smullin Oil Company when he first became involved in the Harper Lake community.

Criteria 2 is “generally restricted to those properties that illustrate (rather than commemorate) a person’s important achievements” (NPS 1990, p. 14). The importance of the individual must be determined, as well as the length and nature of their association with the property under study. The individual must then be significant within a historic context and have gained importance within their profession or group, and the best representative property associated with the person’s adult or productive life identified (NPS 1990, pp. 14–15). Leslie Lockhart may be important within the context of the continued development of the oil industry in Texas and the southwestern United States, however further research would be needed to make that determination. As stated above, Leslie Lockhart’s financial support for the ranch may have come from his affiliation with Rio Grande Oil and subsequent oil investments; however that financial connection would not expand the context of the Lockhart General Merchandise Store to encompass the development of the oil industry in California. The family itself did not make a significant contribution to ranching in the Mojave, nor did Leslie Lockhart make significant contributions to the ranching industry, or any technological advances in ranching. Therefore, the Lockhart General Merchandise Store would not be significant under Criteria 2 of the CRHR for its association with Leslie Lockhart and the Lockhart family.

Criteria 3

The Lockhart General Merchandise Store is a commercial retail building and gas station. It was constructed in 1953 of poured concrete, concrete block, glass block windows and a broad roof truss system. Sheet metal canopies extend out from the building over the former pump locations (ESH 2009d, Attachment 2 p. 4).

The gas station as an architectural form began to evolve around 1920, designed especially to promote corporate identities in their respective territories (Jakle & Sculle 1994, p. 131). The first standardized chain of gas stations was introduced in 1914 by Standard of California, each consisting of a small house with attached canopies, uniformly painted and identified by common signs (Jakle & Sculle 1994, p. 132). The standardized gas station became an enormously important advertising mechanism throughout the 20th century (Jakle & Sculle 1994, p. 133). *National Petroleum News*, an industry journal, gave considerable attention to station innovation. Nine "types" of stations were identified by Jakle and Sculle in their history of the gas station, *The Gas Station in America.* One of those types, the oblong box, was introduced in the 1930s and shares similar design elements with the Lockhart General Merchandise Store, including rectangular perimeter dimensions, projecting canopies, large windows, little exterior decoration, and an exterior paint scheme including signage (Jakle & Sculle 1994, pp. 144–146). The Lockhart General Merchandise Store, however, is not a pure gas station. Rather it is a hybrid, including a retail element which is likely the reason for the large scale of the building.

Criteria 3 seeks properties that embody the distinctive characteristics of a type, period, region or method of construction, referring to the way a building was conceived, designed, or fabricated. In particular, a property must clearly illustrate through distinctive characteristics, patterns of features, individuality or variation of features, or the evolution of a particular class of resources, or transition between classes of resources (NPS 1990, p. 16–18). While the Lockhart General Merchandise Store shares some typical features with gas stations of the era, such as the projecting canopies, it is not a representative example of gas stations of this era, nor does it represent a significant variation of that architectural type. It is also not the work of a master, nor does it possess high artistic values. Therefore the Lockhart General Merchandise Store is not eligible under Criteria 3 of the CRHR.

Criteria 4

While the Crosby flight is a historic event, an evaluation of Harper Lake itself, events associated with the lake and its role in aviation history is outside the scope of this analysis. The Lockhart General Merchandise Store does not have the potential to yield information important to the prehistory or history of the local area, California or the nation within this context.

4. **Excluded Category:** The Lockhart General Merchandise Store is not a building type typically excluded from California Register or National Register eligibility.

5. **Integrity:** A historic property must not only meet one of the criteria above to be considered significant, it must also retain its "integrity." The integrity of a historic resource is defined as "the ability of a property to convey its significance" (NPS

1990, p. 44). There are seven aspects that, in various combinations, define integrity: location, design, setting, materials, workmanship, feeling and association.

Location refers to the place where, in the case of the Lockhart General Store, the property was constructed. Design is the combination of elements that create the form, plan, space, structure and style of a building, while setting is the physical environment. Setting also refers to the character of the place, including the physical conditions under which a property was built and the function it was intended to serve. Materials are the physical pieces a property was constructed of; workmanship is the physical evidence of the craft or crafts or a particular people or culture. Feeling is the expression of the aesthetic or historic sense of a particular period of time, and, finally, association is the direct link between an important event or person and the property (NPS 1990, pp. 44–45).

As discussed above, the Lockhart General Merchandise Store is noted as being the centerpiece of the Harper Lake community, however the community—both people and buildings—are gone. As a result, the integrity of setting, feeling and association of the site has been has been significantly compromised as a result of the demolition of the majority of structures on the site. The Lockhart General Merchandise Store does not retain its ability to convey its significance under the California Register criteria.

Staff would like to note that while the Lockhart General Merchandise Store does not qualify as a historic resource for the purposes of CEQA and the Energy Commission is unable to afford it further consideration for treatment in the siting case process, it does not mean that the resource does not retain value to members of the local community. It simply means that it does not fit within the confines of this analysis. The conclusions presented here do not preclude the local community from pursuing the preservation of this structure through other historic preservation programs.

CONCLUSIONS AND RECOMMENDATIONS

Staff's cultural resources analysis has determined that the project has a moderate to high potential to have significant direct impacts on unknown buried prehistoric archaeological deposits.

Staff recommends that the Commission adopt the following cultural resources Conditions of Certification, **CUL-1** through **CUL-7,** to reduce the known and potential impacts of the proposed project to a less than significant level. The subject conditions are variously intended to facilitate the identification and assessment of unanticipated discoveries of historical resources encountered during construction, and to mitigate any significant impacts from the project on these latter resources if they should be found to be significant. To facilitate the identification and mitigations, the conditions provide for the hiring of a Cultural Resources Specialist and archaeological monitors, for cultural resources awareness training for construction workers, for the archaeological monitoring of ground-disturbing activities, for the recovery of data from significant discovered archaeological deposits, for the writing of a technical archaeological report on all archaeological activities and findings, and for the curation of recovered artifacts and other data. When properly implemented and enforced, staff believes that these conditions of certification would reduce to less than significant known impacts to historical resources and any impacts to unanticipated discoveries of historical resources encountered during construction or operation. Additionally, with the adoption and implementation of these conditions, the proposed AMS project would be in conformity with all applicable laws, ordinances, regulations, and standards.

PROPOSED CONDITIONS OF CERTIFICATION

CUL-1 Prior to the start of ground disturbance (includes "preconstruction site mobilization"; "construction ground disturbance"; and "construction grading, boring and trenching," as defined in the General Conditions for this project), the project owner shall obtain the services of a Cultural Resources Specialist (CRS), and one or more alternate CRSs, if alternates are needed. The CRS shall manage all monitoring, mitigation, curation and reporting activities required in accordance with the Conditions of Certification (Conditions). The CRS may elect to obtain the services of Cultural Resources Monitors (CRMs) and other technical specialists, if needed, to assist in monitoring, mitigation, and curation activities. The project owner shall ensure that the CRS makes recommendations regarding the eligibility 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. No ground disturbance shall occur prior to CPM approval of the CRS and alternates, unless such activities are specifically approved by the CPM. Approval of a CRS may be denied or revoked for non-compliance on this or other projects.

CULTURAL RESOURCES SPECIALIST

The resumes for the CRS and alternate(s) shall include information demonstrating to the satisfaction of the CPM that their training and backgrounds conform to the U.S. Secretary of Interior's Professional Qualifications Standards, as published in Title 36, Code of Federal Regulations, part 61 (36 C.F.R., part 61). In addition, the CRS shall have the following qualifications:

1. The CRS's qualifications shall be appropriate to the needs of the project and shall include a background in anthropology, archaeology, history, architectural history, or a related field;

2. At least three years of archaeological or historical, as appropriate, resource mitigation and field experience in California; and

3. At least one year 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 resumes of the CRS and alternate CRS shall include the names and telephone numbers of contacts familiar with the work of the CRS/alternate

CRS on referenced projects and demonstrate to the satisfaction of the CPM that the CRS/alternate CRS has the appropriate training and experience to implement effectively the Conditions.

CULTURAL RESOURCES MONITORS

CRMs shall have the following qualifications:

1. A B.S. or B.A. degree in anthropology, archaeology, historical archaeology or a related field and one year experience monitoring in California; or

2. An AS or AA degree in anthropology, archaeology, historical archaeology or a related field, and four years experience monitoring in California; or

3. Enrollment in upper division classes pursuing a degree in the fields of anthropology, archaeology, historical archaeology or a related field, and two years of monitoring experience in California.

CULTURAL RESOURCES TECHNICAL SPECIALISTS

The resume(s) of any additional technical specialist(s), e.g., historical archaeologist, historian, architectural historian, and/or physical anthropologist, shall be submitted to the CPM for approval.

Verification: At least 45 days prior to the start of ground disturbance, the project owner shall submit the resume for the CRS, and alternate(s) if desired, to the CPM for review and approval.

At least 10 days prior to a termination or release of the CRS, or within 10 days after the resignation of a CRS, the project owner shall submit the resume of the proposed new CRS to the CPM for review and approval. At the same time, the project owner shall also provide to the proposed new CRS the AFC and all cultural resources documents, field notes, photographs, and other cultural resources materials generated by the project. If there is no alternate CRS in place to conduct the duties of the CRS, a previously approved monitor may serve in place of a CRS so that construction may continue up to a maximum of three days without a CRS. If cultural resources are discovered then construction will remain halted until there is a CRS or alternate CRS to make a recommendation regarding significance.

At least 20 days prior to ground disturbance, the CRS shall provide a letter naming anticipated CRMs for the project and stating that the identified CRMs meet the minimum qualifications for cultural resource monitoring required by this Condition. If additional CRMs are obtained during the project, the CRS shall provide additional letters to the CPM identifying the CRMs and attesting to the qualifications of the CRMs, at least five days prior to the CRMs beginning on-site duties.

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.

At least 10 days prior to the start of 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.

CUL-2 Prior to the start of ground disturbance, if the CRS has not previously worked on the project, the project owner shall provide the CRS with copies of the AFC, data responses, and confidential cultural resources reports for the project. The project owner shall also provide the CRS and the CPM with maps and drawings showing the footprints of the power plant, all linear facilities, all access roads, and all laydown areas. Maps shall include the appropriate USGS quadrangles and a map at an appropriate scale (e.g., 1:2000 or 1" = 200') for plotting cultural features or materials. If the CRS requests enlargements or strip maps for linear facility routes, the project owner shall provide copies to the CRS and CPM. The CPM shall review submittals and, in consultation with the CRS, approve those that are appropriate for use in cultural resources planning activities. No ground disturbance shall occur prior to CPM approval of maps and drawings, unless such activities are specifically approved by the CPM.

If construction of the project would proceed in phases, maps and drawings not previously provided shall be submitted prior to the start of each phase. Written notification identifying the proposed schedule of each project phase shall be provided to the CRS and CPM.

At a minimum, the CRS shall consult weekly with the project construction manager to confirm area(s) to be worked during the next week, until ground disturbance is completed.

The project owner shall notify the CRS and CPM of any changes to the scheduling of the construction phases.

<u>Verification:</u>

1. At least 40 days prior to the start of ground disturbance, the project owner shall provide the AFC, data responses, and confidential cultural resources documents 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. If there are changes to any project-related footprint, revised maps and drawings shall be provided at least 15 days prior to start of ground disturbance for those changes.

3. If project construction is phased, if not previously provided, the project owner shall submit the subject maps and drawings 15 days prior to each phase.

4. On a weekly basis during ground disturbance, a current schedule of anticipated project activity shall be provided to the CRS and CPM by letter, e-mail, or fax.

5. Within five days of identifying changes, the project owner shall provide written notice of any changes to scheduling of construction phase.

CUL-3 Prior to the start of ground disturbance, the project owner shall submit the Cultural Resources Monitoring and Mitigation Plan (CRMMP), as prepared by or under the direction of the CRS, to the CPM for review and approval. The

CRMMP shall be provided in the Archaeological Resource Management Report (ARMR) format, and, per ARMR guidelines, the author's name shall appear on the title page of the CRMMP. The CRMMP shall identify general and specific measures to minimize potential impacts to sensitive cultural resources. Implementation of the CRMMP shall be the responsibility of the CRS and the project owner. Copies of the CRMMP shall reside with the CRS, alternate CRS, each 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.

The CRMMP shall include, but not be limited to, the following elements and measures:

1. 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. A prescriptive treatment plan may be included in the CRMMP for limited resource types. A refined research design will be prepared for any resource where data recovery is required.

2. 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."

3. Specification of the implementation sequence and the estimated time frames needed to accomplish all project-related tasks during the ground disturbance, construction, and post-construction 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 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 construction and how long they would be needed to protect the resources from project-related effects.

7. A statement that all cultural resources encountered shall be recorded on 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 *Guidelines for the Curation of Archaeological Collections*, into a retrievable storage collection in a public repository or museum.

8. A statement that the project owner will pay all curation fees for artifacts recovered and for related documentation produced during cultural resources investigations conducted for the project. The project owner shall identify three possible curation facilities that could accept cultural resources materials resulting from project activities.

9. A statement that the CRS has access to equipment and supplies necessary for site mapping, photography, and recovery of any cultural resource materials that are encountered during ground disturbance and cannot be treated prescriptively.

10. A description of the contents and format of the Cultural Resource Report (CRR), which shall be prepared according to ARMR guidelines.

Verification:

1. At least 30 days prior to the start of ground disturbance, the project owner shall submit the subject CRMMP to the CPM for review and approval.

2. At least 30 days prior to the start of ground disturbance, a letter shall be provided to the CPM indicating that the project owner agrees to pay curation fees for any materials collected as a result of the archaeological investigations (survey, testing, data recovery).

CUL-4 The project owner shall submit the Cultural Resources Report (CRR) to the CPM for approval. The CRR shall be written by or under the direction of the CRS and shall be provided in the ARMR format. The CRR shall report on all field activities including dates, times and locations, findings, samplings, and analyses. All survey reports, DPR 523 forms, and additional research reports not previously submitted to the California Historical Resource Information System (CHRIS) and the State Historic Preservation Officer (SHPO) shall be included as an appendix to the CRR.

If the project owner requests a suspension of 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 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 90 days after completion of ground disturbance (including landscaping), the project owner shall submit the 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.

2. Within 90 days after completion of ground disturbance (including landscaping), 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 California State Historical Resources Commission's *Guidelines for the Curation of Archaeological Collections*, to accept cultural materials, if any, from this project. Any agreements concerning curation will be retained and available for audit for the life of the project.

3. Within 10 days after CPM approval, the project owner shall provide documentation to the CPM confirming that copies of the CRR have been provided to the SHPO, the CHRIS, and the curating institution, if archaeological materials were collected.

4. 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.

CUL-5 Prior to and for the duration of ground disturbance, the project owner shall provide Worker Environmental Awareness Program (WEAP) training to all new workers within their first week of employment at the project site, laydown area, and along the linear facilities routes. The training shall be prepared by the CRS, may be conducted by any member of the archaeological team, and may be presented in the form of a video. The CRS shall be available (by telephone or in person) to answer questions posed by employees. The training may be discontinued when ground disturbance 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 the law;

2. Samples or visuals of artifacts that might be found in the project vicinity;

3. Instruction that the CRS, alternate CRS, and CRMs have the authority to halt construction in the area of a discovery to an extent sufficient to ensure that the resource is protected from further impacts, as determined by the CRS;

4. Instruction that employees are to halt work on their own in the vicinity of a potential cultural resources discovery and shall contact their supervisor and the CRS or CRM, and that redirection of work would be determined by the construction supervisor and the CRS;

5. An informational brochure that identifies reporting procedures in the event of a discovery;

6. An acknowledgement form signed by each worker indicating that they have received the training; and

7. 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 training program draft text and graphics and the informational brochure to the CPM for review and approval, and the CPM will provide to the project owner a WEAP Training Acknowledgement form for each WEAP-trained worker to sign.

2. On a monthly basis, until ground disturbance is completed, the project owner shall provide in the Monthly Compliance Report (MCR) the WEAP Training Acknowledgement forms of workers at the project site and on the linear facilities who have completed the training in the prior month and a running total of all persons who have completed training to date.

CUL-6 The project owner shall ensure that the CRS, alternate CRS, or CRMs monitor full time all ground disturbance at the project site, and ground disturbance at laydown areas, roads, and other ancillary areas, to ensure there are no impacts to undiscovered resources and to ensure that known resources are not impacted in an unanticipated manner.

Full-time archaeological monitoring for this project shall be the archaeological monitoring of all project-related ground disturbance in the project area for as long as the activities are ongoing. Where excavation equipment is actively removing dirt and hauling the excavated material farther than fifty 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 further than fifty feet from the location of active excavation, one monitor shall both observe the location of active excavation and inspect the dumped material.

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 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. Copies of the daily monitoring logs shall be provided by the CRS to the CPM, if requested by the CPM. From these 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 CRS or alternate CRS shall report daily to the CPM on the status of cultural resources-related activities at the construction site, unless reducing or ending daily reporting is requested by the CRS and approved by the CPM.

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 (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 by telephone or e-mail within 24 hours. The CRS shall also recommend corrective action to resolve the problem or achieve compliance with the Conditions. When the issue is resolved, the CRS shall write a report describing the issue, the resolution of the issue, and the effectiveness of the resolution measures. This report shall be provided in the next MCR for the review of the CPM.

A Native American monitor shall be obtained to monitor ground disturbance in areas where Native American artifacts are discovered. Informational [contact] lists of concerned Native Americans and guidelines for monitoring shall be obtained from the Native American Heritage Commission. Preference in selecting a monitor shall be given to Native Americans with traditional ties to the area that shall be monitored. If efforts to obtain the services of a qualified Native American monitor are unsuccessful, the project owner shall immediately inform the CPM. The CPM will either identify potential monitors or will allow ground disturbance to proceed without a Native American monitor.

<u>Verification:</u>

1. 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. While monitoring is on-going, the project owner shall include in each MCR a copy of the monthly summary report of cultural resources-related monitoring prepared by the CRS.

2. Daily, as long as no cultural resources are found, the CRS shall provide a statement that "no cultural resources over 50 years of age were discovered" to the CPM as an e-mail, or in some other form acceptable to the CPM. If the CRS concludes that daily reporting is no longer necessary, a letter or e-mail providing a detailed justification for the decision to reduce or end daily reporting shall be provided to the CPM for review and approval at least 24 hours prior to reducing or ending daily reporting.

3. At least 24 hours prior to implementing a proposed change in monitoring level, documentation justifying the change shall be submitted to the CPM for review and approval.

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 Chairperson 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 and any comments or information provided in response by the Native Americans.

CUL-7 The project owner shall grant authority to halt construction to the CRS, alternate CRS, and the CRMs 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 cultural resources over 50 years of age or, if younger, considered exceptionally significant are found, or impacts to such resources 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. Monitoring and daily reporting as provided in **CUL-6** shall continue during all ground-disturbing activities wherever project construction is not halted. The halting or redirection of construction 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 eligibility, and recommendations for mitigation of any cultural resources discoveries, whether or not a determination of significance has been made.

2. The CRS has completed field notes, measurements, and photography for a DPR 523 "Primary" form. The "Description" entry of the DPR 523 "Primary" form shall include a recommendation on the significance of the find. The project owner shall submit completed forms to the CPM.

3. 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.

Verification:

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 construction activities 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. Completed DPR 523 forms for resources newly discovered during construction 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.

CULTURAL RESOURCES ACRONYM GLOSSARY

AFC	Application for Certification
AMS	Abengoa Mojave Solar
ARMR	Archaeological Resource Management Report
BCE	Before Common Era
CE	Common Era
CEQA	California Environmental Quality Act
CHRIS	California Historical Resources Information System
Conditions	Conditions of Certification
CRHR	California Register of Historical Resources
CRM	Cultural Resources Monitor
CRMMP	Cultural Resources Monitoring and Mitigation Plan
CRR	Cultural Resource Report
CRS	Cultural Resources Specialist
DPR 523	Department of Parks and Recreation cultural resource inventory form
FSA	Final Staff Assessment

LORS Laws, ordinances, regulations, and standards

MCR Monthly Compliance Report

MLD Most Likely Descendent

NAHC Native American Heritage Commission

NRHP National Register of Historic Places

OHP Office of Historic Preservation

PSA Preliminary Staff Assessment

SHPO State Historic Preservation Officer

Staff Energy Commission cultural resources technical staff

WEAP Worker Environmental Awareness Program

REFERENCES

The *TN: 00000* in a reference below indicates the transaction number under which the item is catalogued in the Energy Commission's Docket Unit. The transaction number allows for quicker location and retrieval of individual items docketed for a case or used for ease of reference and retrieval of exhibits cited in briefs and used at Evidentiary Hearings.

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LAND USE

Testimony of Negar Vahidi and Susanne Huerta

SUMMARY OF CONCLUSIONS

The Energy Commission staff (referred to as “staff”) have reviewed the proposed Abengoa Mojave Solar (AMS or “proposed project”) project in accordance with the requirements of the California Environmental Quality Act (CEQA). This section addresses land use issues related to agriculture, compatibility with existing land uses and consistency with the applicable laws, ordinances, regulations, and standards (LORS). With implementation of the recommended conditions of certification, the proposed project would not result in adverse impacts to agricultural lands and would be consistent with the applicable LORS. Staff is proposing Conditions of Certification **LAND-1** to ensure that the proposed project mitigates for the permanent loss of 128 acres of Important Farmland as designated by the Farmland Mapping and Monitoring Program of the California Department of Conservation; **LAND-2** to ensure that the proposed project complies with San Bernardino County’s (county) suggested project decommissioning/closure requirements; and **LAND-3** to ensure the proposed project is in compliance with the Subdivision Map Act.

The proposed project would contribute to the conversion of a total of approximately half a million acres of land that are proposed for solar and wind energy development in the western Mojave Desert area. Cumulative impacts to approximately half a million acres of land would all combine to result in adverse effects on agricultural lands, and the cumulative conversion of these lands would preclude numerous existing land uses including open space and rural residences. However, with implementation of Condition of Certification **LAND-1**, the proposed project’s contribution to the overall conversion of land in the western Mojave Desert area would not be cumulatively considerable.

INTRODUCTION

This land use analysis focuses on the proposed project’s consistency with land use plans, ordinances, regulations, and policies and the project’s compatibility with existing or reasonably foreseeable land uses. In addition, a power plant and its related facilities generally have the potential to create impacts in the areas of air quality, noise, dust, public health, traffic and transportation, and visual resources. These individual resource areas are discussed in detail in separate sections of the Staff Assessment.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Land use LORS directly applicable to the proposed project and the surrounding area include San Bernardino County’s General Plan and Land Use Ordinance. **Land Use Table 1** provides a general description of land use LORS applicable to the proposed project and surrounding lands. The project’s consistency with these LORS is discussed in **Land Use Table 2**.

Land Use Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable LORS	Description
Federal	None
State	
Subdivision Map Act (Public Resources Code Section 66410-66499.58)	This section of the California Public Resources Code provides procedures and requirements regulating land division (subdivisions) and parcel legality. Regulation and control of the design and improvement of subdivisions have been vested in the legislative bodies of local agencies.
Local	
County of San Bernardino 2007 General Plan (SBC 2007a)	The policies and programs of the County of San Bernardino General Plan, adopted March 13, 2007, are intended to serve as a blueprint for most land use decisions. Preparing, adopting, implementing, and maintaining a general plan serves to: identify the community's land use, transportation, environmental, economic, and social goals and policies as they relate to land use and development; form the basis for local government decision-making, including decisions on proposed development; provide residents with opportunities to participate in the planning and decision-making processes of their community; and inform residents, developers, decision makers, and other cities and counties of the ground rules that guide development within the community.
County of San Bernardino 2007 Development Code, Title 8 of the San Bernardino County Code (CSB 2007b; CSB 2010d)	The County's Development Code was adopted March 13, 2007, and amended August 20, 2009 and February 2010. The purpose of this Development Code is to implement the San Bernardino County General Plan by classifying and regulating the uses of land and structures within unincorporated San Bernardino County. In particular, the purposes of the Development Code are as follows: to provide standards and guidelines for continuing orderly growth and development; to conserve and protect the County's important agriculture, cultural, natural, open space and scenic resources; to create a comprehensive and stable pattern of land uses upon which to plan transportation, water supply, sewerage, energy, drainage/flood control and other public facilities and utilities; to encourage the most appropriate uses of land in order to prevent overcrowding of land and avoid undue concentration of population, and maintain and protect the value of property; and to ensure compatibility between different types of development and land use. The Development Code was most recently amended on February 9, 2010, to include Chapter 84.29 (Renewable Energy Generation Facilities) for the purpose of establishing "...standards and permit procedures for the establishment, maintenance and decommissioning of renewable energy generation facilities" (CSB 2010d).

SETTING

PROPOSED PROJECT

Proposed Project Site

The proposed AMS project is a solar electric generating facility to be located on approximately 1,765 acres approximately nine miles northwest of the Town of Hinkley in unincorporated San Bernardino County. Project site access is provided by Harper Lake Road, which is approximately twenty miles west of Barstow along the Highway 58 corridor, and approximately six miles north of where Harper Lake Road intersects with Highway 58. The existing Solar Electric Generating Stations (SEGS) VIII and IX facilities, now owned by NextEra™ Energy Resources, are located immediately northwest of the project site. See **Project Description Figures 1, 2,** and **3.**

The project site is comprised of private property that was historically used as the Lockhart Ranch complex. The property has served as an agricultural and cattle center for over sixty years and, in that capacity, has utilized water from ground wells; farming activities have included flood irrigation and ultimately the pivot system of irrigation of quarter section areas. Currently, there are no ranching or residential activities on the property, and there is only one active pivot irrigation field in production on the site. The property is designated Rural Living (RL) by the San Bernardino County General Plan, and is within the RL zone of the county's Development Code.

Project-Related Facilities

In addition to the proposed AMS site, other features and facilities associated with the proposed project would be located on the project site. The project would have a combined nominal electrical output of 250 megawatts (MW) from twin, independently-operable solar fields, each feeding a 125-MW power island. The plant sites, identified as Alpha (the northwest portion of the Project area) and Beta (the southeast portion of the Project area), would be 884 acres and 800 acres, respectively, and joined at an on-site transmission line interconnection substation to form one full-output transmission interconnection. The applicant proposes that an additional 81 acres shared between the plant sites would be utilized for receiving and discharging offsite drainage improvements.

Each power island would have its own warehouse and control/administrative building. Solar collector array assembly buildings would be installed in the northeast portion of the Alpha solar field, which would be later converted to warehouses. The total square footage of the various proposed project buildings and pre-engineered enclosures (e.g., control/administrative building, warehouse, electrical equipment enclosures, etc.) is approximately 185,000 square feet for the entire project.

The proposed onsite transmission line would be installed on approximately 23 new steel/concrete mono-poles from the Alpha site and approximately nine poles from the Beta site. The poles would be an average of 80 feet in height with a maximum pole height of 110 feet. The onsite transmission line would connect to a new substation that would be located on the southwest corner of the Beta solar field and referred to as "Hinkley." This proposed substation would then interconnect to Southern California

Edison's (SCE) Kramer-Cool Water 230-kV transmission line. The northern boundary of SCE's transmission line is adjacent to the southern boundary of the proposed project site. As such, all project-related transmission facilities would be within the proposed project site boundaries.

For a detailed description of the proposed project components and associated facilities, see the **PROJECT DESCRIPTION** section of the Staff Assessment.

SURROUNDING AREA

The majority of land surrounding the proposed AMS site is open space, rural residences and farms. Approximately ten rural residences and farms are located south of Lockhart Ranch Road and the proposed project site. Four are located west of Harper Lake Road within one mile of the project site. The proposed project would connect to an existing gas line located along Harper Lake Road. In addition, as noted above, the SEGS VIII and IX facilities are adjacent to the northwest boundary of the project site.

Other notable land uses in the surrounding area include Harper Dry Lake and viewing area, which are approximately 1,000 feet east of the project site. According to the U.S. Bureau of Land Management (BLM), water runoff from neighboring land uses has created a large marsh that, "...attracts resident wildlife and thousands of migratory waterfowl, shorebirds and wading birds, making this a prime bird watching spot" (BLM 2010).

AGRICULTURAL LANDS

Historically agricultural activities at the proposed project site and surrounding area included the production of alfalfa and cattle ranching. A 128-acre crop circle located in the northeast quarter of section 32 is irrigated and producing alfalfa. The remainder of the site is largely non-irrigated former agricultural land that has been grazed by cattle, disturbed, or is now fallow. The proposed project would not be located on lands subject to Agricultural Land Conservation (i.e., Williamson Act) contracts (AS 2009a).

The Farm Land Mapping and Monitoring Program (FMMP) of the California Department of Conservation (DOC) provides statistics on the conversion of farmland to non-agricultural uses in San Bernardino County. Under the standard FMMP mapping criteria, the majority of the project site and surrounding area are designated as Grazing Land[1]. The FMMP map also shows a quarter section crop circle with Prime Farmland[2] (71 acres) and Farmland of Statewide Importance[3] (57 acres). The abandoned town of

[1] Grazing Land is "land on which the existing vegetation is suited to the grazing of livestock" (DOC 2007a).

[2] Prime Farmland includes lands with "the best combination of physical and chemical features able to sustain long-term agricultural production."

[3] Farmland of Statewide Importance is "similar to Prime Farmland but with minor shortcomings, such as greater slopes or less ability to store soil moisture. Land must have been used for irrigated agricultural production at some time during the four years prior to the mapping date."

Lockhart, the other agricultural properties west of Harper Lake Road, and the SEGS VIII and IX facilities are all designated as Urban and Built-up Land[4].

In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may also refer to the California Agricultural Land Evaluation and Site Assessment (LESA) Model, prepared by the DOC. The California Agricultural LESA Model is the result of Senate Bill 850 (Stats. 1993, ch. 812, section 3), which charged the Resources Agency, in consultation with the Governor's Office of Planning and Research, with developing an amendment to Appendix G of the CEQA Guidelines concerning agricultural lands. The amendment is intended "to provide lead agencies with an optional methodology to ensure that significant effects on the environment of agricultural land conversions are quantitatively and consistently considered in the environmental review process" (Public Resources Code Section 21095).

The LESA Model is composed of six different factors. Two "Land Evaluation" (LE) factors are based upon measures of soil resource quality, and four "Site Assessment" (SA) factors provide measures of a given project's size, water resource availability, surrounding agricultural lands, and surrounding protected resource lands. For a given project, each of these factors is separately rated on a 100 point scale. The factors are then weighted relative to one another and combined, resulting in a single numeric score for a given project, with a maximum attainable score of 100 points. It is this project score that becomes the basis for making a determination of a project's potential significance, based upon a range of established scoring thresholds (DOC 1997).

The results of the LESA Model are then used to determine the occurrence of significant impacts on agricultural lands and Important Farmlands based on the CEQA Guidelines Appendix G thresholds of significance. Note that Energy Commission staff use the LESA Model for assessment of impacts to agricultural lands for power generation facilities, and have done so for the past decade.

In order to conduct the model, staff obtains soil data from the Natural Resource Conservation Service's (NRCS) Web Soil Survey (WSS), which provides information on the designation of soils in areas with agricultural lands (NRCS 2010). Based on the soils found on the 1,765-acre project site, the NRCS classifies approximately 50% of the project site as Farmland of Statewide Importance, approximately 40% of the site as Prime Farmland if Irrigated, and approximately 10% of the site as Not Prime Farmland (NRCS 2010).

GENERAL PLAN LAND USE AND ZONING DESIGNATIONS

Project Site

San Bernardino County has adopted a "one-map approach" for both the General Plan land use designations and zoning classifications to assure land use consistency between the county's General Plan and its zoning code. The land use and zoning designations for the Project site are RL (Rural Living), which allows the following uses: 1

[4] Urban and Built-Up Land is "land occupied by structures with a building density of at least 1 unit to 1.5 acres, or approximately 6 structures to a 10-acre parcel. This land is used for residential, industrial, commercial ... and other developed purposes."

unit per 2-1/2 acres with a 2-1/2 gross acre parcel size; 20% maximum building coverage; and a 35-foot height limit. In addition, RL is a zone that allows agricultural and open space uses (AS 2009a - page 5.7-8). Development of electrical power generation within the RL designation requires a Conditional Use Permit (CUP), except when permitted by the Energy Commission , which has exclusive permitting authority

Surrounding Area

Lands under the Resource Conservation (RC) land use and zoning designation are northeast and southwest of the project site. The RC designation "...provides sites for open space and recreational activities, single-family homes on very large parcels and similar and compatible uses" (CSB 2007b).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Energy Commission staff has analyzed the information provided in the AFC and has acquired information from other sources to determine consistency of the proposed AMS project with applicable land use LORS and the proposed project's potential to have significant adverse land use-related impacts. In addition, conditions developed by staff to reduce any potential impacts to a less than significant level are provided, as well as a discussion of the feasibility and enforceability of the recommended conditions of approval.

METHOD AND THRESHOLDS FOR DETERMINING SIGNIFICANCE

Significance criteria used in this document are based on Appendix G of the CEQA Guidelines (CCR 2006) and performance standards or thresholds identified by the Energy Commission 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
  - Conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use.
  - Conflict with existing zoning for agricultural use, or a Williamson Act contract.
  - Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural uses.
- Physical disruption or division of an established community.
- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction, or that would normally have jurisdiction, over the project. This includes, but is not limited to, a General Plan, redevelopment plan, or zoning ordinance.
- Individual environmental effects, which, when considered with other impacts from the same project or in conjunction with impacts from other closely related past, present, and reasonably foreseeable future projects, are considerable, compound, or increase other environmental impacts.

In general, a solar farm 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 restricts existing or future uses. Please see other sections of the Staff Assessment, as noted, for a detailed discussion of any additional potential project-related impacts and conditions of certification recommended to reduce those impacts.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Conversion of Farmland

As described in detail in the "**AGRICULTURAL LANDS**" subsection above, multiple governmental agencies at the federal, state, and local level have information regarding the agricultural lands relating to the proposed project and the surrounding area. To summarize, the following is a list of the various designations or categorizations these multiple governmental agencies have provided for the proposed project site and construction laydown area:

- **California DOC:** Under the standard FMMP mapping criteria, the majority of the site is designated as Grazing Land, Prime Farmland (71 acres), Farmland of Statewide Importance (57 acres), and Urban and Built-up Land (AS 2009a). Refer to AFC Figure 5.7-3.

- **USDA NRCS:** According to the WSS, the NRCS designates the proposed 1,765-acre project site as Farmland of Statewide Importance (approximately 50% of the project site or 882.5 acres), Prime Farmland if Irrigated (approximately 40% of the project site or 706 acres), and Not Prime Farmland (approximately 10% or 176.5 acres) (NRCS 2010). These classifications are obtained by manually drawing the project site boundaries into the WSS database, which immediately generates soil maps and data. This interactive mapping system for the WSS does not allow for exact boundaries; therefore, the percentage for each classification is approximate.

- **San Bernardino County:** The proposed project site is within the Rural Living residential land use zoning district, which "...provides sites for rural residential uses, incidental agricultural uses, and similar and compatible uses" (SBC 2007b).

- **Williamson Act**: The project site is not located in an area that is under a Williamson Act contract.

As acknowledged in the AFC, the impact to FMMP Important Farmland designations is considered a significant land use impact. The applicant has recommended implementation of Mitigation Measure LAND 3 in the AFC to mitigate this impact to a less than significant level (AS 2009a – pg. 5.7-22). The applicant's proposed Mitigation Measure LAND 3 would require the conservation of a minimum of 128 acres of Important Farmland or mitigation fees to allow for the protection of Important Farmlands, which would be placed into a "...permanent agriculture conservation easement at a ratio of one acre of agricultural conservation easement for every one acre of important agricultural land developed..." (AS 2009a – pg. 5.7-22). The 128 acres is based on the

FMMP's mapping criteria which designates 71 acres as Prime Farmland and 57 acres as Farmland of Statewide Importance.

As discussed above, based on NRCS designations, the proposed project would convert approximately 882.5 acres of Farmland of Statewide Importance and approximately 706 acres of Prime Farmland, if irrigated, to a non-agricultural use. The soil data used to obtain the NRCS designation is used in the LESA Model. The model was conducted for the proposed 1,765-acre project site in accordance with the detailed instructions provided in the LESA Model Instruction Manual (the completed LESA Model worksheets for the proposed project site are included within **APPENDIX LU-1** at the end of this section). As presented in the Staff Assessment, staff's initial LESA score for the project site was 59.89 (based on a water availability score of 100).

Since the publication of the Staff Assessment, staff obtained new information on water availability for the site from the Energy Commission's water resources staff. Water resources staff stated that 100 percent of the water available for the proposed project site would come from groundwater from the Harper Valley Groundwater Basin, which is within the Mojave Basin Area Adjudication. Under the adjudication, producers of groundwater are allocated a set maximum annual volume of groundwater that is subject to additional annual volume restrictions. The LESA model defines a physical restriction as one that results in "an occasional or regular interruption or reduction in a water supply, or a shortened irrigation season, that forces a change in agricultural practices" (DOC 1997). Under this definition, the Mojave Basin Area Adjudication would act as a physical restriction for LESA model calculation purposes during both drought and non-drought conditions (see **APPENDIX LU-1)**. In addition, under the adjudication, if a groundwater producer uses more than their allocated amount of groundwater, the producer is required to pay into an account established to purchase water from outside of the Mojave Basin Area for recharge or replenish the groundwater. This could result in an economic restriction as defined by the LESA Manual. Based on the physical restriction to water imposed by the adjudication, the water availability score was reduced from 100 to 65.

Using the lower water score, staff re-ran the LESA model and arrived at a final LESA score of 54.64. Because the LE and SA subscores were greater than 20 points (LE was 29.89 and SA was 24.75) the final score of 54.64 is still considered significant, according to the California Agricultural LESA thresholds[5].

While the LESA model provides a basis for evaluating whether impacts to agricultural resources are significant, the model does not capture all the facts relevant to determining impacts to agricultural lands and that can be associated with a particular water supply source. The source of water at the project site is the Harper Valley Groundwater Basin (HVGB). The groundwater supply in this basin is administered in

[5] California LESA Model Scoring Thresholds (DOC 1997, Table 9):

- 0 to 39 Points Not Considered Significant
- 40 to 59 Points Considered Significant (only if LE and SA subscores are each greater than or equal to 20 points)
- 60 to 79 Points Considered Significant (unless either LE or SA subscore is less than 20 points)
- 80 to 100 Points Considered Significant.

accordance with the terms of the Mojave Basin Area Adjudication (http://www.mojavewater.org/home/watermaster/watermasterHistContent.aspx).

The adjudication establishes pumping rights in several groundwater basins including the HVGB and limits the amount of groundwater that can be pumped. In areas of the Mojave basin, such as HVGB, where water levels continue to decline, pumping can be further limited under the terms of the adjudication to reduce the amount of overdraft that may be occurring in a basin. Overdraft in the HVGB has largely been a result of agricultural use. Such limitations on pumping can have the effect of reducing the acreage that can be irrigated for agricultural purposes.

The volume of groundwater that can be pumped without added replacement costs in the area of the AMS project has already been reduced by 20 percent. If continued pumping in the Harper Lake area leads to further groundwater level declines, the volume of groundwater freely available to overlying property owners could be reduced by an additional 20 percent.

The only crop that has and is being grown at the proposed project site is alfalfa, and the crop occupies only one-half crop circle. Alfalfa is a crop that consumes a significant amount of water, generally more water than other crops per acre. Since a major portion of the agricultural land at the AMS project site has been retired, groundwater levels have begun to recover. If alfalfa production was to resume on the land currently retired, overpumping in the Basin would continue and an additional reduction of the groundwater volume use right would likely be implemented under the adjudication. This additional reduction could affect how much land could be used for agricultural production. It should be noted that retiring additional agricultural land would help bring groundwater levels into balance (i.e., basin inflows match basin outflows).

Conclusions Regarding Significance and Mitigation for Conversion of Agricultural Land

In acknowledgment of the limitations of the LESA model and to better assess the significance of impacts to agricultural lands, staff has additionally considered the effects of groundwater pumping in the basin and the limitations of growing high-value crops in the region.

Although the site has high potential for agricultural production due to high soil quality as shown by the LESA Model results, the poor water quality at the site would be both physically and economically restrictive to most productive farming activities, and the adjudicated water rights are a physical restriction to agricultural production. In light of the totality of the facts and circumstances of this case, , staff believes that impacts to all but 128 acres of agricultural resources would be less than significant. Therefore, staff proposes mitigation for the conversion of the 128 acres of FMMP-designated Important Farmlands. As such, staff recommends Condition of Certification **LAND-1,** which requires the project owner to mitigate for the conversion of 128 acres (based on FMMP designations) of agricultural land to non-agricultural use. This proposed condition of certification would require the project owner to purchase farmland and/or easements through a land conservancy on aone-to-one ratio (consistent with the applicant's mitigation measure LAND 3 proposed in the AFC), and would help ensure that agricultural lands of the same or higher quality are conserved within the county.

The components included in Condition of Certification **LAND-1** are based on similar conditions of certification used on other Energy Commission siting projects (e.g., Starwood, Panoche, and East Altamont) where agricultural land was converted to nonagricultural uses. The county suggested coordination with the Southern California Agricultural Land Foundation (SCALF) (CSB 2010a). Based on staff's conversations with SCALF, their foundation does not deal with agricultural conservation easements (CEC 2010a). Upon further research staff identified and contacted the Mojave Desert Land Trust, (MDLT) which would not be a viable organization for the purposes of Condition of Certification **LAND-1**; however, MDLT staff referred Energy Commission staff to their acquisition consultant who has worked with the Transition Habitat Conservancy, which has indicated that they are a viable organization for Condition of Certification **LAND-1** (THC 2010a). The implementation of Condition of Certification **LAND-1** would reduce the proposed project's impacts of agricultural land conversion to less than significant levels.

The project site is not located in an area that is under a Williamson Act contract; therefore, the proposed project would not result in any conflict with Williamson Act contracts. In addition, the project would not involve other changes that would result in the conversion of Farmland to non-agricultural uses. However, according to the county's Development Code, agricultural land uses, including crop production and agricultural accessory structures, are permitted uses within the RL designation. Energy production, however, requires the issuance of a Conditional Use Permit (CUP). **Land Use Table 2** below discusses the project's consistency with all applicable LORS.

Physical Division of an Existing Community

The proposed AMS project is located in a rural area of unincorporated San Bernardino County. The power plant would be located entirely on private property, on a 1,765-acre site. Access to the site would be through the existing State Highway 58 and Harper Lake Road. No existing roadways or pathways would be removed from service due to the proposed AMS.

Ten scattered rural residences and farms are located within a one-mile radius of the proposed site. However, the residences are not located within any established residential communities or developments, and there would be no relocation of these residences as a result of the proposed project. In addition, no off-site linear facilities would be constructed as a result of the proposed project. The proposed onsite transmission line segment would connect to SCE's existing Kramer-Cool Water 230-kV transmission line adjacent to the southern border of project site, and therefore, no new right-of-way acquisition would be required. As such, implementation of the proposed project would not result in impacts associated with the physical division of an existing or established community.

Land Use Plan, Policy, or Regulation

As required by California Code of Regulations, Title 20, Section 1744, Energy Commission staff evaluates the information provided by the project owner in the AFC (and any amendments), project design, site location, and operational components to determine if elements of the proposed project would conflict 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. As part of the licensing process, the Energy Commission must determine whether a proposed facility complies with all applicable state, regional, and local LORS (Public Resources Code section 25523[d][1]). The Energy Commission must either find that a project conforms to all applicable LORS or make specific findings that a project's approval is justified even where the project is not in conformity with all applicable LORS (Public Resources Code section 25525). When determining LORS compliance, staff is permitted to rely on a local agency's assessment of whether a proposed project is consistent with that agency's zoning and general plan. On past projects, staff has requested that the local agency provide a discussion of the findings and conditions that the agency would make when determining whether a proposed project would comply with the agency's LORS, were they the permitting authority. Any conditions recommended by an agency are considered by Energy Commission staff for inclusion in the proposed conditions of certification for the project.

As stated above in the "Setting" subsection, the land use and zoning designations for the project site are both Rural Living (RL), which allows the following uses: 1 unit per 2-1/2 acres with a 2-1/2 gross acre parcel size; 20% maximum building coverage; and a 35-foot height limit (AS 2009a – pg. 5.7-8). The proposed project would have two independently-operable solar fields (i.e., plants) identified as Alpha and Beta, which would be 884 and 800 acres, respectively, and "…[e]ach plant site utilizes approximately 710 acres of the total land for solar thermal collector arrays" (AS 2009a – pg. 2.0-5). Therefore, these two plant sites exceed the 20% maximum building coverage for the RL zone. In addition, as stated in the AFC,

> "…[t]he entire length of the transmission gen-tie line is located on the Project site and will be installed on approximately 23 new steel/concrete mono-poles from the Alpha Plant site and approximately nine poles from the Beta Plant site. The poles are expected to average approximately 80 feet in height (maximum pole height of 110 feet)" (AS 2009a – pg. 2.0-32).

As a result, these tower heights would exceed the 35-foot height limit of the RL zone. On October 22, 2009, Energy Commission staff submitted data requests to the applicant. Land Use Data Request #78 addresses these issues, and asks that the applicant to provide information on how they plan to resolve conflicts with the height and building coverage requirements of the RL zone, and San Bernardino County's position on these zone inconsistencies, and a related schedule (CEC 2009m).

In addition to the standard data request, as part of staff's analysis of local LORS compliance and to determine the county's view of the project's consistency with its General Plan and Development Code, staff sent a letter to the county on November 10, 2009, detailing the potential LORS compliance issues associated with the proposed project, including the issues regarding the building coverage and height limit (CEC 2009o). In addition, the letter pointed out that "[e]lectric power generation is listed as a use that requires a conditional use permit (CUP) [San Bernardino County Development Code, Table 82-7], and a General Plan Amendment to apply the Energy Facilities (EN) Overlay." Staff requested that the county provide its position on the proposed project's consistency with its General Plan, Development Code, and other applicable LORS.

On November 10, 2009, the Deputy Director of the county's Land Use Services Department, James M. Squire, sent a letter to the Energy Commission acknowledging that "…since the proposed energy facility is subject to state regulation, the facility is exempt from the County's EN Overlay process. No General Plan Amendment is required" (CSB 2009a). In addition, Mr. Squire explained that the purpose of the EN Overlay,

> "...is to provide alternative standards for relating to height and setbacks for energy facilities. The intent was not to necessitate additional time delays by requiring a GPA for renewable energy producing facilities... [and] the County is currently reviewing alternative methods of providing increased height and reduced setbacks for such facilities. The results of this review will most likely lead to another amendment to our Code relative to the EN Overlay requirements and standards" (CSB 2009a).

On December 3, 2009, Energy Commission staff and the county's planning staff conducted a conference call to discuss these land use issues. County staff stated that on December 17th the County's Planning Commission would hear a motion to repeal the GPA requirement for the EN Overlay and adopt a new General Plan chapter on Renewable Energy Development and the associated Development Standards. Energy Commission staff requested that the county provide input as to what types of development standards (e.g., for height, lot coverage, landscaping etc.) and conditions they would want to see applied to the AMS project, since development of an energy generation facility in the RL zone would typically require a CUP. The county indicated that they did not have sufficient time to review the bulk of the AMS project information due to staff workloads; and therefore, were not yet ready to provide input regarding standards or conditions that they would normally apply as part of a CUP. However, the county did indicate that they would provide Energy Commission staff with a copy of the draft Development Standards for Renewable Projects, and that they would convene a meeting of applicable internal county departments to develop a list of conditions they would like applied to the project. The conditions would be provided to staff by mid January 2010 (CEC 2009u).

In a letter dated December 8, 2009, Principal Planner, Carrie Hyke, sent the draft standards for Chapter 84.29 (Renewable Energy Generation Facilities), which is proposed to be included in the County Development Code (CSB 2009b). Following that, in an email dated January 7, 2010, Ms. Hyke informed Energy Commission staff that the proposed renewable energy development standards would go to the County Board on February 9th. With an approval by the Board, the new standards would repeal the EN Overlay and negate the need for a General Plan Amendment (GPA) for the proposed project. In addition, as noted above, development of the proposed project in the RL zone would ordinarily require a CUP; therefore, Ms. Hyke stated that the county would provide Energy Commission staff with their suggested conditions for approval of the proposed project by January 23rd (CSB 2010c).

On February 2, 2010, the county submitted their suggested Conditions of Approval for the AMS project (CSB 2010b). In general, the conditions include general performance standards required under the Development Code for issues such as lighting, air quality, fire hazards, noise, vibration, and waste disposal; as well as the requirements necessary for the issuance of grading and building permits including plans and reports such as grading and erosion control plans, and geotechnical and hydrogeologic reports.

On February 9, 2010, San Bernardino County Land Use Services Department staff (referred to as LUS staff) confirmed the County Board's approval of Chapter 84.29 (Renewable Energy Generation Facilities) of the Development Code, thereby repealing the EN Overlay and negating the need for a GPA (CSB 2010d).

Based on the information provided by the applicant and the county thus far, the proposed project still would be inconsistent with the 20% maximum building coverage and 35-foot height limit requirements. As such, on February 10, 2010, staff emailed LUS staff informing them of this inconsistency and requesting their further input. On February 11th, LUS staff indicated that the county would have to approve a "Major Variance" for the development standards of the RL zone under Development Code Chapter 85.17 (Variances), and that the county "…would grant a variance for this project because the technology used does not fit into the typical standards" (CSB 2010e). Based on staff's analysis of Chapter 85.17, the county's input and position regarding the AMS project, and the components necessary for development of the AMS, staff has made the findings necessary for the granting of a county Major Variance to confirm that with issuance of such a variance (but for the exclusive power plant licensing authority of the Energy Commission) the proposed project would comply with applicable county LORS. Staff's evaluation of the proposed project with respect to the four required elements associated with a county "Major Variance" can all be made in the affirmative, thereby allowing for the issuance of "Major Variance" for the proposed AMS (see **Land Use Table 2**).

Applicable LORS also include the applicant's compliance with the Subdivision Map Act. As stated in AFC Section 1.0 (Executive Summary), the applicant has established site control of the following parcels: APN 0490-121-42; APN 0490-131-06; APN 0490-131-07; APN 0490-131-08; APN 0490-131-11; APN 0490-131-12; APN 0490-131-15; APN 0490-131-16; APN 0490-161-08; APN 0490-161-09; APN 0490-161-10; APN 0490-161-11; APN 0490-161-12; APN 0490-161-13 (AS 2009a – pg. 1.0-3). In September 2009, staff submitted recommendations for data adequacy stating that there is no discussion of the method and timetable for merging or otherwise combining these parcels so that the proposed project will be located on a single legal parcel (CEC 2009e). In response, the applicant submitted a supplement to the data adequacy form stating that,

> "...the Project site currently contains 14 separate and contiguous parcels... wholly located within San Bernardino County. The property would be developed as a Solar Electrical Generating Plant which is exempt from the Map Act process (parcel map) under Section 66412(l) of the California Subdivision Map Act. Since all parcels are contiguous and will be under one ownership, the Applicant would file, and San Bernardino County would process a Lot Merger application per Section 66449.20.3/4 of the Map Act, as referenced in the San Bernardino County Code of Ordinances Chapter 87.04 Additional Subdivision Procedures" (AS 2009b).

However, according to the Subdivision Map Act, section 66412(I) refers to a "windpowered electrical generation device," which does not apply to the proposed project (CGC 2010). As such, the proposed project is required to be consistent with the regulations under the Subdivision Map Act, and therefore, staff recommends implementation of Condition of Certification **LAND-3**, in order to ensure compliance with the Subdivision Map Act and site control.

Based on staff's independent review of San Bernardino County's applicable LORS documents and information provided by the county, the proposed project would be consistent with applicable land use LORS (see **Land Use Table 2**) upon implementation of staff's proposed Condition of Certification **LAND-2**, which would ensure that the project complies with the county's decommissioning standards set forth by newly approved Chapter 84.29 of the county Development Code. Implementation of Condition of Certification **LAND-3** also would verify the applicant's compliance with the Subdivision Map Act.

Land Use Table 2
Project Compliance with Adopted Land Use LORS

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
Federal	None		
State			
Subdivision Map Act (Public Resources Code Section 66410-66499.58)	Provides procedures and requirements regulating land division (subdivisions) and parcel legality. Regulation and control of the design and improvement of subdivisions have been vested in the legislative bodies of local agencies.	YES (With implementation of Condition of Certification **LAND-3**)	The proposed project site consists of 14 contiguous private parcels. As noted above, in a supplement to the data adequacy form, the applicant states that a Solar Electrical Generating Plant is exempt from the Map Act process (parcel map) under Section 66412(l) of the California Subdivision Map Act, and therefore, would process a Lot Merger application per Section 66449.20.3/4 of the Map Act, as referenced in the San Bernardino County Code of Ordinances Chapter 87.04 Additional Subdivision Procedures (AS 2009b). However, according to the Subdivision Map Act, Section 66412(l) applies to "a windpowered electrical generation device" (CGC 2010). As such, the proposed project is not exempt from the standards required by the Subdivision Map Act, and staff recommends implementation of Condition of Certification **LAND-3** in order to ensure that applicant develops the proposed project on one legal parcel, and is in compliance with the Subdivision Map Act.
Local			
San Bernardino County General Plan	**COUNTYWIDE GOALS AND POLICIES OF THE LAND USE ELEMENT** LU 1.2 The design and siting of new development will meet locational and development standards to ensure compatibility of the new development with adjacent land uses and community character. **DESERT REGION GOALS AND POLICIES OF THE LAND USE ELEMENT** D/LU 1.2 Limit future industrial	YES	As discussed above under the "**SETTING**" section, it should be noted that San Bernardino County has a "one-map approach" for both the General Plan land use designations and zoning classifications to assure land use consistency between the county's General Plan and its zoning code. Therefore, with the county's newly adopted Development Code Chapter 84.29 (Renewable Energy Generating Facilities), the county recognizes the need for renewable power generating facilities. Given the past and future projected solar projects in the area (refer to the "Cumulative Impacts Analysis" subsection), and the allowances for development of solar power in the RL zone in the county's newly adopted Development Code Chapter 84.29 (Renewable Energy Generating Facilities), and the existing large-scale solar farms (e.g., SEGS VIII and IX) adjacent to the AMS site, the proposed project would be compatible with these policies of the county General Plan.

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
	development to those uses which are compatible with the Community Industrial Land Use Zoning District or zone, are necessary to meet the service, employment and support needs of the region, do not have excessive water requirements, and do not adversely impact the desert environment. **DESERT REGION GOALS AND POLICIES OF THE CONSERVATION ELEMENT** D/CO 1.2 Require future land development practices to be compatible with the existing topography and scenic vistas, and protect the natural vegetation. **DESERT REGION GOALS AND POLICIES OF THE OPEN SPACE ELEMENT** D/OS 1.3 Maintain Rural Living (RL) and Resource Conservation (RC) Land Use Zoning Districts or zoning on steep slopes and remote areas to minimize hillside grading and to protect the rural and natural environment.		In addition, as noted in Section 2.2 (Project Objectives) of the AFC, approval of the proposed project would help achieve the state's renewable energy objectives and utility requirements (AMS 2009a – pg. 2.0-2), which will facilitate the power needs of the region.
	COUNTYWIDE GOALS AND POLICIES OF THE CONSERVATION ELEMENT CO 6.1 Protect prime agricultural lands from the adverse effects of urban encroachment, particularly increased erosion and sedimentation, trespass, and non-agricultural land development.	YES (With implementation of Condition of Certification **LAND-1**)	As discussed under the "Conversion of Farmland" subsection, the permanent conversion of 128 acres of FMMP-designated Important Farmland to a non-agricultural use is a significant impact. However, staff recommends Condition of Certification **LAND-1,** which requires the project owner to mitigate for the conversion of 128 acres of Important Farmland to non-agricultural use. With the adoption and implementation of this condition, the impacts of farmland conversion would be reduced to a less than significant level, and the proposed project would be consistent with this policy.

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
	CO 8.3 Assist in efforts to develop alternative energy technologies that have minimum adverse effect on the environment, and explore and promote newer opportunities for the use of alternative energy sources.	YES	The proposed project is the development of a solar energy farm that would produce up to a nominal 250 MW net of power. The power generated by the proposed project would be conveyed into SCE's electric grid to provide electricity supply for the area's population. Because the proposed project makes use of a renewable resource (i.e., sun light), it is consistent with this goal of the General Plan. In addition, the county has consistently been very helpful in assisting staff with any information needed to complete this analysis.
	CO 10.2 The location of electric facilities should be consistent with the County's General Plan, and the General Plan should recognize and reflect the need for new and upgraded electric facilities.	YES	As discussed above for General Plan policies LU 1.2 and D/LU 1.2, the location of the proposed AMS is consistent with county's General Plan requirements regarding siting of new industrial development such as solar power generating facility. As discussed above under the "**SETTING**" section, it should be noted that San Bernardino County has a "one-map approach" for both the General Plan land use designations and zoning classifications to assure land use consistency between the county's General Plan and its zoning code. Therefore, with the county's newly adopted Development Code Chapter 84.29 (Renewable Energy Generating Facilities), the county recognizes the need for power generating facilities, and thus the proposed project would be consistent with this General Plan policy.
	DESERT REGION GOALS AND POLICIES OF THE CONSERVATION ELEMENT GOAL D/CO 2. Encourage utilization of renewable energy resources.	YES	The development of the proposed project represents the development of a large scale solar facility that would encourage the use of renewable energy resources consistent with this county goal
	D/CO 4.2 The conversion of agricultural land to non-agricultural uses shall be discouraged unless the proposed use can be demonstrated to be preferable in terms of economic development, and resource availability and resource conservation.	YES (With implementation of Condition of Certification **LAND-1**)	As discussed under the "Conversion of Farmland" subsection, the permanent conversion of 128 acres of FMMP-designated Important Farmland to a non-agricultural use is a significant impact. However, staff recommends Condition of Certification **LAND-1,** which requires the project owner to mitigate for the conversion of 128 acres of Important Farmland to non-agricultural use. With the adoption and implementation of this condition, the impacts of farmland conversion would be reduced to less than significant levels. With implementation of Condition of Certification **LAND-1**, the proposed project would be consistent with the policies within the Conservation Element.

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
San Bernardino County Code – Title 8 – Development Code	**82.02.020 General Requirements for Development and New Land Uses** (d) Legal parcel. The site of a proposed development or new land use shall be a parcel that was legally created in compliance with the Subdivision Map Act and Division 9 (Subdivisions).	YES (With implementation of Condition of Certification **LAND-3**)	The applicant intends to file a Lot Merger application per Section 66449.20.3/4 of the Map Act. In addition, staff recommends implementation of Condition of Certification **LAND-3**, in order to ensure that applicant develops the proposed project on a single legal parcel and is in compliance with the Subdivision Map Act. With implementation of Condition of Certification **LAND-3**, the proposed project would be in compliance with the Subdivision Map Act.
	CHAPTER 82.04 RESIDENTIAL LAND USE ZONING DISTRICTS **Excerpts from Table 82-7 – Allowed Land Uses and Permit Requirements for Residential Land Use Zoning Districts:** **<u>Rural Living</u>** **Land Use –** Electric power generation(2) **Permit Required by District –** CUP **Notes: (2) –** Requires a General Plan Amendment to apply the Energy Facilities (EN) Overlay	YES	As discussed above under the "**SETTING**" section, it should be noted that San Bernardino County has a "one-map approach" for both the General Plan land use designations and zoning classifications to assure land use consistency between the county's General Plan and its zoning code. In addition, the county's newly adopted Development Code Chapter 84.29 (Renewable Energy Generating Facilities) recognizes the need for renewable power generating facilities. As an electric power generation land use, the proposed project would require a Conditional Use Permit (CUP) by the county. Given the exclusive authority of the Energy Commission to license the project, staff requested that the county provide input as to what types of development standards (e.g., for height, lot coverage, landscaping etc.), and conditions they would want to see applied to the AMS project since development of an energy generation facility in the RL zone would typically require a CUP. On February 2, 2010, the county submitted their suggested Conditions of Approval for the AMS project (CSB 2010b). In general, the conditions include general performance standards required under the Development Code for issues such as lighting, air quality, fire hazards, noise, vibration, and waste disposal; as well as the requirements necessary for the issuance of grading and building permits including plans and reports such as grading and erosion control plans, and geotechnical and hydrogeologic reports. On February 11th, LUS staff indicated that the county would have to approve a "Major Variance" for the development standards of the RL zone under Development Code Chapter 85.17 (Variances), and that the county "…would grant a variance for this project because the technology used does not fit into the typical standards" (CSB 2010e). Based on staff's analysis of Chapter 85.17 (see discussion below), the county's input and position regarding the AMS project, and the components necessary for development of the AMS, staff has made the findings

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
			necessary for the granting of a county Major Variance to confirm that with issuance of such a variance (but for the exclusive power plant licensing authority of the Energy Commission) the proposed project would comply with applicable county LORS. Staff's evaluation of the proposed project with respect to the four required elements associated with a county "Major Variance" can all be made in the affirmative, thereby allowing for the issuance of "Major Variance" for the proposed AMS. With application of a "Major Variance" to the proposed project, issuance of a CUP would not be necessary. In addition, as discussed above, the EN Overlay was officially repealed by the county on February 9, 2010. As such, a GPA would not be required (CSB 2010d).
	Excerpts from Table 82-9C – Residential Land Use Zoning District Development Standards Desert Region: **<u>Rural Living</u>** **Density –** 1 unit per 2.5 acres **Setbacks –** **Front** - 25 ft **Side** - Street side: 25 ft **Side** - Interior (each): Lot 75 wide or less - 5 ft on one side, 10 ft on other; Other lots - 15 ft **Rear** - 15 ft **Lot Coverage –** Maximum Coverage - 20% **Height Limit** Maximum Height - 35 ft	YES	Onsite transmission line poles are expected to average approximately 80 feet in height with a maximum pole height of 110 feet (AS 2009a – pg 2.0-30). In addition, the lot coverage would exceed 20%, and according to AFC Figure 2-3(b) (Project Site map), the fence appears to be setback from Lockhart Road and consistent with the street side requirements; however, due to the scale of the map, it is difficult to definitively state that the fencing is 15 feet from the street ROW. According to county LUS staff, the components of the proposed project that do not adhere to these development standards would require a "Major Variance" if the county were the permitting agency. Although the county did not makes the specific findings required for the variance, county LUS staff believe that the county would approve a "Major Variance" considering that the project includes technology that does not fit into the typical standards of the RL zone (CSB 2010e). As such, Energy Commission staff evaluated the proposed project against the requirements for a "Major Variance" and made specific findings, recognizing that the county expressed support of the proposed project. See the detailed discussion under Chapter 85.17 below. Given that findings for a "Major Variance" can all be made in the affirmative, the proposed AMS would be consistent with this portion of the county Development Code.

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
	CHAPTER 84.29 RENEWABLE ENERGY GENERATION FACILITIES **84.29.020 Applicability and Land Use Zoning Districts** The Land Use Zoning Districts that allow renewable energy facilities are limited to the following: RC (Resource Conservation) AG (Agriculture) FW (Floodway) RL (Rural Living) Note: If a facility is proposed solely in the Rural Living land use zoning district, it must include a minimum of 20 acres in the development proposal. IR (Regional Industrial)	YES	This chapter of the county Development Code was recently adopted in February of 2010 in recognition of the State's need for Renewable Power Generating Facilities. The entire 1,765-acre project site is within the RL zone, and therefore, is consistent with this standard.
	84.29.040 Solar Energy Development Standards (a) Setbacks. Solar energy generating equipment and their mounting structures and devices shall be set back from the property line either pursuant to the standards in the Land Use Zoning District, or 130% of the mounted structure height, whichever is greater. **84.29.50 Special Fencing Standards** Special fencing standards may be applied without a variance in recognition of the capital costs of renewable energy facilities. Total fence heights allowed are inclusive of any height extension devices such as slanted razor-wire panels.	YES	According to AFC Figure 2-3(b) (Project Site map), the proposed project fence appears to be setback from Lockhart Road and consistent with the street side requirements; however, due to the scale of the map, it is difficult to definitively state that the fencing is 15 feet from the street ROW. As discussed in detail above and according to county LUS staff, the components of the proposed project that do not adhere to these development standards would require a "Major Variance" if the county were the permitting agency. Although the county did not makes the specific findings required for the variance, county LUS staff believe that the county would approve a "Major Variance" considering that the project includes technology that does not fit into the typical standards (CSB 2010e). As such, Energy Commission staff evaluated the proposed project against the requirements for a "Major Variance" and made specific findings, recognizing that the county expressed support of the proposed project. See the detailed discussion under Chapter 85.17 below. Given that findings for a "Major Variance" can all be made in the affirmative, the proposed AMS would be consistent with these portions of the county Development Code.

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
	(a) Fencing on street side. Chainlink fencing up to 8 feet in height may be installed no closer than 15 feet from the right-of-way on streetside boundaries. Security devices such as razor-wire height extensions may only be directed inward to the property, and may not extend beyond the property boundary to overhang the right-of-way. **(b) Fencing on interior boundaries.** Chainlink fencing up to 8 feet in height may be installed along the property line on interior (non-streetside) boundaries. Security devices such as razor-wire height extensions may only be directed inward to the property, and may not extend beyond the property boundary to overhang any other property. **(c) Electric Fencing.** Electric fencing is not allowed.		
	84.29.060 Decommissioning Requirements **(a) Closure Plan**. Following the operational life of [the project], the project owner shall perform site closure activities to meet federal, state and local requirements for the rehabilitation and revegetation of the project site after decommissioning. The Applicant shall prepare a Closure, Revegetation, and Rehabilitation Plan and submit to the Planning Division for review and approval prior to occupancy. Under this plan, all aboveground structures and facilities shall be removed to a depth of three feet below grade, and	YES (With implementation of Condition of Certification **LAND-2** and consistent with the requirements of **COMPLIANCE-11**)	According to Section 3.0 of the AFC, a decommissioning plan specifying the appropriate closure procedures would be developed and implemented, and Energy Commission and other responsible agencies would be notified of the decommissioning schedule and plans prior to commencing the permanent closure. In addition, the Energy Commission often requires a facility closure plan of all power plant licensing cases in the general conditions applied to each project. For the proposed AMS, Energy Commission Compliance staff has recommended Condition of Certification **COMPLIANCE-11** in the **GENERAL CONDITIONS** section of the Staff Assessment. In addition to **COMPLIANCE-11,** land use staff recommends implementation of Condition of Certification **LAND-2** to ensure compliance with the county's suggested decommissioning requirements in as much as these requirements do not conflict with **COMPLIANCE-11**, because at the point-in-time in the future when/if the proposed AMS is decommissioned or closed, the county may have decommissioning requirements different than the currently adopted Development Code

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
	removed offsite for recycling or disposal. Concrete, piping, and other materials existing below three feet in depth may be left in place. Areas that had been graded shall be restored to original contours. Succulent plant species shall be salvaged prior to construction, transplanted into windrows, and maintained for later transplanting following decommissioning. Shrubs and other plant species shall be revegetated by the collection of seeds, and re-seeding following decommissioning. **(b) Compliance with other requirements.** Project decommissioning shall be performed in accordance with all other plans, permits and mitigation measures that would assure the project conforms with applicable requirements and would avoid significant adverse impacts.		standards. **COMPLIANCE-11** ensures a closure process that provides for careful consideration of available options and applicable laws, ordinances, regulations, standards, and local/regional plans in existence at the time of closure will be undertaken.
	CHAPTER 85.17 VARIANCES 85.17.060 Findings and Decision **(a) General findings. The review authority may approve a Variance (Major or Minor) only after first finding all of the following:** (1) The granting of the Variance will not be materially detrimental to other properties or land uses in the area and will not substantially interfere with the present or future ability to use solar energy systems;	YES	For a Minor Variance, a maximum variance of 30% is allowed for both the area and height requirements. As the lot coverage and height of the transmission line towers would exceed the maximum percentages for a minor variance, these standards would require a “Major Variance.” County LUS staff indicated the county likely would grant a variance for the proposed project since the technology used does not fit into the typical standards (CSB 2010e). However, the county did not provide specific findings for a variance. As such, the following are staff’s findings recognizing that the county has expressed support for the proposed project: 1. The SEGS VIII and IX are existing solar facilities adjacent to the northern boundary of the proposed project site. Otherwise, the surrounding area primarily consists of open space, along with rural

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
	(2) There are exceptional or extraordinary circumstances or conditions applicable to the subject property or to the intended use that do not apply to other properties in the same vicinity and land use zoning district; (3) The strict application of the land use zoning district deprives the subject property of privileges enjoyed by other properties in the vicinity or in the same land use zoning district; and (4) The granting of the Variance is compatible with the maps, objectives, policies, programs, and general land uses specified in the General Plan and any applicable specific plan.		residences. Therefore, the granting of a Major Variance would not be materially detrimental to surrounding properties or land uses. In addition, the proposed project would not interfere with the ability to use solar energy systems; on the contrary, as a solar generating facility, the proposed project would contribute to achieving and supporting the state's electric utility requirements with the long term production of renewable electric energy. 2. As noted above, county LUS staff had indicated that the intended land use includes technology that does not fit into the typical standards. As such, the proposed use is an exceptional circumstance, and therefore, county LUS staff believes the county would grant a "Major Variance" (CSB 2010e). 3. The SEGS VIII and IX are existing solar facilities adjacent to the northern boundary of the proposed project site, which are also within the RL zone. As such, it is likely that these existing solar facilities have enjoyed privileges, such as variances from development standards required by the RL zone. It should be noted that these privileges were realized by these projects prior to the county's adoption of the Development Code Chapter on Renewable Energy Generation Facilities (Chapter 84.29). 4. The implementation of the proposed AMS would not require any changes to any applicable county LORS as discussed above. Therefore, the granting of a Variance for the proposed AMS would be compatible the maps, objectives, policies, programs, and general land uses specified in the General Plan and the Development Code.

Land Use Compatibility

This section addresses the proposed project’s compatibility with other existing land uses in the same setting. Land use compatibility refers to the physical compatibility of planned and existing land uses. For example, nuisance producing land uses such as heavy industry is often physically incompatible with residential land uses. As discussed in detail above under the subsection entitled “**SETTING,”** the proposed project is within the RL zone and would be located in an area that primarily consists of open space and scattered rural residences and farms. In addition, the SEGS VIII and IX facilities are adjacent to the northwest boundaries of the proposed project site. The proposed project would require the removal of all abandoned buildings and farm-related facilities on the project site. Sensitive receptors such as residences are within a one-mile radius of the project site.

When a jurisdictional authority, such as the County of San Bernardino, establishes zoning designations to implement its general plan, it is that agency’s responsibility to ensure the compatibility of adjacent zoning and permitted uses, and incorporate conditions and restrictions that ensure those uses would not result in a significant adverse impact (“minimum of detriment”) to surrounding properties. It is therefore assumed that permitted electricity generating uses, or those deemed equivalent to a permitted use, sited on properties within the RL zone, are compatible with surrounding uses. Those uses operating under a valid use permit would also be considered compatible.

Administrative or conditional use permitting requirements 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 (see **Land Use Table 2**), under the San Bernardino County Development Code, electricity generation is an allowable conditional use that is subject to a land use permit in the RL zone, which requires specific development and use standards.

The existing SEGS VIII and IX facilities are adjacent to the project site, and multiple solar farm projects also are expected to be developed in the western Mojave area in the near future (see below under the subsection entitled **CUMULATIVE IMPACTS**). As a result, staff concludes that given the past and future projected solar projects in the area, and the allowances for development of solar power in the RL zone, the county would likely view such a land use type to be appropriately sited at the proposed location.

As stated in the AFC, the proposed project would be consistent with the San Bernardino County General Plan and Development Code with approval of a CUP. As such, the applicant included Mitigation Measure LAND-1 which requires the applicant to coordinate with the county and CEC “...to resolve any land use conflicts and comply with standard county requirements for similar facilities processed through a County CUP” (AS 2009a – pg. 5.7-20). As discussed in detail above under the “**SETTING**” section and the discussion in **Land Use Table 2**, a CUP would not be necessary for the proposed AMS with the approval of a “Major Variance,” which the county has indicated it would approve considering that the “…project includes technology that does not fit into the typical [county Development Code] standards” (CSB 2010e). In addition, staff’s evaluation of the proposed project, consistent with the exclusive siting authority of the Energy Commission, with respect to the four required elements associated with a county “Major Variance” can all be made in the affirmative, thereby allowing for the issuance of “Major Variance” for the proposed AMS (see **Land Use Table 2**).

The **TRAFFIC AND TRANSPORTATION** section provides a discussion of vehicular access to the proposed project site.

Sensitive Receptors

A proposed siting location may be considered an incompatible use if a new source of pollution or hazard is located within close proximity to a sensitive receptor. From a land use perspective, sensitive receptor sites are those locations where people who would be more adversely affected by pollutants, toxins, noise, dust, or other project-related consequence or activity are likely to live or gather. Children, those who are ill or immune-compromised, and the elderly are generally considered more at risk from environmental pollutants. Therefore, schools, along with 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. Depending on the applicable code, proximity is defined as “within 1,000 feet” of a school by the Health and Safety Code (California Health & Safety Code §§ 42301.6–9) or within one-fourth of a mile of a school under CEQA (Cal. Code Regs., tit. 14, § 21151.4). Proximity is not necessarily a determining factor for a potentially significant impact, but is the threshold generally used to require further evaluation.

As described above in the “**SETTING”** subsection, scattered rural residences and farms are within one mile of the proposed project site. However, given the existing and previous permitted uses in the project area, such as the existing SEGS VIII and IX facilities, once operational the proposed project would not be incompatible with surrounding sensitive receptors.

From a land use perspective, the siting of the AMS project at the proposed location would not be incompatible with surrounding sensitive receptors. 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.

CUMULATIVE IMPACTS ANALYSIS

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, section 15130).

GEOGRAPHIC EXTENT

The geographic scope for the analysis of cumulative land use impacts related to this land use analysis includes the desert region of San Bernardino County. The county’s community plans map defines the desert region as the entire area north and northeast of the San Bernardino National Forest, which accounts for the majority of the county (CSB 2009a).

Cumulative impacts include the conversion of agricultural land. Projects related to agriculture consist of all construction activities, and residential, and industrial developments within the region. For the purpose of this analysis, in addition to the projects listed in **Cumulative Impacts Tables 2 and 3,** data obtained from the DOC and the BLM's online GIS maps were considered when identifying activities that could contribute to cumulative impacts.

As noted above in the "Setting," the lands surrounding the project site are designated as Grazing Land by the FMMP. In addition, according to DOC's Important Farmland maps of San Bernardino County, the majority of the desert region is outside of the survey boundaries. The areas that are surveyed include the southwestern portion of the desert region, which primarily consists of Grazing Land, with concentrations of Urban and Built-Up Land designations within the cities of Barstow, Victorville, and Hesperia.
The geographic scope for the analysis of cumulative land use impacts and LORS compliance are the local and regional communities and sensitive receptors. Cumulative impacts could result from the physical division of an established community or conflict with any applicable land use plan, policies, or regulation adopted for the purpose of avoiding or mitigating environmental impacts.

EXISTING CUMULATIVE CONDITIONS

As described in **Cumulative Impacts Table 2,** the only existing land uses similar to, and in the vicinity of, the proposed project site are the SEGS VIII and IX facilities. Otherwise, the surrounding area consists of undeveloped desert land and mountain terrain with small rural communities in the vicinity. The closest community is Hinkley, which is located approximately nine miles northeast of the project site. However, there are scattered rural residences and farms within a mile of the project site. Agricultural lands are not prevalent within the desert region of San Bernardino County. According to FMMP Important Farmland maps, within the west Mojave area much of the land has not been surveyed, so of the surveyed land the primary designation is Grazing Land with large concentrations of Urban and Built-Up Land and sporadic areas of Prime Farmland and Farmland of Statewide Importance (DOC 2008). As such, the existing development, described in **Cumulative Impacts Table 2**, has contributed to the conversion of existing rural land uses including rural residences, open space, and agricultural activities.

FUTURE FORESEEABLE PROJECTS

Foreseeable Projects in the Project Area

As described in **Cumulative Impacts Figure 2** and **Cumulative Impacts Table 3**, a 585 MW solar photovoltaic project is proposed for 5,033 acres of BLM land less than one mile northeast of the proposed project site, and a 10,105-acre wind energy project approximately seven miles south of the project site. Development of these projects would result in the conversion of approximately 15,000 acres of desert lands to industrial uses in the Harper Lake region. As such, future foreseeable development would contribute to the conversion of existing rural and open space land uses.

Foreseeable Renewable Projects in the Western Mojave Desert

As shown on **Cumulative Impacts Figure 1** and **Table 1** solar and wind applications for use of BLM and private land are proposed on approximately 553,000 acres of BLM land and 13,900 acres of non-federal land in the Western Mojave Planning Area. As such, future foreseeable development would contribute to the conversion of existing rural and open space land uses.

OVERALL CONCLUSION

Land uses other than agriculture and farm residences proposed near the project site include a 5,000-acre solar photovoltaic project and 10,105-acre wind generation project within 10 miles of the project site. This is in addition to the existing SEGS VIII and IX facilities. The cumulative implementation of renewable energy projects in the Harper Lake region would result in the conversion of thousands of acres of lands that are currently used for open space activities (which could include active or passive recreation), agricultural production, or rural residences. The conversion of these lands would represent a significant adverse cumulative land use impact, without considering the conversion of the lands resulting from the proposed projects.

Condition of Certification **LAND-1** is intended to mitigate the proposed project's contribution to the cumulative loss of agricultural land. In addition, Conditions of Certification **LAND-2** and **LAND-3** have been recommended to ensure the proposed project's consistency with applicable state and San Bernardino County LORS. Therefore, the proposed project's contribution to the already existing significant cumulative scenario would not be cumulatively considerable.

RESPONSE TO COMMENTS

Staff received comments from the State of California Department of Conservation, County of San Bernardino, Transition Habitat Conservancy, and the applicant regarding land use.

STATE OF CALIFORNIA, DEPARTMENT OF CONSERVATION, DIVISION OF LAND RESOURCE PROTECTION

April 7, 2010 (DOC 2010a); May 3, 2010 (DOC 2010b)

The California Department of Conservation (DOC) provided comments on the agricultural land impacts of the proposed AMS (DOC 2010a). Land Use staff requested DOC's input regarding the approach used in the Staff Assessment to conduct the analysis of proposed project impacts on agricultural lands, and to provide the DOC's position regarding staff's recommended Condition of Certification **LAND-1** to mitigate agricultural land conversion.

Comment: When determining the agricultural value of the land, the Department considers that the crop yield or grazing of a property may have been reduced over the years due to inactivity, but it does not mean that the there is no longer any agricultural value. The inability to farm the land for agriculture, rather than the choice not to do so, is what could constitute a reduced agricultural value.

After reviewing the Staff Assessment document, the Department considers the Land-1 mitigation to be the most appropriate mitigation for the loss of 1,588.5 acres of Important Farmland. This requires the project owner to mitigate for the conversion of 1,588.5 acres of agricultural land (based on NRCS designations) to nonagricultural use by purchasing farmland and/or easements through a level not to exceed a one-to-one ratio.

In the past when the Department has reviewed proposed solar farms it has weighed the public benefits of the creation of renewable energy against the loss of productive agricultural land. Important factors that have been considered include the availability of irrigation water, soil types, impacts on adjacent agricultural operations, and current cropping systems.

The Department does not typically review the impacts of development on desert lands. However, if the construction of a solar facility removes and replaces agriculture on agricultural lands, the Department does consider it to have a significant impact on those agricultural lands, including grazing land. While solar facilities may be an allowed use under a county's Zoning and General Plan, they can still be considered and impact to agricultural resources under a CEQA review. The loss of agricultural land represents a permanent reduction in the State's agricultural land resources. Therefore, the Department suggests that solar facilities mitigate for the loss of agricultural land.

On May 3, 2010, DOC provided additional information (both in writing and verbally) to staff regarding their statements (provided above) in their April 7, 2010 Staff Assessment comment letter. At this point, DOC concurs that mitigation for 128 acres of Important Farmlands is appropriate for the proposed AMS Project. Land use staff contacted the DOC on May 3 and May 4, 2010 to obtain clarification regarding the DOC's change in their position to support mitigation of 128 acres of Important Farmlands (CEC 2010d; CEC 2010e). DOC staff indicated that they re-conducted the LESA model using a lowered water availability score, and acknowledged that scoring can be somewhat subjective. The DOC's current recommendation for mitigating for 128 acres of FMMP-designated Important Farmlands is based on their revised LESA model scores.

> **Response:** Energy Commission staff appreciates the DOC's comments and input on the Staff Assessment, and the information provided by DOC throughout the proposed project analysis process. As discussed in the **Land Use** section of the Supplemental Staff Assessment, after consideration of a number of qualitative factors related to water availability and water quality associated with farming that could occur at the proposed AMS site, staff has concluded that the project would have a significant impact to the 128 acres of Important Farmland as designated by the DOC's FMMP, and is recommending 128 acres of mitigation for this impact. Please see the Conversion of Farmland subsection above for the discussion of these qualitative factors, and the revisions to Condition of Certification **LAND-1.** Staff believes that implementation of **LAND-1** would mitigate the proposed AMS's contribution to cumulative loss of agricultural lands throughout the State of California.

COUNTY OF SAN BERNARDINO, LAND USE SERVICES DEPARTMENT, ADVANCE PLANNING

April 2, 2010 (CSB 2010g); April 15, 2010 (CSB 2010h)

County of San Bernardino (county) provided comments to staff regarding the proposed AMS's agricultural land impacts in the form two separate correspondences. In its April 2, 2010 correspondence (CSB 2010g), the county points out that,

> …the California Department of Conservation's Farmland Mapping program began in the 1960s as a method of tracking changes (i.e. loss of Farmlands) over time. This was a result of the greater awareness of the ongoing loss of California farmland to suburbanization, city annexations, new city formations, development of airports, development of public lands, expansions of military sites, etc. For the purposes of categorizing farmland, DOC established categories such as "Prime Farmland" and "Farmland of Statewide Importance", etc. Although such categorizations provided a level of clarity for performing environmental reviews (compared with a general lack of information, prior), the bottom-line is that today "mitigation" is not solely based on CDC's Farmland Mapping. Also, "mitigation" is not solely based on CDC's Farmland Mapping because this mapping was performed Statewide, on a macro-scale level.

Comment: The County follows the LESA Model (CSB 2010g). NRCS information was prepared at a more local level, and the LESA Model is intended to be applied at the project-level. If the analysis backs the NRCS designation of 1588.5 acres of "Important Farmland" lost due to the proposed development (and it appears, from the information provided below, that it does), then, if the County were the permitting agency, the County should include a mitigation measure requiring replacement of the 1588.5 acres of "Important Farmland" on a 1:1 ratio. Also, it should be verified whether, or not, the portion that is "Prime Farmland" (particularly if it is irrigated "Prime Farmland") is to be mitigated at a replacement ratio greater than 1:1.

County staff endorses the use of the state Department of Conservation's analysis methodologies (CSB 2010h). However, upon further consideration, the site characteristics do not truly have "high potential for agricultural production" uses as stated in the Staff Assessment. Further, the State and the County both have policies to endorse the use of "degraded lands" (Interim Guidance for Desert Renewable Energy Project Development, CEC, September 2009, page 16, under Land Use/Agriculture). Particularly in this case, that can raise a conflict of whether to protect habitat for endangered species or protect farmlands. As we have reviewed the site characteristics further, we believe that the likelihood of returning the project site to full agricultural use is highly unlikely for economic reasons similar to reasons why it is not currently in use, with one crop circle as an exception.

There is one remaining crop circle under cultivation on the project site and it is the only portion of the site designated as Prime Farmland and Farmland of Statewide Importance.

The County supports the applicant's proposal [in the AFC] to either place a minimum of 128 acres of Important Farmland under permanent agricultural conservation easement or provide adequate mitigation fees in lieu of providing land. We believe that this is a realistic and adequate mitigation strategy for the loss of agricultural lands.

Response: Staff appreciates comments provided by the County of San Bernardino Land Use Services Department and county staff's willingness to work collaboratively with Energy Commission land use staff throughout the analysis of the proposed AMS project. After consideration of a number of qualitative factors related to water availability and water quality associated with farming that could occur at the proposed AMS site, staff has concluded that the project would have a significant impact to 128 acres of Important Farmland as designated by the DOC's FMMP, and is recommending (in concurrence with the DOC and the county) 128 acres of mitigation for this impact.

TRANSITION HABITAT CONSERVANCY

April 15, 2010 (THC 2010a)

Transition Habitat Conservancy (THC) provided comments (THC 2010a) on the Land Use section of the Staff Assessment focused on agricultural land impacts. THC comments fall into two categories: determination of significance and methodology of staff's proposed mitigation.

Comment: <u>Determination of Significance</u> - We are pleased to see the California version of the Land Evaluation Site Assessment (LESA) was used to assess the potential significance of the conversion of land by the development of the AMS Project. We are, however surprised at the outcome given the limited water resources at the project site. We request the LESA analysis for AMS Project be peer reviewed by the staff of the Department of Conservation's Land Resource Protection Division to identify if it was prepared correctly given the unique conditions at the project site. The peer review should include careful consideration of quantity and quality of water available for agricultural operation at the project site.

Response: Staff appreciates comments provided by the THC and the THC's willingness to work collaboratively with Energy Commission land use staff throughout the analysis of the proposed AMS project. Please refer to the California Department of Conservation (DOC) letter dated April 7, 2010 (DOC 2010a) and additional input (DOC 2010b), which provide comments and information on the staff's land use analysis included in the Staff Assessment. The DOC agrees with staff's approach to analyzing impacts and the associated proposed Condition of Certification **LAND-1** for reducing agricultural land conversion impacts to a less than significant level. After consideration of a number of qualitative factors related to water availability and water quality associated with farming that could occur at the proposed AMS site, staff has concluded that the project would have a significant impact to 128 acres of Important Farmland as designated by the DOC's FMMP, and is recommending 128 acres of mitigation for this impact.

APPLICANT (ABENGOA SOLAR INC.)

April 21, 2010 (ESH 2010m)

Comment: The applicant's comments focus on proposed Condition of Certification **LAND-1**. The applicant proposes that Condition of Certification **LAND-1** be removed in its entirety, or modified from the mitigation of 1,588.5 acres to mitigation of 128 acres of farmland.

> **Response:** As discussed above in the response to DOC's and the County of San Bernardino's comments on the Staff Assessment, after consideration of a number of qualitative factors related to water availability and water quality associated with farming that could occur at the proposed AMS site, staff has concluded that the project would have a significant impact to 128 acres of Important Farmland as designated by the DOC's FMMP, and is recommending 128 acres of mitigation for this impact.

CONCLUSIONS AND RECOMMENDATIONS

- The proposed project would result in the permanent conversion of 128 acres of FMMP-designated Important Farmland to a non-agricultural use (i.e., a solar farm), which represents a significant impact. Therefore, staff recommends Condition of Certification **LAND-1**, which requires the project owner to mitigate for the conversion of 128 acres of Important Farmland to a non-agricultural use at a level not to exceed a one-to-one ratio.
- The proposed project is consistent with the county's General Plan and Development Code. The county "…would grant a variance for this project because the technology used does not fit into the typical standards" (CSB 2010e). Staff made the findings necessary for the granting of a county Major Variance to confirm that with issuance of such a variance (but for the exclusive power plant licensing authority of the Energy Commission) would bring the proposed project into compliance with applicable county LORS. Staff's evaluation of the proposed project with respect to the four required elements associated with a county "Major Variance" can all be made in the affirmative, thereby allowing for the issuance of "Major Variance" for the proposed AMS, but for the exclusive siting authority of the Energy Commission.
- Staff is proposing Condition of Certification **LAND-2** to ensure that the proposed project complies with San Bernardino County's suggested project decommissioning/closure requirements.
- With implementation of staff's proposed Condition of Certification **LAND-3**, the proposed project would be consistent with the applicable state and San Bernardino County LORS pertaining to the Subdivision Map Act.
- The proposed project would not disrupt or divide the physical arrangement of an established community.
- The proposed project would be compatible with existing on-site and surrounding land uses.
- The proposed project's contribution to the overall significant cumulative land use impacts in the project area would not be cumulatively considerable.

If the California Energy Commission approves the project, staff is proposing Conditions of Certification **LAND-1** to ensure that the proposed project mitigates for the permanent conversion of 128 acres of FMMP-designated Important Farmland; **LAND-2** to ensure that the project closure/decommissioning complies with the county's suggested Conditions of Approval; and **LAND-3** to ensure the project is in compliance with the Subdivision Map Act.

PROPOSED CONDITIONS OF CERTIFICATION

LAND-1 The project owner shall mitigate for the loss of 128 acres of Important Farmland as designated by the California Department of Farmland Mapping and Monitoring Program, at a one-to-one ratio.

Verification: The project owner shall provide a mitigation fee payment to an agricultural land trust such as the Transition Habitat Conservancy or any other land trust that has been previously approved by the Compliance Project Manager (CPM) prior to the start of construction. The fee payment will be determined by an independent appraisal conducted on available, comparable, farmland property on behalf of the agricultural land trust. The project owner shall pay all costs associated with the appraisal. The project owner shall provide documentation to the CPM that the fee has been paid and that the 128 acres of farmland and/or easements shall be purchased within three years of start of operation as compensation for the 128 acres of FMMP-designated Important Farmland to be converted by the AMS project. The documentation also shall guarantee that the land/easements purchased by the trust will be located in San Bernardino County and will be available in perpetuity for productive agricultural use . If no available land or easements can be purchased in San Bernardino County, then the purchase of lands/easements in other areas within western Mojave or adjacent counties, such as Kern County or Riverside County, is acceptable. The project owner shall provide to the CPM updates in the Annual Compliance Report on the status of farmland/easement purchase(s).

LAND-2 The project owner shall ensure that permanent closure of the project and its associated facilities comply with the County of San Bernardino's suggested Conditions of Approval (CSB 2010b) regarding project closure and decommissioning and San Bernardino County Development Code Chapter 84.29.060, Decommissioning Requirements.

Verification: Consistent with the requirements of **COMPLIANCE-11**, the project owner shall incorporate the applicable requirements of the San Bernardino County Development Code section 84.29.060, Decommissioning Requirements, into the AMS Facility Closure Plan, to the extent feasible, and in as much as the county requirements do not conflict with the California Energy Commission's requirements and standards related to the closure of power generating facilities. Consistent with the requirements of **COMPLIANCE-11,** the Project owner shall submit the Facility Closure Plan to the CPM at least 12 months prior to commencement of planned facility closure/decommissioning.

LAND-3 The project owner shall comply with the Subdivision Map Act (Pub. Resources Code Section 66410-66499.58) by adhering to the provisions of Chapter 87.04 of the San Bernardino County Code of Ordinances to ensure legality of parcels and site control.

Verification: At least 30 days prior to construction of the AMS project, the project owner shall submit evidence to the CPM, indicating approval of the merger of parcels by San Bernardino County, or written approval of another process (i.e., to adjust lot lines) that is acceptable to the county. The submittal to the CPM shall include evidence of compliance with all conditions and requirements associated with the approval of the Certificate of Merger and/or Notice of Lot Line Adjustment by the county. If all parcels or portions of parcels are not owned by the project owner at the time of the merger, a separate deed shall be executed and recorded with the county recorder. A copy of the recorded deed shall be submitted to the CPM, as part of the compliance package.

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APPENDIX LU-1
ABENGOA MOJAVE SOLAR PROJECT SITE
LESA MODEL WORKSHEETS

Appendix A. California Agricultural LESA Worksheet

The California Agricultural LESA Model is composed of six different factors. Two "Land Evaluation" factors are based upon measures of soil resource quality. Four "Site Assessment" factors provide measures of a given project's size, water resource availability, surrounding agricultural lands, and surrounding protected resource lands. For a given project, each of these factors is separately rated on a 100 point scale. The factors are then weighted relative to one another and combined, resulting in a single numeric score for a given project, with a maximum attainable score of 100 points. It is this project score that becomes the basis for making a determination of a project's potential significance, based upon a range of established scoring thresholds. The California Agricultural LESA Instruction Manual found at the California Department of Conservation, Division of Land Resource Protection website provides detailed instructions on how to complete the LESA worksheet.

Calculation of the Land Evaluation (LE) Score

Part 1. Land Capability Classification (LCC) Score

(1) Determine the total acreage of the project.
(2) Determine the soil types within the project area and enter them in **Column A** of the **Land Evaluation Worksheet** provided on page A-2.
(3) Calculate the total acres of each soil type and enter the amounts in **Column B**.
(4) Divide the acres of each soil type (**Column B**) by the total acreage to determine the proportion of each soil type present. Enter the proportion of each soil type in **Column C**.
(5) Determine the LCC for each soil type from the applicable Soil Survey and enter it in **Column D**
(6) From the LCC Scoring Table below, determine the point rating corresponding to the LCC for each soil type and enter it in **Column E**.

LCC Scoring Table

LCC Class	I	IIe	IIs, w	IIIe	IIIs, w	IVe	IVs, w	V	VIe, s, w	VIIe, s, w	VIII
Points	**100**	**90**	**80**	**70**	**60**	**50**	**40**	**30**	**20**	**10**	**0**

(7) Multiply the proportion of each soil type (**Column C**) by the point score (**Column E**) and enter the resulting scores in **Column F**.
(8) Sum the LCC scores in **Column F**.
(9) Enter the LCC score in box <1> of the Final LESA Score Sheet on page A-10.

Part 2. Storie Index Score

(1) Determine the Storie Index rating for each soil type and enter it in **Column G**.
(2) Multiply the proportion of each soil type (**Column C**) by the Storie Index rating (**Column G**) and enter the scores in **Column H**.
(3) Sum the Storie Index scores in **Column H** to gain the Storie Index Score.
(4) Enter the Storie Index Score in box <2> of the Final LESA Score Sheet on page A-10.

Land Evaluation Worksheet
Land Capability Classification (LCC) and Storie Index Scores

A	B	C	D	E	F	G	H
Soil Map Unit	Project Acres	Proportion of Project Area	LCC	LCC Rating	LCC Score	Storie Index	Storie Index Score
112	866.8	0.498	IIIe	70	34.86	50	24.9
117	668.5	0.384	IIIe	70	26.88	57	21.89
137	41	0.024	IIe	90	2.16	86	2.06
152	148.4	0.085	IVs	40	3.4	40	3.4
178	16.4	0.009	NR	0	0	NR	0
Totals	**1,741.10**	**1.00** (Must Sum To 1.0)		***LCC Total Score***	**67.30**	***Storie Index Total Score***	**52.25**

Site Assessment Worksheet 1.
Project Size Score

	I	J	K
	LCC Class I - II	LCC Class III	LCC Class IV- VIII
		866.8	
		668.5	
	41		
			148.4
Total Acres	**41**	**1,535.30**	**148.4**
Project Size Scores	**80**	**100**	**40**
Highest Project Size Score		**100**	

Part 1. Project Size Score

(1) Using **Site Assessment Worksheet 1** provided on page A-2, enter the acreage of each soil type from **Column B** in the **Column I, J or K** that corresponds to the LCC for that soil. (Note: While the Project Size Score is a component of the Site Assessment calculations, the score sheet is an extension of data collected in the Land Evaluation Worksheet, and is therefore displayed beside it.)

(2) Sum **Column I** to determine the total amount of class I and II soils on the project site.

(3) Sum **Column J** to determine the total amount of class III soils on the project site.

(4) Sum **Column K** to determine the total amount of class IV and lower soils on the project site.

(5) Compare the total score for each LCC group in the Project Size Scoring Table below and determine which group receives the highest score.

Project Size Scoring Table

Class I or II		Class III		Class IV or Lower	
Acreage	Points	Acreage	Points	Acreage	Points
>80	100	>160	100	>320	100
60-79	90	120-159	90	240-319	80
40-59	80	80-119	80	160-239	60
20-39	50	60-79	70	100-159	40
10-19	30	40-59	60	40-99	20
10<	0	20-39	30	40<	0
		10-19	10		
		10<	0		

(6) Enter the **Project Size Score** (the highest score from the three LCC categories) in box <3> of the Final LESA Score Sheet on page A-10.

Part 2. Water Resource Availability Score

(1) Determine the type(s) of irrigation present on the project site, including a determination of whether there is dry land agricultural activity as well.

(2) Divide the site into portions according to the type or types of irrigation or dry land cropping that is available in each portion. Enter this information in **Column B** of **Site Assessment Worksheet 2 - Water Resources Availability** provided on page A-5.

(3) Determine the proportion of the total site represented for each portion identified, and enter this information in **Column C**.

(4) Using the <u>Water Resources Availability Scoring Table</u> provided on page A-6, identify the option that is most applicable for each portion, based upon the feasibility of irrigation in drought and non-drought years, and whether physical or economic restrictions are likely to exist. Enter the applicable Water Resource Availability Score into **Column D**.

(5) Multiply the Water Resource Availability Score for each portion by the proportion of the project area it represents to determine the weighted score for each portion in **Column E**.

(6) Sum the scores for all portions to determine the project's total Water Resources Availability Score.

(7) Enter the Water Resource Availability Score in box <4> of the Final LESA Score Sheet on page A-10.

Site Assessment Worksheet 2.
Water Resource Availability

A Project Portion	B Water Source	C Proportion of Project Area	D Water Availability Score	E Weighted Availability Score (C x D)
1	Harper Valley Groundwater Basin - part of the Centro Sub-Basin of the Mojave River Basin	1	~~100~~ 65	~~100~~ 65
2				
3				
4				
5				
6				
		1.00 **(Must Sum to 1.0)**	***Total Water Resource Score***	**~~100~~ 65**

Water Resource Availability Scoring Table

Option	Non-Drought Years			Drought Years			WATER RESOURCE SCORE
	RESTRICTIONS			RESTRICTIONS			
	Irrigated Production Feasible?	Physical Restrictions ?	Economic Restrictions ?	Irrigated Production Feasible?	Physical Restrictions ?	Economic Restrictions?	
1	YES	NO	NO	YES	NO	NO	100
2	YES	NO	NO	YES	NO	YES	95
3	YES	NO	YES	YES	NO	YES	90
4	YES	NO	NO	YES	YES	NO	85
5	YES	NO	NO	YES	YES	YES	80
6	YES	YES	NO	YES	YES	NO	75
7	YES	YES	YES	YES	YES	YES	65
8	YES	NO	NO	NO	– –	– –	50
9	YES	NO	YES	NO	– –	– –	45
10	YES	YES	NO	NO	– –	– –	35
11	YES	YES	YES	NO	– –	– –	30
12	Irrigated production not feasible, but rainfall adequate for dry land production in both drought and non-drought years.						25
13	Irrigated production not feasible, but rainfall adequate for dry land production in non-drought years but not in drought years).						20
14	Neither irrigated nor dry land production feasible.						0

Part 3. Surrounding Agricultural Land Use Score

(1) Calculate the project's Zone of Influence (ZOI) as follows:

(a) a rectangle is drawn around the project such that the rectangle is the smallest that can completely encompass the project area.

(b) a second rectangle is then drawn which extends one quarter mile (1,320 feet) on all sides beyond the first rectangle.

(c) The ZOI includes all parcels that are contained within or are intersected by the second rectangle, less the area of the project itself.

(2) Sum the area of all parcels to determine the total acreage of the ZOI.

(3) Determine which parcels are in agricultural use and sum the areas of these parcels.

(4) Divide the area in agriculture found in step (3) by the total area of the ZOI found in step (2) to determine the percent of the ZOI that is in agricultural use.

(5) Determine the Surrounding Agricultural Land Score utilizing the Surrounding Agricultural Land Scoring Table below.

Surrounding Agricultural Land Scoring Table

Percent of ZOI in Agriculture	Surrounding Agricultural Land Score
90-100	100
80-89	95
70-79	90
65-69	85
60-64	80
55-59	70
50-54	60
45-49	50
40-44	40
35-39	30
30-34	20
20-29	10
<19	0

(6) Enter the Surrounding Agricultural Land Score in box <5> of the Final LESA Score Sheet on page A-10.

Part 4. Surrounding Protected Resource Land Score

The Surrounding Protected Resource Land scoring relies upon the same Zone of Influence information gathered in Part 3, and figures are entered in Site Assessment Worksheet 3, which combines the surrounding agricultural and protected lands calculations.

(1) Use the total area of the ZOI calculated in Part 3 for the Surrounding Agricultural Land Use score.

(2) Sum the area of those parcels within the ZOI that are protected resource lands, as defined in the LESA Instruction Manual (e.g., Williamson Act contracted lands, publicly owned lands maintained as park, forest, or watershed resources).

(3) Divide the area that is determined to be protected in step (2) by the total acreage of the ZOI to determine the percentage of the surrounding area that is under resource protection.

(4) Determine the Surrounding Protected Resource Land Score utilizing the Surrounding Protected Resource Land Scoring Table below.

Surrounding Protected Resource Land Scoring Table

Percent of ZOI Protected	Protected Resource Land Score
90-100	100
80-89	95
70-79	90
65-69	85
60-64	80
55-59	70
50-54	60
45-49	50
40-44	40
35-39	30
30-34	20
20-29	10
<20	0

(5) Enter the Surrounding Protected Resource Land score in box <6> of the Final LESA Score Sheet on page A-10.

Surrounding Agricultural Land and Surrounding Protected Resource Land

A	B	C	D	E	F	G
Zone of Influence					Surrounding Agricultural Land Score (from table on page A-7)	Surrounding Protected Resource Land Score (from table on page A-8)
Total Acres	Acres in Agriculture	Acres of Protected Resource Land	Percent in Agriculture (B/A)	Percent Protected Resource Land (C/A)		
11,035	220	480	2	4	0	0

Final LESA Score Sheet

Calculation of the Final LESA Score

(1) Multiply each factor score by the factor weight to determine the weighted score and enter in Weighted Factor Scores column.
(2) Sum the weighted factor scores for the LE factors to determine the total LE score for the project.
(3) Sum the weighted factor scores for the SA factors to determine the total SA score for the project.
(4) Sum the total LE and SA scores to determine the Final LESA Score for the project.

		Factor Scores	Factor Weight	Weighted Factor Scores
LE Factors				
Land Capability Classification (see page A-2)	<1>	67.3	0.25	16.8
Storie Index Rating (see page A-2)	<2>	52.25	0.25	13.06
LE Subtotal			**0.50**	**29.89**
SA Factors				
Project Size (see page A-2)	<3>	100	0.15	15
Water Resource Availability (see page A-5)	<4>	~~100~~ 65	0.15	~~15~~ 9.75
Surrounding Agricultural Land (see page A-9)	<5>	0	0.15	0
Surrounding Protected Resource Land (see page A-9)	<6>	0	0.05	0
SA Subtotal			**0.50**	**~~30~~ 24.75**
			Final LESA Score	**~~59.89~~ 54.64**

California Agricultural LESA Scoring Thresholds

Total LESA Score		Scoring Decision
0 to 39 points		Not Considered Significant
40 to 59 points		Considered Significant only if LE and SA subscores are each greater than or equal to 20 points
60 to 79 points		Considered Significant unless either LE or SA subscore is less than 20 points
80 to 100 points		Considered Significant

The California Agricultural LESA Model is designed to make determinations of the potential significance of a project's conversion of agricultural lands during the Initial Study phase of the CEQA review process. Scoring thresholds are based upon both the total LESA score as well the component LE and SA subscores. In this manner the scoring thresholds are dependent upon the attainment of a minimum score for the LE and SA subscores so that a single threshold is not the result of heavily skewed subscores (i.e., a site with a very high LE score, but a very low SA score, or vice versa). For additional information on the significance scoring thresholds under the California Agricultural LESA Model, consult Section 4 in the LESA Instruction Manual.

SOIL AND WATER RESOURCES

Testimony of Christopher Dennis, P.G., John Fio, Gus Yates, P.G., C.H.g., And Mike Conway

SUMMARY OF CONCLUSIONS

Based on the assessment of the proposed Abengoa Mojave Solar (AMS) project, the California Energy Commission (Energy Commission) staff finds that:

- The proposed use of groundwater for industrial cooling would not significantly impact groundwater levels in existing the Harper Valley Groundwater Basin (HVGB) wells, the basin balance, or the quality of groundwater in the basin. Staff has proposed Conditions of Certification **SOIL&WATER-6** and **-7** to establish pre-construction baselines for groundwater elevation and quality that can be quantitatively compared against simulated and observed levels during ongoing monitoring in the project pumping wells and near potentially impacted existing wells. These results would be used, if necessary, to avoid, minimize, or mitigate impacts to other wells and to the Harper Lake marsh from a reduction or degradation in the quantity or quality of groundwater available in the other wells and extracted to support the Harper Lake marsh.
- The proposed project would not significantly increase or decrease erosion rates within its watershed if Conditions of Certification **SOIL&WATER-1** and **-2** are implemented as proposed during construction and operation.
- The proposed on-site drainage management design would perform adequately and potential impacts to onsite structures, downgradient property, and Harper Lake bed would be mitigated if Conditions of Certification **SOIL&WATER-1** and **-3** are implemented as proposed.
- Requirements to mitigate potential impacts related to discharge of Heat Transfer Fluid (HTF) to land treatment units, brines to evaporation ponds, and stormwater are provided for in Condition of Certification **SOIL&WATER- 2**.
- The proposed method of sanitary wastewater disposal by a septic system and leach field would have no significant impacts provided the requirements of Condition of Certification **SOIL&WATER-9** are met.
- Staff believes that construction and operation of the project would not result in immitigable project-specific direct, indirect, or cumulative significant impacts to soil or water resources with the adoption of the recommended conditions of certification.
- Based on the elements of the proposed project submitted by the applicant, staff believes the project would comply with all applicable federal, state, and local laws, ordinances, regulations, and standards (LORS) with the adoption of the recommended conditions of certification. Two of these conditions, **SOIL&WATER-11** and **-12**, will ensure compliance with the state’s water policies as discussed further below.
    - The applicant has proposed to use groundwater for evaporative cooling when other cooling technologies exist. Staff believes the proposed use of groundwater for evaporative cooling would not comply with the state’s water policies.

However, with the implementation of Conditions of Certification **SOIL&WATER -11** and **-12**, which would require the project owner to implement and support a water conservation program for the life of the project, staff concludes that the AMS project would conform to LORS.

- The applicant has proposed the use of evaporation ponds as the preferred method of wastewater disposal. Staff believes potential impacts related to the use of evaporation ponds to dispose of the industrial wastewater could be mitigated through effective application of state and local LORS. However, this method of wastewater disposal is not consistent with the Energy Commission's policy that encourages the use of zero liquid discharge (ZLD) systems that eliminate wastewater discharge and inherently conserve water. Therefore, staff finds that this method of wastewater disposal does not comply with the state's water policies. However, as discussed above, with the implementation of Conditions of Certification **SOIL&WATER-11** and **-12,** staff concludes that the AMS project would conform to LORS.

The state has expressed a strong interest in developing its solar energy resources. However, the construction and operation of solar energy facilities requires the use of water, which state policy also protects. The Energy Commission must balance the state's interest in promoting solar energy development with its interest in conserving and protecting the state's water resources. Of the solar thermal projects currently proposed for the Mojave and Colorado deserts, only the AMS project and the Genesis project propose to use groundwater for power plant cooling. Staff recognizes the state's long-term interest in maximizing solar power generation, but also believes the use of water for power plant cooling is contrary to the state's long-term interest in minimizing adverse environmental impacts and ensuring conformity with state water policy. This will be an especially critical issue in the renewable development areas that will be identified in the Desert Renewable Energy Conservation Plan (DRECP). Later this year, Energy Commission staff plans to file a request with the Energy Commission for an Order Instituting an Informational Proceeding to address this issue further, outside this siting case.

INTRODUCTION

The California Environmental Quality Act (CEQA) requires that the significant environmental effects of a proposed project be identified and that such impacts be eliminated or mitigated to the extent feasible (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 Regs., tit. 14, § 15382).

This section analyzes potential impacts to soil and water resources from the construction and operation of the AMS project. Where the potential of a significant impact is identified, staff has proposed mitigation to reduce the significance of the impact and, as appropriate, has recommended conditions of certification. Similarly, staff has included conditions of certification to ensure that the project complies with all laws that are or would be, absent the Energy Commission's exclusive jurisdiction, applicable to the project.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The following federal, state, and local environmental LORS apply to the proposed AMS project and similar facilities, and help ensure the best and appropriate use and management of both soil and water resources by protecting human health and the environment.

Soil & Water Table 1
Laws, Ordinances, Regulations, and Standards

Applicable LORs	Description
Federal LORS	
Clean Water Act (33 USC Section 1257 et seq.)	The Clean Water Act (CWA) (33 USC § 1257 et seq.) requires states to set standards to protect water quality, which includes regulation of storm water and wastewater discharges during construction and operation of a facility. California established its regulations to comply with the CWA under the Porter-Cologne Water Quality Control Act of 1967. The CWA also establishes protection of navigable waters. Activities that result in the dredging or filling of jurisdictional waters of the United States require authorization under a Section 404 permit issued by the Army Corps of Engineers (USACE). The USACE may grant authorization under either an individual permit or a nationwide permit to address operations that may affect the ephemeral washes. Section 404 permits are also subject to CWA Section 401 water quality certification through the Regional Water Quality Control Board (RWQCB). Section 401 certification through the RWQCB is required if there are potential impacts to surface waters of the State and/or Waters of the United States, such as perennial and ephemeral drainages, streams, washes, ponds, pools, and wetlands. The RWQCB can require impacts to these waters to be quantified and mitigated.
Resource Conservation and Recovery Act, 42 USC 6901 *et seq.*; 40 CFR Part 260 et seq.	The Resource Conservation Recovery Act (RCRA) is a comprehensive body of regulations that give U.S. EPA the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also sets forth a framework for the management of non-hazardous solid wastes.
State LORS	
California Constitution, Article 10, Section 2	This section requires that the water resources of the State be put to beneficial use to the fullest extent possible and states that the waste, unreasonable use, or unreasonable method of use of water is prohibited.
The Porter-Cologne Water Quality Control Act of 1967, Water Code Sec 13000 et seq.	Requires the State Water Resources Control Board (SWRCB) and the nine RWQCBs to adopt water quality criteria to protect state waters. Those regulations require that the RWQCBs issue Waste Discharge Requirements specifying conditions for protection of water quality as applicable. Section 13000 also states that the State must be prepared to exercise its full power and jurisdiction to protect the quality of the waters of the State from degradation.
California Water Code Section 13050	Defines "waters of the State."

Applicable LORs	Description
California Water Code Section 13240, 13241, 13242, 13243, & Water Quality Control Plan for the Lahontan Region (Basin Plan)	The Basin Plan establishes water quality objectives that protect the beneficial uses of surface water and groundwater in the Region. The Basin Plan describes implementation plans and other control measures designed to ensure compliance with statewide plans and policies and provides comprehensive water quality planning. The following chapters are applicable to determining appropriate control measures and cleanup levels to protect beneficial uses and to meet the water quality objectives: Chapter 2, Present and Potential Beneficial Uses; Chapter 3, Water Quality Objectives, and the sections of Chapter 4, Implementation, entitled “Requirements for Site Investigation and Remediation,” “Cleanup Levels,” “Risk Assessment,” “Stormwater Problems and Control Measures,” Erosion and Sedimentation,” “Solid and Liquid Waste Disposal to Land,” and “Groundwater Protection and Management.”
California Water Code Section 13260	Requires filing, with the appropriate RWQCB, a report of waste discharge that could affect the water quality of the state unless the requirement is waived pursuant to Water Code section 13269.
California Code of Regulations, Title 23, Division 3, Chapter 30	This chapter requires the submission of analytical test results and other monitoring information electronically over the internet to the SWRCB’s Geotracker database.
State Water Resources Control Board General Permit CAS000002.	The SWRCB regulates storm water discharges associated with construction projects affecting areas greater than or equal to 1 acre to protect state waters. Under General Permit CAS000002, the SWRCB has issued a National Pollutant Discharge Elimination System (NPDES) General Permit for storm water discharges associated with construction activity. Projects can qualify under this permit if specific criteria are met and an acceptable Storm Water Pollution Prevention Plan (SWPPP) is prepared and implemented after notifying the SWRCB with a Notice of Intent.
State Water Resources Control Board 2003-003-DWQ	This general permit applies to the discharge of water to land that has a low threat to water quality. Categories of low threat discharges include piping hydrostatic test water.
California Code of Regulations, Title 22	Title 22, Division 4, Chapter 15 specifies Primary and Secondary Drinking Water Standards in terms of Maximum Contaminant Levels (MCLs). These MCLs include total dissolved solids (TDS) ranging from a recommended level of 500 milligrams per liter (mg/l), an upper level of 1,000 mg/l and a short term level of 1,500 mg/l. Other water quality MCLs are also specified, in addition to MCLS specified for heavy metals and chemical compounds.
California Code of Regulations, Title 23	Title 23, Division 3, Chapter 15 applies to waste discharges to land and requires the Regional Board issue Waste Discharge Requirements specifying conditions for protection of water quality as applicable.
Warren-Alquist Act, Section 25008	Requires that the Commission promote “all feasible means” of water conservation and “all feasible uses” of alternative water supply sources.
The California Safe Drinking Water and Toxic Enforcement Act	The California Health & Safety Code Section 25249.5 et seq. prohibits actions contaminating drinking water with chemicals known to cause cancer or possessing reproductive toxicity. The RWQCB administers the requirements of the Act.

Applicable LORs	Description
Local LORS	
Mojave Basin Area Adjudication	The Mojave Basin Area water rights adjudication has divided the basin into subareas with the Mojave Water Agency as the Watermaster and administer of the judgment. The adjudication's physical solution is to balance long-term supply and demand with any deficit accounted for by the purchase and recharge of supplemental water. In addition, the adjudication specifically states that no party to the judgment is relieved of their responsibility to comply with state or federal water quality protection laws or any permits, standards, requirements, or orders intended to protect water quality. The adjudication also states there is a need to conserve water and make the maximum beneficial use of the water resources in the State
County of San Bernardino General Plan and Development Code	Grading in San Bernardino County is subject to terms and conditions of San Bernardino County's General Plan, Development Code and California Building Code, based upon the 2006 International Building Code. If a county grading permit is required, the grading plan would need to be completed in compliance with San Bernardino County's General Plan and Development Code.
California Safe Drinking Water Act and San Bernardino County Code Title 3, Division 3, Chapter 6, Public Water Supply Systems	Requires public water systems to obtain a Domestic Water Supply Permit. The California Safe Drinking Water Act requires public water systems to obtain a Domestic Water Supply Permit. Public water systems are defined as a system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out the year. California Department of Public Health (CDPH) administers the Domestic Water Supply Permit program, and has delegated issuance of Domestic Water Supply Permits for smaller public water systems in San Bernardino County to the County. Under the San Bernardino County Code Title 3, 5.15-6 Division 3, Chapter 6, Public Water Supply Systems, the County Department of Environmental Services monitors and enforces all applicable laws and orders for public water systems with less than 200 service connections. The proposed project would likely be considered a non-transient, non-community water system.
San Bernardino County Development Code Section 82.13.080, Soil Erosion and Sediment Control Plans/Permits	Section 82.13.080 establishes regulations and procedures to control human existing and potential induced accelerated erosion. Elements of this ordinance include project planning, preparation of Soil Erosion and Sediment Control Plans, runoff control, land clearing, and winter operations.
San Bernardino County Ordinance Code, Title 3, Division 3, Chapter 8, Waste Management, Article 5, Liquid Waste Disposal	This ordinance requires the following compliance for all liquid waste disposal systems: (1) compliance with applicable portions of the Uniform Plumbing Code and the San Bernardino County Department of Environmental Health (DEHS) standards; (2) approval by the DEHS and building authority with jurisdiction over the system; or (3) for alternative systems, approval by the DEHS, the appropriate building official of this jurisdiction, and the appropriate California RWQCB.
San Bernardino County Ordinance Code, Title 6, Division 3, Chapter 3, Uniform Plumbing Code	This ordinance describes the installation and inspection requirements for locating disposal/leach fields and seepage pits.

Applicable LORs	Description
State Policies and Guidance	
Integrated Energy Policy Report (Public Resources Code, Div. 15, Section 25300 et seq.)	In the 2003 Integrated Energy Policy Report (IEPR), consistent with SWRCB Policy 75-58 and the Warren-Alquist Act, the Energy Commission adopted a policy stating they will approve the use of fresh water for cooling purposes by power plants only where alternative water supply sources and alternative cooling technologies are shown to be "environmentally undesirable" or "economically unsound."
State Water Resources Control Board Res. No. 68-16	The "Antidegradation Policy" mandates that: 1) existing high quality waters of the State are maintained until it is demonstrated that any change in quality will be consistent with maximum benefit to the people of the State, will not unreasonable affect present and anticipated beneficial uses, and will not result in waste quality less than adopted policies; and 2) requires that any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters, must meet WDRs which will result in the best practicable treatment or control of the discharge necessary to assure that: a) a pollution or nuisance will not occur and b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.
State Water Resources Control Board Res. 75-58	The principal policy of the SWRCB that addresses the specific siting of energy facilities is the Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Power Plant Cooling (adopted by the Board on June 19, 1976, by Resolution 75-58). This policy states that use of fresh inland waters should only be used for power plant cooling if other sources or other methods of cooling would be environmentally undesirable or economically unsound. In a letter dated January 20, 20100, the SWRCB clarified that this policy applies in most cases to surface water, not groundwater.
State Water Resources Control Board Res. No. 88-63	States that all groundwater and surface water of the State are considered to be suitable for municipal or domestic water supply with the exception of those waters that meet specified conditions.
State Water Resources Control Board Res. 2005-0006	Adopts the concept of sustainability as a core value for State Water Board programs and directs its incorporation in all future policies, guidelines, and regulatory actions.
State Water Resources Control Board Res. 2008-0030	Requires sustainable water resources management such as low impact development (LID) and climate change considerations, in all future policies, guidelines, and regulatory actions. Directs Regional Water Boards to "aggressively promote measures such as recycled water, conservation and LID Best Management Practices where appropriate and work with Dischargers to ensure proposed compliance documents include appropriate, sustainable water management strategies."

SETTING

The proposed project would be located on a relatively flat and previously developed area in Harper Valley, in the eastern Mojave Desert, near Hinkley, San Bernardino County, California (**Soil & Water Figure 1**). Water resources in this area are extremely limited and vegetation sparse. Due to these limitations, there is a need for a high degree of water use management and protection against accelerated soil erosion.

HARPER VALLEY

The proposed project would be developed on the western edge of Harper Lake, an alkali playa in Harper Valley. Harper Valley is a topographically closed basin, surrounded by Black Mountain, Fremont Peak, the Gravel and Mud Hills, Harper and Kramer Hills, the Rand Mountains, Iron Mountain, Mount General, and the Waterman Hills (DWR2003). Surface water runoff from mountain precipitation flows through washes and discharges to the alluvium-filled valley. Excess surface flow drains to Harper Lake where it evaporates, creating the Harper Lake playa. There are no documented seeps or springs in the Harper Lake area.

The AMS project site is underlain by the HVGB, which is approximately 410,000 acres in size as defined by the California Department of Water Resources (DWR) (DWR2003). However, the HVGB is part of the Centro subarea, one of five subareas defined in the Mojave River Area adjudication (MBAA1996). The HVGB as defined by the DWR is larger than the Harper Valley groundwater subarea as delineated within the U.S. Geological Survey (USGS) numerical model developed for the Mojave River Area adjudication (USGS2001). The area delineated in the USGS model is herein referred to as the “Harper Lake model zone” for the purposes of staff’s analysis.

The Harper Lake model zone is defined by the Lockhart Fault in the southwest and the contact between alluvium and bedrock to the north, east, and south. The AMS project site is within the northwest trending Lenwood-Lockhart fault zone (DWR2003; AS2009a). This fault zone appears to laterally impede groundwater flow, and this impedance across the fault is incorporated into the USGS model (USGS2001)[1].

Groundwater from the Harper Lake model zone is the primary natural water supply for the valley region. Groundwater in the Harper Lake model zone is generally unconfined and has limited hydraulic connection with the regional Mojave Basin area. Groundwater inflow is primarily across the Lockhart Fault and through the Hinkley Gap towards Harper Lake. Groundwater outflow is primarily through agricultural and industrial pumping and consumption. Historically, as a result of agricultural development, groundwater consumption exceeded groundwater recharge. As a result, groundwater levels and storage declined. Following the Mojave Basin Area adjudication, groundwater consumption decreased and groundwater levels have begun to rise and storage increase in the Harper Lake model zone.

The groundwater occurs in two Quaternary alluvial aquifers beneath the AMS project site and generally flows towards Harper Lake (MG1989; AS2009a). At the proposed project location, the depth to groundwater in the upper aquifer (uQal) is approximately 125 to 145 feet below ground surface (bgs) (AS2009a).[2] Transmissivity of the upper

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[1] The USGS Mojave River Valley Model is a groundwater model developed out of the adjudication of the Mojave River Basin area. This model includes the Harper Valley Groundwater Basin.
[2] Perched water is present in the vicinity of Harper (dry) Lake. The depth to this perched water at the proposed project site appears to occur at approximately 27 to 33 feet bgs, based on boring logs recorded by the applicant during an on-site geotechnical investigation (AS2009a).

aquifer, estimated from well tests, ranges from 100,000 to 300,000 gallons per day per foot (gpd/ft) (AS2009a). Groundwater in the vicinity of the proposed project contains varying concentrations of sodium, chloride, bicarbonate, sulfate, boron, and Total Dissolved Solids (TDS) (DWR2003).

The upper aquifer is approximately 300 to 400 feet thick and overlays the laterally extensive Black Mountain Basalt (MG1989). This Pleistocene basalt flow originated from Black Mountain and is approximately 200 feet thick beneath the AMS project site and confines to semi-confines the aquifer beneath it (MG1989; AS2009a). Most of the groundwater wells in the vicinity of the AMS project appear to be completed to depths above the basalt layer (MG1989), with an average well depth of approximately 365 feet bgs. Beneath the AMS project site, the aquifer below the basalt layer (lQal) appears to extend to the bedrock at approximately 950 feet bgs (MG1989).

Under pre-development conditions (prior to the 1930s), groundwater discharged to Harper Lake (USGS2001; CSUF2007). However, as agricultural use of the land developed, the groundwater elevation lowered due to pumping and consumption from storage to such a degree that discharge from the regional aquifer to the lakebed no longer occurs. Now, perched water conditions generally exist at approximately 27 to 33 feet bgs near Harper Lake (USGS2001; AS2009a). A perched water condition occurs when water in the ground is retained by an underlying low permeability strata that separates that water from a deeper aquifer.

Precipitation and groundwater underflow supply water to the basin. Recharge from precipitation is considered negligible in the USGS numerical model (USGS2001). Direct recharge from rainfall to the valley floor and surrounding low hills is substantially less than the potential rate of evapotranspiration and potential for soil moisture retention. When runoff or precipitation does reach the dry lake, infiltration to groundwater is negligible and most of the water is removed by evaporation (Hogan2004; USGS2001).

The Mojave River and its tributaries supply groundwater to the Mojave Basin area. Due to continued overdraft, the Mojave Basin area was adjudicated (MBAA1996). The adjudication states there is a need to conserve water and make the maximum beneficial use of the water resources in the state (MBAA1996). For purposes of administration of the judgment, the Mojave Basin area was divided into five separate hydrologic subareas: Este (East Basin), Oeste (West Basin), Alto (Upper Basin), Centro (Middle Basin), and Baja (Lower Basin) (MBAA1996). The proposed AMS project, the Harper Lake model zone, and HVGB are all located in the adjudication’s Centro subarea. Under the Porter-Cologne Water Quality Act (Water Code Sec 13000 et seq.), each regional water quality control board is required to develop a basin plan that defines and the beneficial uses of water in all basins within a region and protects those beneficial uses from discharges of waste. The beneficial uses of the surface water and groundwater in Harper Valley are defined in the 2005 *Water Quality Control Plan for the Lahontan Region, North and South Basins* (the Basin Plan) and presented below in **Soil & Water Table 2**.

Soil & Water Table 2
Beneficial Use Designations for the Harper Valley

SURFACE WATER	
Beneficial Use Designation	**Description**
Municipal and Domestic Supply	Beneficial uses of waters used for community, military, or individual water supply systems including, but not limited to, drinking water supply.
Agricultural Supply	Beneficial uses of waters used for farming, horticulture, or ranching, including, but not limited to, irrigation, stock watering, and support of vegetation for range grazing.
Groundwater Recharge	Beneficial uses of waters used for natural or artificial recharge of ground water for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers.
Flood Peak Attenuation / Flood Water Storage	Beneficial uses of riparian wetlands in flood plain areas and other wetlands that receive natural surface drainage and buffer its passage to receiving waters.
Water Contact Recreation	Beneficial uses of waters used for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, and use of natural hot springs.
Noncontact Water Recreation	Beneficial uses of waters used for recreational activities involving proximity to water, but not normally involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, and aesthetic enjoyment in conjunction with the above activities.
Warm Freshwater Habitat.	Beneficial uses of waters that support warm water ecosystems including, but not limited to, preservation and enhancement of aquatic habitats, vegetation, fish, and wildlife, including invertebrates.
Cold Freshwater Habitat	Beneficial uses of waters that support cold water ecosystems including, but not limited to, preservation and enhancement of aquatic habitats, vegetation, fish, and wildlife, including invertebrates.
Wildlife Habitat	Beneficial uses of waters that support wildlife habitats including, but not limited to, the preservation and enhancement of vegetation and prey species used by wildlife, such as waterfowl.
Water Quality Enhancement	Beneficial uses of waters that support natural enhancement or improvement of water quality in or downstream of a water body including, but not limited to, erosion control, filtration and purification of naturally occurring water pollutants, streambank stabilization, maintenance of channel integrity, and siltation control.

GROUNDWATER	
Beneficial Use Designation	**Description**
Municipal and Domestic Supply	Beneficial uses of waters used for community, military, or individual water supply systems including, but not limited to, drinking water supply.
Agricultural Supply	Beneficial uses of waters used for farming, horticulture, or ranching, including, but not limited to, irrigation, stock watering, and support of vegetation for range grazing.
Industrial Service Supply	Beneficial uses of waters used for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, geothermal energy production, hydraulic conveyance, gravel washing, fire protection, and oil well repressurization.
Freshwater Replenishment	Beneficial uses of waters used for natural or artificial maintenance of surface water quantity or quality (e.g., salinity).

Source: RWQCB2005.

The Basin Plan gives equal priority to each beneficial use of the surface water and groundwater. Included in the definition of surface water are playas and ephemeral washes. As presented in the table above, the desert washes provide beneficial functions and values such as groundwater recharge, flood peak attenuation and floodwater storage, and wildlife habitat.

In the vicinity of the AMS project site are wetlands that are maintained by the Federal Bureau of Land Management (BLM). Consistent with a Condition of Certification for the neighboring Solar Electric Generating Systems (SEGS) plants, up to 75 acre-feet per year (AF/y) of groundwater is pumped to Harper Lake to maintain water levels in the wetlands by a well located on the proposed AMS project site. This well is located within the proposed solar field and is expected to be properly abandoned by the project owner. A new well is expected to be installed by the BLM on land adjacent to the project site near the wetlands. The existing well would not be abandoned until the new well is functional and used as the new wetlands water supply well. Please refer to the **BIOLOGICAL RESOURCES** section for additional discussion regarding the wetlands water supply.

PROPOSED PROJECT DESCRIPTION

The AMS project would be a 250-MW capacity solar electric generating system that would consist of rows of parabolic mirrors (collectors) that would heat a fluid (Therminol or similar fluid) inside piping placed at the focal point of each mirror row (AS2009a). The hot therminol would pass through a series of coils to boil water and create steam for a steam turbine generator. The solar field would be kept free of vegetation by hand pulling or the use of spot spraying of commercially available herbicides (AS2009a). The potential for wind erosion would be minimized by the use of dust palliatives (AS2009a). Mirror washing would be conducted at regular intervals. Operation of the project would require 63 fulltime and 10 seasonal employees (AS2009a).

Construction of the proposed power plant would involve approximately 1,765 acres (2.8 square miles) in an unincorporated portion of San Bernardino County (AS2009a). The project would be divided into two nearly identical, independently-operable, solar fields and power blocks (alpha and beta), each connected to a shared electrical transmission line interconnection substation (AS2009a). Each power block would have a 125-MW capacity, with the alpha plant occupying approximately 884 acres and the beta plant occupying approximately 800 acres (AS2009a). Approximately 81 acres would be used by both plants for managing storm water flowing to the project site and redirecting that flow to Harper Lake (AS2009a). In addition, each power block would have its own water treatment unit, evaporation ponds, heat transfer fluid bioremediation unit, and natural-gas powered auxiliary boiler to prevent freezing of the therminol[3] (AS2009a). Construction of the AMS project is estimated to take 26 months, with an average workforce of 830 persons and a peak workforce of 1,162 persons (AS2009a).

Soil Erosion and Storm Water Control

The project proposes to manage stormwater in accordance with site-specific grading plans, a construction Storm Water Pollution Prevention plan (SWPPP), a Drainage Erosion and Sediment Control Plan (DESCP), and in accordance with the San Bernardino County ordinances. These plans and ordinances would establish methods of when and how to control and manage storm water flow as it reaches, flows across, and then leaves AMS.

Water Supply and Use

Groundwater from the upper (uQal) aquifer would supply all proposed water uses at the AMS project (AS2009a). Four new wells are proposed to supply water for both construction[4] and operation of the project (AS2009a). Each of the two solar plants would have its own production well and a backup well. Each power block would also have a dedicated water treatment unit for plant process needs and a package treatment unit for potable water (AS2009a). Well installation would occur prior to the beginning of construction to support grading and other construction water needs (AS2009a).

Wastewater Management

Hydrostatic Test Water

An estimated 1.2 acre-feet of hydrostatic test water would be used for pressure testing the AMS project’s piping and vessels (AS2009b). Depending on analysis of the water, the hydrostatic test water would either be trucked to a wastewater treatment facility or discharged to land where it would infiltrate the soil or evaporate (AS2009a).

Sanitary Waste

Sanitary waste would be contained in portable facilities during construction and routinely disposed of at a local treatment facility (AS2009a). During plant operation, sanitary waste at each power block would be disposed of through a septic and leach field system (AS2009a). Approximately 1,250 gallons per day (gpd) of wastewater would be disposed of through each septic system (AS2009a).

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[3] Therminol freezes at 54^{o}F (AS2009a).
[4] As an additional supply of construction water, the existing on-site Ryken well would be used during construction only (AS2009b).

Process Wastewater

Process wastewater would be generated from cooling tower blowdown, chemical feed area, and general plant drains at each power block (AS2009a). The cooling tower blowdown would be processed by clarification, reverse osmosis (RO), a demineralizer system, and other treatment systems before being used for mirror washing and reused as steam system makeup water (AS2009a). Reject water from this treatment process at each power block would be discharged to two 5-acre, double-lined evaporation ponds (AS2009a). The evaporation ponds would be sized to retain all solids generated by the evaporation of the wastewater during the life of the project (AS2009a).

Wastewater from the chemical feed area and general plant drains would be processed through an oil/water separator (AS2009a). The separated oil and sludge would be containerized and transported to an off-site oil recycling facility. The remaining wastewater would be pumped to the plant’s evaporation ponds (AS2009a).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

This section provides an evaluation of the expected direct, indirect, and cumulative impacts to soil and water resources that would be caused by construction, operation, and maintenance of the project. Staff's analysis of potential impacts consists of a description of the potential effect, an analysis of the relevant facts, and application of the threshold criteria for significance to the facts. Staff has identified potential impacts, staff provides a summary of the applicant's proposed mitigation and a discussion of the adequacy of the proposed mitigation. If necessary, staff presents additional or alternative mitigation measures and refers to specific conditions of certification related to a potential impact and the required mitigation. Mitigation is designed to reduce the effects of potential significant project impacts to a level that is less than significant.

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

Impacts leading to soil erosion or depletion or degradation of water resources are among those staff believes could be most potentially significant soil and water resource issues associated with the proposed project. The thresholds of significance for these issues are discussed below.

Soil Resources

Staff evaluated the potential impacts to soil resources including the effects of construction and operation activities that could result in erosion and downstream transportation of soils and the potential contamination of soils and groundwater. There are extensive regulatory programs in effect that 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 impacts would be less than significant. In addition, soils would be protected by the development and implementation of grading plans, construction SWPPP, and a DESCP.

Although these programs and BMPs are generally effective on most gas-fired power projects, the proposed project is of a substantially larger scale. Modeling and calculations can be used to estimate future scenarios and provide a basis for design parameters; however, these methods are based on assumptions and projections that can be imprecise. To account for the potential imprecision in the modeling and calculations, staff has proposed conditions of certification that would mitigate potential impacts. The LORS and policies presented in **Soil & Water Table 1** were used to determine the threshold of significance for the proposed AMS project.

Water Resources

To evaluate if significant CEQA impacts to soil or water resources would occur, the following criteria were used. Where a potentially significant impact was identified, staff or the applicant proposed mitigation to ensure the impacts would be less than significant.

- Would the project violate any water quality standards or waste discharge requirements?

- Would the project substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?
- Would the project 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, tsunami, or mudflow?
- 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? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)
- Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?

DIRECT/INDIRECT IMPACTS AND MITIGATION

A discussion of the direct and indirect AMS project construction and operations impacts and mitigation is presented below. For each potential impact evaluation, staff describes the potential effect and applies the threshold criteria for significance to the facts. If mitigation is warranted, staff provides a summary of the applicant's proposed mitigation and a discussion of the adequacy of the proposed mitigation. In the absence of an applicant-proposed mitigation or if mitigation proposed by the applicant is inadequate, staff mitigation measures are recommended. Staff also provides specific conditions of certification related to a potential impact.

During construction, groundwater would be used for dust suppression, soil compaction, and hydrostatic pipeline and vessel testing. Potential impacts to soils related to increased erosion or release of hazardous materials could be possible during construction. Potential storm water impacts could result if increased runoff flow rates and volume discharge from the site increase flooding downstream. Water quality could be impacted by discharge of hazardous materials released during construction or by project-induced migration of poorer quality groundwater to higher quality groundwater. Project water demand could affect the quantity of available groundwater.

Operation of the AMS project could lead to potential impacts to soil, storm water runoff, water quality, and water supply. Soils may be potentially impacted through accelerated erosion or the release of hazardous materials used during the operation of the AMS project. Storm water runoff from the proposed project could result in impacts if increased runoff flow rates and volumes discharged from the AMS project increase erosion or downstream flooding. Water quality could be impacted by discharge of eroded sediments from the project or by the discharge of hazardous materials released during operation. Potential impacts to soil, storm water, water quantity, water quality, and water supply related to the construction and operation of the project, including the applicant's proposed mitigation measures and staff's proposed mitigation measures, are discussed below.

Soil and Wind Erosion

Construction and operation activities proposed by the applicant can adversely impact soil resources including increased soil erosion, soil compaction, loss of soil productivity, and disturbance of soils crucial for supporting vegetation and water dependant habitats. Activities that expose and disturb the soil leave soil particles vulnerable to detachment by wind and water. Soil erosion results in the loss of topsoil and increased sediment loading to nearby receiving waters. The magnitude, extent, and duration of those impacts would depend on several factors, including the proximity of the AMS project site to surface water, the soil types affected, and the method, duration, and time of year of construction activities. Prolonged periods of precipitation, or high intensity and short duration runoff events coupled with earth disturbance activities can result in on-site erosion. In addition, high winds during grading and excavation activities can result in wind borne erosion leading to increased particulate emissions that adversely affect air quality.

The proposed project would discharge to Harper Lake, which has no direct connection to a perennial stream or other navigable waters or permanent water source such as another lake or spring and does not qualify as jurisdictional feature subject to regulation under the federal Clean Water Act (USACE2010a). Discharges from the proposed project are, therefore, not expected to have a significant impact to sensitive surface waters.

The AMS project site would be subject to wind and water erosion during construction. Construction of the project is scheduled to take approximately 26 months to complete. The total earth movement would be substantial with approximately four million cubic yards of soil to be cut, moved, and reused in a 1,765-acre site area (AS2009a).

The Natural Resources Conservation Service (NRCS) classifies soils at the project site as Cajon sand and Cajon sandy loam with lesser amounts of Kimberlina loamy fine sand and Norob-Halloran complex soils. Eighty percent or more of the proposed project site is underlain by Cajon sand and Cajon sandy loam (AS2009a). According to the Unified Soils Classification System (USCS), Cajon sand and Cajon sandy loam soils contain poorly graded sand (SP) and silty sands (SM). These excessively well drained soils have a high rate of water transmission. Minor soils within the proposed project site boundary include Kimberlina loamy fine sand and the Norob-Halloran complex. Kimberlina loamy fine sand consists of loamy fine sand, sandy loam, fine sandy loam (SM), and loam (ML). The Norob-Halloran complex consists of loamy sand and sandy loam (SM), sand (SP, SP-SM), gravelly loamy sand (SC-SM), sand clay loam (SC), and clay loam (CL). These soils may have low infiltration rates in some areas, but generally have a high rate of water transmission. Collectively the proposed project boundary contains soils with a low to moderately low susceptibility to sheet and rill erosion. Local soils are also poorly consolidated and highly susceptible to wind erosion (AS2009a).

Construction

The Revised Universal Soil Loss Equation, version 2 (RUSLE2) was used to estimate potential soil loss from water erosion. In its current state, the potential project area could lose approximately 0.58 tons/acre/year from water erosion. Given the planned construction activities, the impacts from water erosion could be significant. Some of the soils are prone to significant erosion and could cause significant offsite impacts without the proper erosion control measures. The applicant proposes to implement sediment and erosion control BMPs that would mitigate and limit soil loss to approximately 0.61 tons/acre/year during construction. Projected wind erosion rates are similarly high for the existing site condition and the construction phase. The estimated existing site condition wind erosion rate and wind erosion rate during construction are both over 100 tons/acre/year.

High winds during grading and excavation activities can result in wind borne erosion leading to increased particulate emissions that adversely impact air quality. The implementation of appropriate erosion control measures would help conserve soil resources, protect downstream properties and resources, and protect air quality. Conditions of Certification in the **AIR QUALITY** section require a construction mitigation plan to prevent significant impacts from fugitive dust and wind erosion during construction. Please refer to the **AIR QUALITY** section for details of the construction mitigation plan. The requirement to use soil weighting and bonding agents following grading would conserve freshwater by reducing the need for water as a means to control fugitive dust.

In the draft project grading plan and DESCP, the applicant proposes BMPs for wind and water erosion control during project construction. The implementation of appropriate erosion control measures would help conserve soil resources, maintain water quality, and prevent accelerated soil loss. The erosion and sedimentation control measures include: applying water or soil binders to the roads in active construction and laydown areas; controlling speed on unpaved surfaces; installing stabilized entrances/exits; use of earthen berms, silt fences, or fiber rolls to control sedimentation; and preserving existing vegetation. During grading work, soil would also be stabilized by maintaining sufficient water content to make it resistant to weathering and erosion by wind and water (AS2009a).

Operations

The proposed project would have lower rates of water erosion during the operations phase of the project, approximately 0.066 tons/acre/year. The reduced rate of erosion during operations is achievable through use of BMPs and site design features. During the operations phase, berms would surround each solar field and minimize sediment migration off-site (AS2009a). The applicant also proposes regular applications of dust palliatives and water during operations that would reduce wind erosion to 1 ton/acre/year. Reduced wind erosion would also result in reduced mirror damage due to sediment abrasion (AS2009a).

Given the low frequency of precipitation and storm water runoff, BMPs proposed by the applicant should limit potential soil loss from water erosion caused by on-site precipitation events. BMPs would be applied and erosion and sedimentation control measures repaired as soon as erosion is evident. Temporary erosion control measures would be implemented as needed to control erosion during both construction and operation. Temporary sediment control materials would be maintained on-site throughout the life of the project to respond as needed to unforeseen rain or emergencies. With implementation of BMPs identified by the applicant in the AFC and proposed in Condition of Certification **SOIL&WATER-1**, significant soil erosion and subsequent sedimentation would be avoided. Overall, staff believes the applicant has identified a reasonable plan and sequence for implementing BMPs in the DESCP that would avoid significant adverse erosion and sedimentation impacts resulting from precipitation runoff. Staff concludes that through the proper application of BMPs as proposed by these conditions of certification, the impact to soil resources from water and wind erosion during construction would be reduced to a level that is less than significant.

The applicant has also proposed permanent wind erosion control measures to mitigate potential erosion and subsequent fugitive dust impacts resulting from prevailing winds during construction and operation of AMS project. During operation, areas not covered by foundations, paving, or the solar array would be treated with soil stabilizers. The AMS project is expected to minimize wind erosion in an effort to protect the mirrors and minimize maintenance and damage. Erosion control measures would be required by staff in Condition of Certification **SOIL&WATER-1**. With implementation of the requirements, staff does not believe there would be significant impacts to soil resources during operation of the AMS project.

The proposed project would build solar fields, Alpha and Beta, which will contain all on-site soils and prevent off-site sedimentation. Application of soil binders could reduce infiltration in solar fields. Less infiltration means more runoff and more potential sedimentation. In compliance with **SOIL&WATER-1**, the applicant will contain all storm water generated on site, with the exception of upstream run-on diverted through the proposed drainage channel. Additional requirements for mitigation of soil erosion impacts are included as a part of waste discharge requirements of Condition of Certification **SOIL&WATER-2**.

Storm Water and Drainage

Paved areas would include site access roads and small portions of each power island. Each 20-acre power island would include approximately 1.75 acres of paved areas, including emergency access roads, administration, and warehouse buildings. Power island access would be available year round and would not be weather dependent. Solar field access may be subject to flooding. Drainage crossings on Lockhart Road and Harper Lake Road would be routed beneath the roads. Solar field access roads would cross channel bottoms and may be subject flooding during high-flow events. Solar fields would remain unpaved.

The proposed project would contain all storm water runoff generated on-site. The proposed facilities would closely match existing topography and would contain an average slope of 1%. The solar fields would be bordered by berms of sufficient height to contain storm water runoff. The relatively flat solar fields, consisting of high permeability soils, encourage percolation of storm water. Runoff from each power island within each solar field, would sheet flow into the solar fields. Each of the two power islands is expected to have no more than 1.75 acres of pavement. Chemical storage areas and areas containing oil-filled transformers would drain to oil-water separators for treatment prior to being discharged to the site's evaporation ponds (AS2009a).

The proposed project would discharge to Harper Lake, which has no direct connection to a perennial stream or other navigable waters or permanent water source such as a lake or spring and does not qualify as jurisdictional feature subject to regulation under the federal Clean Water Act (USACE2010a). Discharges from the proposed project are, therefore, not expected to affect federally regulated surface waters. Nonetheless, staff believes implementing BMPs during construction is necessary to protect natural downstream habitat and drainage features from construction discharges.

Staff believes the terrain, originating from the Kramer Hills south of the AMS project, slopes toward the AMS project site and historically drained towards the site. The applicant has designed eight on-site drainage channels that border the solar fields and convey run-on through or around the site. The channels were designed according to the 1986 San Bernardino County Hydrology Manual and account for appropriate bulking, erosion protection, and freeboard. The applicant sized the channels for the 100-year storm to simulate a high intensity short duration rainfall event typical of a desert landscape (AS2009a).

As proposed, the graded project site would slope towards the northeast with a slope of approximately 1%. Proposed earth-lined drainage channels intercept storm water run-on from the southern and western site boundaries and convey it around the project through earth-lined drainage channels, where it would discharge in its natural location into Harper (dry) Lake. The proposed outlet structure consists of a 30-acre “spreading ground,” which would allow concentrated flows passing through the site to transition back to its natural state as sheet flow. The designed diversion channel could handle flows up to 21,232 cubic feet per second (cfs), the calculated combined flow generated in channels intercepted by the proposed project. A smaller channel along the northern border of the west solar field, Channel F, would capture flows up to 458 cfs and convey them north to an existing drainage ditch. Designed site drainages convey the 100-year storm, in accordance with the County of San Bernardino Flood Control District standards. Grading plans propose to maintain drainage features to the extent possible. Storm water run-off generated on each power block would be conveyed to localized containment areas where it would be conveyed to each power block's oil-water separator (AS2009a).

Proposed drainage channels may be subject to scour and erosion, which could alter their hydraulic capacity or functionality. The AMS project would alter natural storm water drainages but is not expected to significantly alter sediment migration patterns within the drainage area. Maintenance of drainage channels and diversions is required to ensure peak flood flows are routed away from the solar field. Staff will require a channel maintenance program, which will ensure that the project's channels perform at design capacity throughout the life of the project. Condition of Certification **SOIL&WATER-3** requires that the applicant identify activities and procedures needed to maintain the design capacity of the drainage features to avoid future potential flood related impacts. Condition of Certification **SOIL&WATER-3** requires the project owner prepare a channel maintenance program and obtain Compliance Project Manager (CPM) approval prior to implementation. These conditions will require the applicant to identify activities and procedures needed to maintain the design capacity of the drainage features to avoid future potential flood related impacts.

Staff reviewed the applicant's hydrologic calculations in the Hydrology Study to evaluate the off-site areas tributary to the AMS project site. Historically storm water from off-site areas would flow toward and across the site via eight separate drainages. As proposed, the AMS project would concentrate these flows and divert them through the property. Staff reviewed the applicant's drainage design drawings and design assumptions and agrees that the proposed drainages adequately convey run-on through the project and will return flow to its upstream volume and flow rate prior to discharge into Harper Lake.

Staff also assessed the potential for the proposed drainage design plan to cause impacts related to off-site flooding. Staff reviewed appropriate federal, state, and local guidelines and specifications applicable to engineered channels. Staff used these criteria to examine the applicant's flood management plan and to provide comment on the limitations and thresholds of the plan to avoid potential impacts. Staff was initially concerned with the applicant's proposal to design a 90-degree bend in the highest capacity portion of Channel A3. This channel segment is designed to convey the combined peak discharges from all the upstream diversions. Though the applicant sized the channel conservatively by assuming all peak discharges (Q) would converge at the same time, Staff was still concerned about over-topping of the channel and potential for flooding adjacent properties. The San Bernardino Public Works Department described a similar concern due to channel over-topping in comments docketed February 1, 2010 (CSB2010b). In response to staff's concern the applicant completed a water-surface profile analysis on April 4, 2010 using Water Surface Pressure Gradient for Windows (WSPGW) (AS2010g). The model indicates a maximum water depth of 11.45 feet along the outer-bank of channel A3, at approximately Station 2903. Staff agrees that this water level rise is accurate given the modeled flows and presents no significant threat to the adjacent property if the channel is designed to include 2 feet of freeboard above the maximum flood stage water level. In the current channel design scenario, a small section of Channel A3 near Station 2903 may require up to 1.5 feet of increased depth to maintain the necessary 2 feet of freeboard. The channel is otherwise expected to be sufficiently deep and protected with a gabion mattress to prevent scour and to contain the design event. Condition of Certification **SOIL&WATER-3** will also require that 2 feet of freeboard be maintained above the maximum flood stage water level, at all times. Staff is not concerned about overbank flow given the described analysis.

Staff also worked with the RWQCB to develop requirements for Condition of Certification **SOIL&WATER-2,** to ensure there are no offsite storm water impacts. However, staff concludes the proposed on-site drainage management design would perform adequately and any potential impacts would be mitigated if Conditions of Certification **SOIL&WATER-1**, **-2**, and **-3** are implemented as proposed.

Based on the methods proposed by the applicant, staff believes that storm water runoff from the site as well as potential nuisance flows from plant operation and maintenance would not cause significant impacts to the receiving waters with implementation of the Condition of Certification **SOIL&WATER-1**. If implemented as proposed, staff believes the storm water management, including on-site retention, would protect the site from erosion and downstream areas from sedimentation and degradation by deleterious materials. Condition of Certification **SOIL&WATER-1** requires that the applicant develop a DESCP. Staff believes that if the AMS project complies with these conditions, there would not be significant erosion or sedimentation impacts due to on-site storm water runoff.

Flooding, Tsunami, and Seiche

All storm water overland flow reaching the proposed project would be diverted to a central channel and redirected to the Harper Lake. Storm water from a 100-year, 24-hour storm event captured on the project site would be routed to the solar fields where it would be retained until all the storm water evaporated or infiltrated into the soil (AS2009a). No storm water from storm events up to 100-year storm events would leave the AMS project site. The on-site management of the storm water would reduce potential impacts from storm water related flooding to a level that is less than significant. The redirecting of the storm water overland flow would not impact adjacent land uses and may provide a positive benefit to the Harper Lake playa marsh area during larger storm events by providing storm water to this area.

The AMS project site is too far inland to be affected by tsunami or seiche, and the proposed solar fields and power blocks are not located within the 100-year floodplain as defined by Federal Emergency Management Agency (FEMA). The electrical transmission line interconnection and natural gas supply line are immediately adjacent to the proposed project (AS2009a). To prevent potential impacts, staff recommends Conditions of Certification **SOIL&WATER-1** and **-2** that would require BMPs, as discussed above, to ensure that the service utilities line would not be affected by or exacerbate flooding.

Water Supply

The applicant has proposed to pump groundwater from on-site wells for all potable water and plant operation needs. Staff has analyzed the project's proposed groundwater use to determine if it would cause substantial depletion or degradation of local or regional groundwater quality and supply. A summary of the AMS project water requirements is presented below in **Soil & Water Table 3**.

Soil & Water Table 3
Proposed Annual Project Water Source and Use

	Water Demand[1]	Water Supply Source	Estimated Average Volume of Water Required	Estimated Maximum Volume of Water Required
Construction	Soil Compaction and Dust Suppression	Proposed On-site Groundwater Wells and One Existing On-site Well	1,716,000 gpd (1,025 AF/y)	1,716,000 gpd (1,025 AF/y)
	Ongoing Construction Needs		59,800 gpd (68 AF/y)	61,750 gpd (70 AF/y)
	Drinking Water[2]		1,660 gpd (1.9 AF/y)	2,324 gpd (2.6 AF/y)
	Total Construction Water Demand		**1,095 AF/y**	**1,098 AF/y**
Operation	Cooling Water Makeup, Mirror Wash Water; and Maintenance[3]	Proposed On-site Groundwater Wells	2,140 AF/y	2,140 AF/y
	Landscaping[4]		Included in the Total Water Requirement	
	Fire Protection (used as necessary)		363,200 gallons	363,200 gallons
	Drinking and Sanitation		20 AF/y	20 AF/y
	Total Operational Water Demand		**2,160 AF/y**	**2,160 AF/y**

Source: AS2009a; AS2009b.
Notes: 1. Construction water use is based on a 26-month construction schedule. Operations water use assumes the AMS project would operate at 100% of the plant's total capacity over the life of the project. 2. Estimated at 2 gallons per day per person. 3. The AFC states that the cooling water makeup, mirror wash water, and maintenance water would be 2,163 AF/y. Groundwater impact modeling conducted by the applicant used a volume of 2,160 AF/y. To be consistent with the applicant's modeling, staff's analysis uses a volume of 2,160 AF/y. 4. Water that would be used for landscaping was not identified by the applicant and therefore is assumed to be included in the total operational water demand.

Potable water for the construction workforce would be supplied by on-site wells. A single treatment facility would be installed for each pair of wells, one in each solar field (AS2009a). The depth to groundwater at the project site is estimated to be between 125 to 145 feet bgs (AS2009a). Groundwater would not be encountered during grading activity. Staff recommends Condition of Certification **SOIL&WATER-4** to ensure that on-site groundwater wells would be constructed in accordance with state and local LORS (AS2009a).

During construction months 1 through 6, groundwater would be used at the rate of 1,025 AF/y (1,766,050 gpd) (AS2009a; AS2009b). During months 7 through 26 of construction, groundwater would be used at a rate of between 68 AF/y (58,800 gpd) and 70 AF/y (61,750 gpd) (AS2009a; AS2009b). Maximum groundwater use during project operation would be 2,160 AF/y.

All of the AMS project water would come from the HVGB located in the Centro subarea of the Mojave Basin adjudication. The adjudication is a groundwater management system, but this system does not provide absolute protection against overdraft. Groundwater quality is not a primary component of the adjudication. The adjudication focuses on groundwater volumes (water rights) with a goal to balance groundwater supply and consumption. To manage the volume of water pumped within the adjudication boundary, the adjudication has established water allowances for each subarea and each groundwater pumper in the five subareas. In the Harper Lake area, where the AMS project would be sited, the prescribed groundwater allowances are presented below in **Soil & Water Table 4**.

Soil & Water Table 4
Water Allowance and Use in the Harper Lake Area

Harper Lake Area Water Allowance		
Water Allocation	**Water Volume (AF/y)**	**Description**
Base Annual Production (BAP)	12,542	This volume is the verified maximum annual volume of production by each producer in a subbasin during the 5-year period from 1986 to 1990.
Free Production Allowance (FPA)	10,036	The amount of BAP that may be produced from a subarea free of any replacement obligation (a fee charged by the Watermaster for a volume of water used in excess of the FPA). In the Centro subbasin, the FPA is 80% of the BAP and represents an initial 20% ramp down volume.
Production Safe Yield (PSY)	4,144	PSY is defined by the highest average annual volume of water that can be produced from a subarea without causing a long-term decline in water levels. The numerical PSY volume is defined by groundwater modeling and ongoing groundwater level measurements. The goal of the adjudication is to balance long-term supply and demand and make up any deficit by the purchase and recharge of supplemental water so that the FPA is within 5% of the PSY.
AMS Project Water Allowance and Water Use		
Water Allocation	**Water Volume (AF/y)**	**Description**
Base Annual Production (BAP)	10,478	Equals the AMS project's land purchase, transfer, and option purchase BAP volume.
Free Production Allowance (FPA)	5,239	Represents a consumptive use adjustment for changing the groundwater use from agricultural to that used by the AMS project. One-half (50%) of the agricultural water is assumed to have returned to the groundwater as return flow. 5,239 AF/y = 10,478 AF/y / 2.
Adjudication Ramp Down (actual FPA)	4,192	Equals the adjudication ramp down volume, which is about 20% of the proposed AMS project's FPA.
Volume the AMS project Proposes to Use	2,160	The maximum volume of groundwater Abengoa proposes to use.
Existing Cumulative Harper Lake Area Production		
Water Use	**Water Volume (AF/y)**	**Description**
2007-08 Verified Production	1,731	The verified production in the Harper Lake area during 2007 to 2008. Includes pumping by the SEGS 8 & 9 power plants.
AMS Project Proposed Production	2,160	The maximum proposed groundwater pumping by the AMS project.
Total Harper Lake Area Production	3,891	The total groundwater pumping in the Harper Lake area, when the AMS project proposed maximum pumping is included.
Remaining Balance for PSY	253	The volume of Harper Lake area Production Safe Yield (PSY) in excess of the Total Harper Lake Area Production (4,144 AF/y minus Total Harper Lake Area Production of 3,894 AF/y).

Source: MBAA1996; MBAW2009a; MBAW2010; AS2009a.

Base Annual Production (BAP) is the verified maximum production by each user between the years 1986 to 1990 (MBAA1996). Each producer has a BAP right to the Free Production Allowance (FPA) within each subarea (MBAA1996). The FPA is the total amount of water that may be produced from a subarea in a year without the obligation to pay for replacement of water that exceeds the FPA (MBAA1996). Each subarea's production safe yield is defined as the highest average annual volume of water that can be produced from a subarea under one of three scenarios: "1) over a sequence of years that are representative of long-term average annual natural water supply to the subbasin net of long-term average annual natural outflow from the subarea; (2) under given parameters of production, applied water, return flows, and consumptive use; and (3) without resulting in a long-term net reduction of groundwater in storage in the subarea" (MBAA1996). Current (2007-2008) groundwater pumping in the Harper Lake area is approximately 6% less than the PSY.

Based on actual water level data, the PSY level may be incrementally increased or decreased year to year. The adjudication management goal is to bring the FPA to within 5% of the PSY. The adjudication prohibits the transfer of FPA into the Harper Lake area to support a project and out of the Harper Lake area to support a project (MBAW2009a). Production in excess of the FPA is subject to a replacement obligation, which is a fee designed to fund the purchase of replacement water in the amount in excess of the FPA.

If groundwater levels are stable, the ramp down requirement to bring the FPA to within 5% of PSY may not be needed. However, the maximum volume of water the AMS project would use (2,160 AF/y) would be less than the initial adjudicated ramp down value (4,192 AF/y). Even if the ramp down value was to increase to 50% of the FPA (approximately 2,620 AF/y), the proposed project would have enough allocated groundwater to continue to operate.

Potential Project Impacts to Groundwater Levels and the Basin Balance

While the AMS project's water requirements are within their ramp down FPA, staff also considered the potential impact of the project's proposed groundwater use on groundwater levels and the basin balance in the HVGB. The applicant and staff used a computer model of the Mojave Basin developed by the USGS for the Mojave Basin Area adjudication (USGS2001). Staff's modeling analysis is used herein and a discussion of the model and model results is presented as Appendix B.

The model results indicate that groundwater levels in the vicinity of the proposed AMS project are recovering from past impacts and the recovery effect decreases with distance from the AMS project site. It is noteworthy that observed water levels in the vicinity of the AMS project site have increased, whereas in other areas in Harper Valley observed groundwater levels seem to have stabilized or continue to decline. The local groundwater recovery was primarily the result of the termination of agricultural activity on and in the vicinity of the AMS project site.

Based on the USGS model, staff used local aquifer conditions and the expected well construction configuration to evaluate the potential project-related pumping and recharge impacts to a representative sample of wells in the Harper Lake model zone. All use of wells within a groundwater basin contributes toward a lowering of water levels at other well locations. The overlap of drawdown among two or more wells is called “well interference,” and is considered significant when it changes conditions in and around an existing well to the point that it affects well yield. Reductions in well yield can occur as the static or pumping water level drops below the top of the well screen or the water production capacity decreases as a result of incrusting deposits clogging the well screen openings and water-bearing formation around the well screen. A loss of yield is appreciable if the well becomes incapable of meeting 1) maximum daily demand, 2) dry-season demand, or 3) annual demand.

Potential Project Impacts to Groundwater Levels

Soil & Water Table 5 below summarizes available well completion data for the Harper Lake model zone and recent (2008) observed depths to water. These data show on average wells are 365 feet deep and the top of the well screens located 198 feet below land surface. Hence, pumping wells extract groundwater primarily from the deeper alluvium represented by layer 2 of the groundwater-flow model. In 2008, the average depth to water was 124 feet below land surface, indicating that on average the well screens are submerged 55 feet below the water table.

Soil & Water Table 5
Summary of Well Construction and Observed Water Level Data Available for the Harper Lake Area

Well ID	Well Depth (ft bgs)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Well Type	Static Water Level (ft bgs)	Year Measured
DWR Record 1	350	210	350	Domestic	184	2003
DWR Record 2	410	180	410	Irrigation	130	1972
DWR Record 3	545	205	545	Irrigation	190	1979
DWR Record 4	350	210	350	Domestic	---	1976
DWR Record 5	545	205	545	Irrigation	190	1979
DWR Record 6	367	155	367	Irrigation	---	1967
DWR Record 7	285	123	285	Irrigation	130	1972
DWR Record 8	415	250	415	Irrigation	250	1977
DWR Record 9	460	220	460	Irrigation	218	1974
DWR Record 10	400	180	400	Domestic	---	1974
DWR Record 11	460	160	460	Irrigation	---	1969
DWR Record 12	350	150	350	Community	192	1983
DWR Record 13	350	180	350	Domestic	340 (?)	1987
DWR Record 14	350	170	350	Domestic	209	1980
DWR Record 15	460	160	460	Irrigation	---	1969
DWR Record 16	225	160	225	Domestic	174	1979
DWR Record 17	300	189	300	Irrigation	163	1970
DWR Record 18	360	160	360	Domestic	---	1982
DWR Record 19	300	---	---	Domestic	---	1982
DWR Record 20	360	200	360	Domestic	---	1982
DWR Record 21	350	250	350	Domestic	---	1982
DWR Record 22	400	150	400	Domestic	---	1982
DWR Record 23	445	220	445	Irrigation	220	1968
DWR Record 24	425	160	425	Irrigation	---	1968
DWR Record 25	457	170	457	Irrigation	173	1969
USGS Record 1	---	---	---	---	79	2008
USGS Record 2	363	---	---	---	230	2008
USGS Record 3	126	---	---	---	206	2008
USGS Record 4	134	---	---	---	84	2008
USGS Record 5	200	---	---	---	62	2008
USGS Record 6	223	---	---	---	75	2008
USGS Record 7	---	---	---	---	16	2008
USGS Record 8	361	---	---	---	145	2008
USGS Record 9	500	---	---	---	201	2008
Ryken Well	425	58	425	Irrigation	143	2008
Average (2008)	**365**	**179**	**394**	---	**124**	---

Source: DWR2010; USGS2010.
Notes: Static water level averages are for 2008 only. A dashed line indicates data is not available. A question mark indicates an uncertain data value.

The maximum theoretical well yield can be defined as the pumping rate supplied by a well without lowering the water level in the well below the pump intake (F&C1979). Typically, pump intakes are located near the top of the screened interval because it is desirable to keep the screen submerged under water; submerging the well screen can minimize chemical clogging and physical deterioration of the well screen (Driscoll1995). In addition, submersible motors require a sufficient flow of water over the motor to maintain the manufacturer specified cooling requirements (CGA1999). These pumps are also optimized for specific water pressure at the pump intake to maintain pump performance (CGA1999). To ensure that well pumps in the Harper Lake area are adequately protected, staff recommends 25 feet of head should be maintained in the wells in the Harper Lake area. Considering the average well screen is submerged 55 feet below the water table, the maximum acceptable drawdown that can occur before impacting pump performance and theoretical well yield is on average 30 feet (55 feet of water column less the 25 feet of head recommended for pump performance and cooling purposes).

Modeling of the construction water use indicates that drawdown at 29 well locations range from -2 to 18 feet[5] (Appendix B). During plant operation, modeling indicates that drawdown in these wells would range from -2 to 19 feet over the life of the project (project operations assumed to end in the year 2042). The modeling results indicate the expected water level decline at the reported well locations is less than the 30 feet threshold and therefore considered not significant. However, natural heterogeneity contributes to uncertainty in the hydrogeologic analysis, and actual drawdown at a specific site can be different from that predicted by the model. For example, the numerical groundwater model is a spatial and temporal simplification of the real world system, and actual conditions at a specific well can be different from the basin-wide averages represented in the model. Similarly, the 30 feet significance threshold is based on the data that was available and represents average construction and water level conditions for a subset of existing wells located in the basin.

Site specific conditions for wells near the site may be significantly different from those represented by average construction and water level conditions. Furthermore, present-day (pre-project) conditions at some wells conceivably may already fail the threshold criteria in their existing state. For example, as presented in **Soil and Water Table 5**, at the time well construction or the most recently reported water level measurement, the well screens were already exposed in at least five wells. Such a condition would be considered a significant impact if it were caused by project pumping. It is possible these conditions still existed in 2008 in these and other unidentified wells that exist near the project. Staff notes there is concern by private well owners located adjacent to the project site about potential interference (drawdown) with in their due to project pumping will impact the reliability of their private water supply. Hence, staff's analysis concluded though water level impacts are not expected to be significant (i.e., exceed the threshold), staff believes monitoring and oversight is required to confirm the conclusions of the impact analysis.

[5] Simulated water levels at some locations are recovering even with project construction pumping, and negative drawdown indicates simulated water levels in 2012 are greater than 2008.

On the basis of these factors, staff believes the applicant should document pre-project conditions (i.e., identify conditions of existing wells near the site), monitor groundwater levels to track actual changes in groundwater conditions, and mitigate significant impacts, if any, that are identified. Staff therefore recommends requiring Condition of Certification **SOIL&WATER-6**, which requires the project owner to: (1) conduct a field reconnaissance and identify all existing wells within a radius defined by the 20-foot drawdown contour interval[6] as predicted by the groundwater model at the end of the project life (see Soil and Water Appendix B Figure 3); (2) determine and record the well construction for each well (e.g., well screen interval, pump depth, and static water level); and (3) establish a groundwater monitoring network that utilizes existing these wells to monitor and document potential changes in groundwater use, groundwater levels, and groundwater level trends, if any, relative to background and pre-project conditions. Staff identified the boundaries of the monitoring area using the 20-foot impact contour from the groundwater-flow model results (see Soil and Water Appendix B Figure 3). Although the threshold used in the analysis was 30-feet, the 20-foot contour interval was selected for the monitoring area because it corresponds to the area indicated by the model sensitivity tests where water level declines could potentially equal or exceed 30 feet relative to no-project conditions. This would also ensure the 30-foot threshold criteria is not exceeded and that well specific impacts would be mitigated. To ensure that the AMS project's water use is consistent with the volume of groundwater use analyzed by staff, staff also recommends the applicant comply with Condition of Certification **SOIL&WATER-5,** which limits construction water use to 1,098 AF/y and operation water use to 2,160 AF/y.

Potential Project Impacts to the Basin Balance

As explained further in Appendix B and demonstrated in **Soil and Water Appendix B Table 5,** the proposed AMS project pumping would remove approximately 1,860 AF/y of groundwater from storage in the Harper Lake model zone and approximately 400 AF/y from the other portions of the Centro subarea. By 2042, the end of the functional life of the project, groundwater pumping by the project would consume from these two areas 59,500 and 12,800 AF of the simulated stored groundwater in place as of 2008, respectively. Additionally, pumping would consume about 18,200 acre-feet of simulated recharge from adjacent portions of the Centro subarea that otherwise would have increased basin storage in the Harper Lake model zone without the AMS project. As calculated in Appendix B, the following groundwater storage reductions would occur as a result of the AMS project pumping:

- Project pumping would remove about 1% of the estimated total storage volume (approximately 4,945,550 AF) in place within the Harper Lake model zone and less than 0.1% of the estimated total storage volume in place within the remainder of the Centro subarea.

[6] The monitoring area is identified by the simulated 20-foot impact contour from the groundwater-flow model results (see Soil and Water Appendix B Figure 3). Although the impact analysis employed a threshold of 30-feet, 20-feet is utilized to delineate the monitoring area because it generally corresponds to the uncertainty in the area where drawdown of 30-feet or more is simulated by the model sensitivity test results. Monitoring within this slightly larger area therefore provides a factor of safety to ensure all unidentified wells that conceivably could experience a drawdown of 30-feet or more are identified.

- The accessible groundwater, which is represented by water in the saturated zone between the water table and average depth to the bottom of existing wells, is approximately 1,740,500 AF. The AMS project groundwater consumption would represent 3% of this volume of water.
- The Harper Lake model zone has limited connection with the Mojave River, and based on model results the storage decline within the Harper Lake model zone has negligible effect on simulated stream leakage to the Centro subarea from the Mojave River.

Staff believes these results indicate project pumping will not have significant impacts on aquifer storage volumes or other users in the HVGB or Centro Subarea with the implementation of Conditions of Certification **SOIL&WATER-6** and **-7** and **BIO-16** and **BIO-20. SOIL&WATER-6** and **-7** would require the project to establish a groundwater elevation and quality monitoring and reporting program. **BIO-16** would require the project to initiate a tamarisk eradication, monitoring, and reporting program. Tamarisk can consume groundwater depending on a number of factors such as plant health, plant size, and depth of groundwater below ground surface (BOR1992; USGS2010b). **BIO-20** would require the project to ensure continued delivery of pumped groundwater to the Harper Lake marsh area.

Staff conducted additional model analysis to estimate an operational yield for the Harper Lake model zone. The operational yield is defined herein as the maximum pumping rate resulting in no long-term cumulative loss in Harper Lake model zone groundwater storage over the life of the project. With the proposed project, the simulated pumpage in the Harper Lake model zone is 7,750 AF/y (5,490 AF/y of existing pumpage plus 2,260 AF/y of maximum pumpage by the project). The 5,490 AF/y of existing pumpage is the 2008 modeled pumping rate, which the applicant reportedly developed from Mojave Water Agency data (ESH 2009f). This volume appears to be almost 1,600 AF/y greater than that reported in the Mojave Water Agency's annual report (almost 3,900 AF/y). The higher pumping rate simulated in the model likely over estimates the projected future groundwater storage decline and model results might therefore be characterized as being conservative.

Based on the applicant's modeled pumpage, the operational yield of the Harper Lake model zone is 6,235 AF/y (about 20% less than existing pumpage plus AMS project pumpage). In other words, simulated Harper Lake model zone pumpage can be as high as 6,235 AF/y and not cause a simulated long-term net decline in Harper Lake model zone storage. A 1,515 AF/y reduction in simulated pumpage, either from mandatory pumping cut-backs or similar amount of water savings from conservation, is therefore required to bring the Harper Lake model zone to a point within 5% of this operational yield when the project consumes a maximum 2,260 AF/y of groundwater for construction and operation.

Under the adjudication, a 1,515 AF/y reduction to the Harper Lake model zone would translate to a 2,096 AF/y reduction to the proposed AMS project's FPA. The AMS project FPA is 5,239 AF/y. The adjudication's initial 20% ramp down value plus an additional 20% ramp down (to bring the Harper Lake model zone to within 5% of operation yield) reduces the AMS project's FPA to 3,143 AF/y. This FPA volume is still almost 30-percent greater than the project's proposed maximum groundwater use.

Potential Impacts to Biological Resources

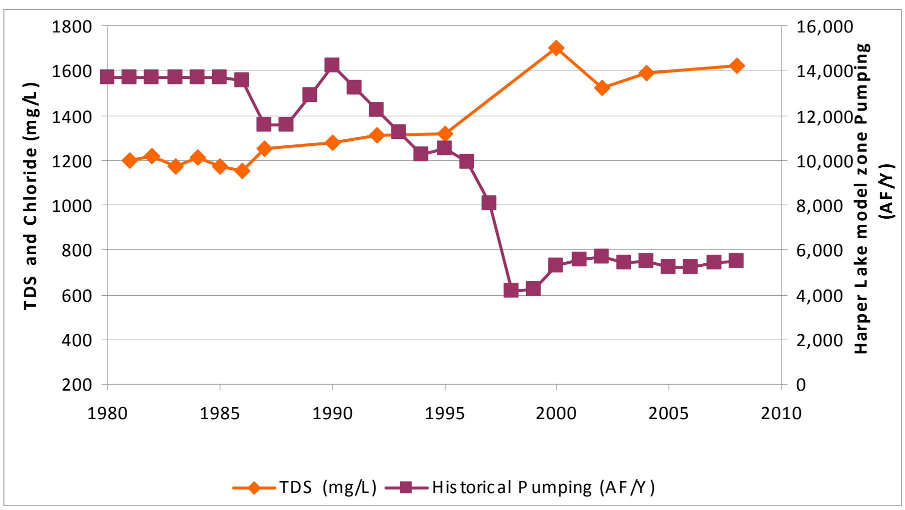
As discussed in this section and in the **BIOLOGICAL RESOURCES** section, staff determined that there would be no significant impacts to biological resources due to the projects proposed groundwater pumping with the implementation of Conditions of Certification **SOIL&WATER-6** and **BIO-20**. In addition, there are no known seeps or springs in the Harper Lake area.

Water Quality

Groundwater quality data is available from the Ryken well, located approximately in the middle between the Alpha and Beta plants of the proposed AMS project. The Ryken well is 14 inches in diameter with a screened depth of approximately 58 to 425 feet below ground surface, and used by the applicant for aquifer testing reported in the AFC (AS2009a). The Ryken well provides the most complete groundwater quality dataset available of all wells located near the proposed AMS project wells, and therefore is the focus of staff's analysis. While the Ryken well provides an indication of the groundwater quality at the AMS project location, groundwater quality beneath the site and adjacent areas varies naturally both laterally and with depth as well as over time. The proposed project wells planned for construction at the Alpha plant would be located 0.98 miles to the northwest of the Ryken well, and the proposed wells planned for construction at the Beta plant would be located 0.66 miles to the southeast of the Ryken well.

Soil & Water Graph 1 shows the relationship between historical Harper Lake Valley Basin pumping (as represented in the Harper Lake model zone of the groundwater-flow model) and TDS concentrations in Ryken well-water samples. In general, annual pumping in the Harper Lake model zone began to decrease after 1985 and corresponded to an upward trend in TDS concentrations measured in Ryken well-water samples.

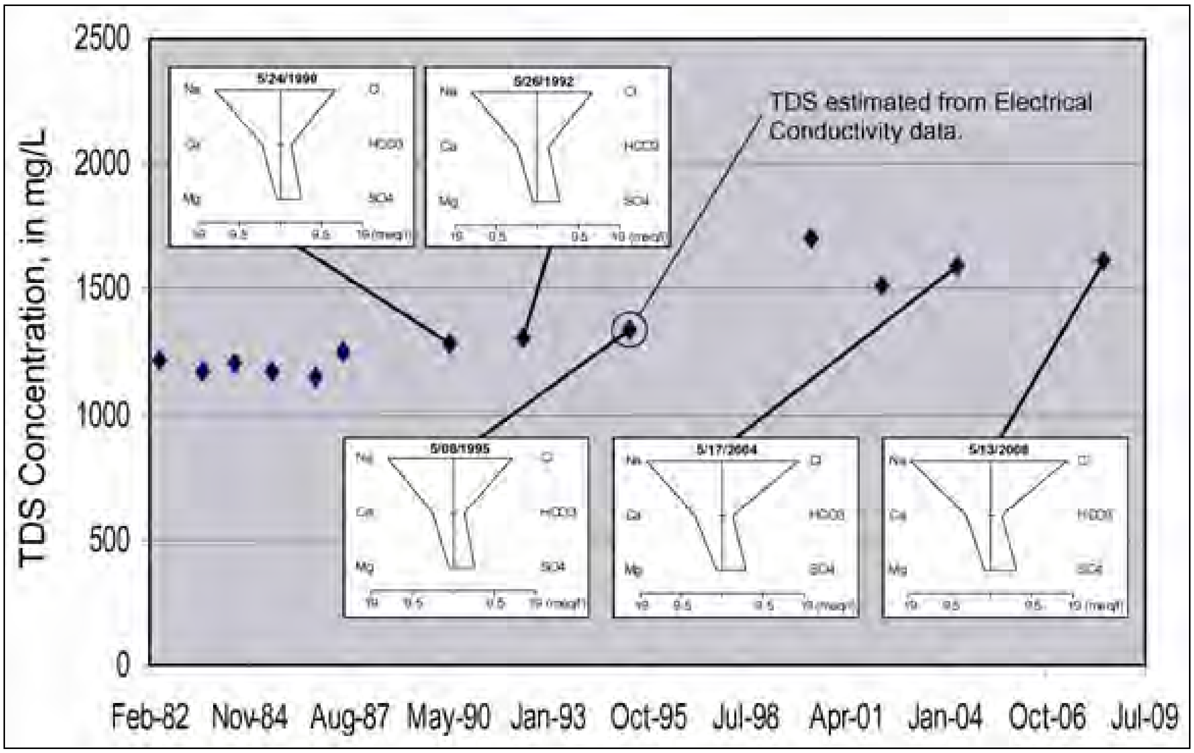
Soil & Water Graph 1
Historical TDS Concentrations in Ryken Well Water Samples
And Annual Harper Lake Model Zone Pumping Rate



Source: USGS2010a; AS2009a.

Analysis of the cations and anions in the well-water samples provide an indication of the character and quality of the groundwater. **Soil & Water Graph 2** below shows that TDS concentrations and the proportional contribution of sodium and chloride to the TDS concentrations increase following the decline in annual pumping rate. As TDS concentrations and the concentrations of sodium and chloride ions increase, the desirability of groundwater as a drinking water source decreases.

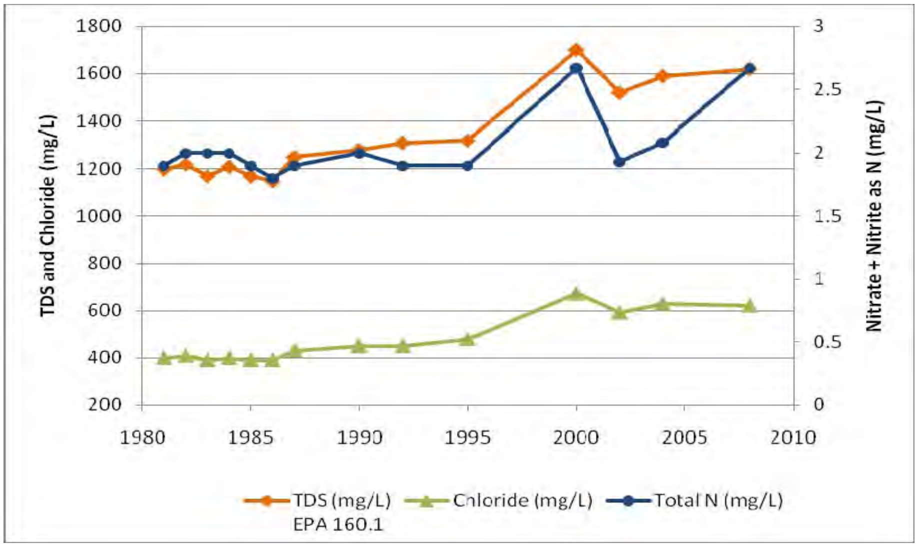
Soil & Water Graph 2
Summary of Historical Cation and Anion Concentrations
In Groundwater from the Ryken Well



Source: USGS2010a.

Analysis of TDS, chloride, and total nitrogen concentrations in the groundwater from the Ryken well provides an additional indication of groundwater quality changes over time. Summarized below in **SOIL & WATER Graph 3** are the results of 14 well-water samples from the Ryken well collected between 1981 to 2008 (USGS2010a). The analytical results indicate that when the Ryken well property was in use for agriculture during 1980s, the TDS, chloride, and total nitrogen concentrations appear relatively stable. However, it appears that after groundwater pumping declined starting in the late 1980s the TDS, chloride, and total nitrogen concentrations began to increase.

Soil & Water Graph 3
Total Dissolved Solids, Chloride, and Total Nitrogen Concentrations in the Ryken Well



Source: USGS2010a.

The inverse relationship between groundwater pumping and quality of the well-water produced suggests that the relatively high use of groundwater for agriculture extracted greater proportions of groundwater that are relatively low in TDS, chloride ion, and total nitrogen concentrations. The top of the Ryken well screen is located at the shallow depth of only 58 feet below land surface, and the filter pack and well screen likely intersect the shallow, lower quality perched groundwater zone. During times of higher pumping rates, greater proportions of the deeper, better quality aquifer water may have been extracted, effectively diluting the contribution from the shallow, relatively lower quality perched groundwater. When the pumping rate decreased, a proportionally greater contribution of the relatively low quality perched groundwater caused TDS, chloride, and total nitrogen concentrations to increase. High TDS and chloride concentrations in groundwater are consistent with partially evaporated water such as one would expect near the playa lakebed. High nitrogen concentrations are also consistent with water associated with agricultural irrigation returns. Without additional data and analyses, it is not possible to determine the relative contributions from these different water sources, but it seems likely that a similar inverse relationship between pumping rate and water quality could be expected from the AMS project's proposed wells if constructed such that their filter pack and well screens intercept the perched water zone.

Staff notes water quality data is limited for this site. Based on staff's analysis of the limited data, it appears the AMS project's use of groundwater would not significantly impact the quality of groundwater in the HVGB, but conceivably may contribute to lateral movement of poorer quality groundwater from beneath the Harper (dry) Lake towards the BLM marsh water supply well. The marsh water supply well is located between the proposed AMS project wells and Harper (dry) Lake. The AFC reports that TDS concentrations generally increase towards Harper (dry) Lake, suggesting that poor quality groundwater may exist in the main aquifer beneath the lakebed. However, staff is not aware of any data to support or refute this assumption. Modeling results prepared by the project applicant show that the project's groundwater pumping would induce the lateral movement of groundwater from beneath the Harper (dry) Lake towards the project's water supply wells, however, the time of travel is likely on the order of 50 to 100 years.

Analyses of groundwater movement and quality provide differing results. Modeling results prepared by the project applicant show that the project's groundwater pumping would likely, over time, induce the lateral movement of poorer quality groundwater from the Harper Lake area towards the project's water supply wells. In contrast, historical data, while limited, demonstrates that groundwater has been pumped from site wells for decades. When the agricultural demand for water was at its peak, this demand was about five times greater than the proposed groundwater use for the AMS project. However, even with the historical pumping, it does not appear that groundwater produced by the Ryken well decreased in quality as a result of groundwater movement from beneath Harper (dry) Lake. It is possible that travel times from beneath the lakebed to adjacent wells are so long an impact has not yet been detected. Alternatively, groundwater in the main aquifer beneath the playa may not be sufficiently degraded to impact adjacent wells. Wells upgradient of the proposed project would not be adversely affected by this potential lateral movement of poorer quality groundwater.

Staff concludes there is no evidence to confirm that a water quality impact to the existing BLM marsh water supply well would occur from proposed AMS project pumping. To ensure no impacts to groundwater quality in the existing BLM marsh water supply well occur, Condition of Certification **SOIL&WATER-7** requires that the project establish a baseline of water quality in the BLM well and collect water samples semi-annually and report the results semi-annually to the Energy Commission and BLM. If for three consecutive years it is determined that the marsh water-supply well has been impacted by project pumping (the composition of the water produced exceeds pre-project constituent concentrations in TDS, sodium, or selenium concentrations) and BLM determines that such water quality would adversely affect the marsh, Condition of Certification **SOIL&WATER-7** would require the project to provide treatment or a new water supply to either meet or exceed pre-project water quality conditions.

Staff is concerned that the current BLM well may be constructed such that its filter pack and screen intercepts both poor quality shallow perched water and the better quality upper aquifer groundwater (uQal). A well constructed in this manner allows poor quality perched water to mix with the better quality aquifer water and degrade the quality of water in the well. Staff recommends that any well used to supply water to the marsh be constructed or retrofitted to prevent low quality perched water from entering the well and upper aquifer. Staff believes the existing Ryken well should either be abandoned or modified to prevent flow from the perched aquifer to mitigate this impact. In addition, if the perched aquifer is present in the areas where the new project wells are proposed, the well should be constructed to prevent flows from the perched zone and mitigate potential impacts. Staff recommends the applicant be required to comply with Condition of Certification **SOIL&WATER-4** to ensure the Ryken well is abandoned properly and new wells are constructed so that water quality impacts are mitigated to a level that is less than significant.

Wastewater Management

Improper handling or containment of construction wastewater could cause a broad dispersion of contaminants to soil or groundwater. Discharge of any non-hazardous construction-generated wastewater would require compliance with discharge regulations. Sources of construction wastewater would include equipment wash water and hydrostatic test water. Equipment wash water would be transported to an appropriate treatment facility. Hydrostatic test water would be discharged to land or trucked off-site to an appropriate treatment and disposal facility. Discharge of the hydrostatic test water to land would be done in accordance with the SWRCB Water Quality Order No. 2003-003-DWQ as a discharge to land with a low threat to groundwater. Sanitary wastewater generated during construction would be containerized in portable facilities with the waste removed by a licensed waste hauler. With the use of BMPs and compliance with LORS, staff concludes that there would be no significant impact from construction-generated wastewater. To ensure that the construction wastewater is managed appropriately, staff proposes Condition of Certification **SOIL&WATER-8** to ensure that all construction wastewater is managed in accordance with appropriate BMPs and applicable LORS.

During plant operations, process wastewater would be generated from the reverse osmosis/demineralizer system, chemical feed area, and general plant drains. The reverse osmosis/demineralizer system water would be discharged to evaporation ponds. Wastewater from the chemical feed area and general plant drains would be processed through an oil/water separator with the water discharged to the evaporation ponds. Sizing of the evaporation ponds appears to be sufficient to accommodate the discharge to the ponds. The oil and sludge from the oil/water separator would be removed off-site to a recycling facility or landfill.

HTF affected soil would be temporarily stored and treated in bioremediation/land farm units on approximately 1.5-acre units near each power block (AS2009a). The HTF affected soil would be stored until chemical analysis are conducted to determine if the affected soil should be managed as hazardous or non-hazardous waste in accordance with Condition of Certification **WASTE-7**.

The applicant prepared a Report of Waste Discharge for the four evaporation ponds and the two land treatment units, which was submitted to both the Commission and Lahontan Regional Water Quality Control Board. The initial submittal was incomplete and lacked a specific monitoring and reporting plan and appropriate closure plans for the waste management units. On April 16, 2010, the applicant submitted additional Report of Waste Discharge components, including a proposed leak detection and monitoring plan, a land treatment unit closure plan, and an evaporation pond closure plan. Staff considered these documents adequate for a complete Report of Waste Discharge. Staff prepared waste discharge requirements, which are contained in Appendices C, D, and E. **SOIL&WATER-2** would require that the applicant comply with the requirements contained in Appendices C, D, and E. Staff concludes that impacts to soil and water resources would be less than significant if the requirements of Condition of Certification **SOIL&WATER-2** are met. **SOIL&WATER-2** would ensure that the land treatment units and surface impoundments are managed in accordance with appropriate BMPs and applicable LORS.

Sanitary wastes generated during operation of the AMS project would be generated by sinks, toilets, and other sanitary facilities. Because there are no sanitary sewer connections, the sanitary wastewater would be processed through a septic system and discharged to a leach field. Solids would be periodically removed by a professional service. The maximum average daily wastewater flow from each power block to its corresponding leach field is expected to be 1,250 gallons (CH2ML2009e). Staff recommends Condition of Certification **SOIL&WATER-9** to ensure that the sanitary waste is managed in accordance with appropriate BMPs and County of San Bernardino Code Title 3, Division 3, Chapter 8, Waste Management, Article 5, Liquid Waste Disposal and Title 6, Division 3, Chapter 3, and the Uniform Plumbing Code.

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, Title 14, section 15130). A summary of the estimated water use of reasonably foreseeable projects in the Harper Valley and their potential water use is presented below in **Soil & Water Table 7**.

Soil & Water Table 7
Large-Scale Projects, Developed, Under Development, or
Reasonably Foreseeable Projects in the Harper Valley Basin

Potential New Groundwater Users	Estimated Water Use	
	During Construction	During Operation
Hawes Composting Facility. A 160-acre biosolids and green material composting facility proposed to produce agricultural grade compost.	Negligible	1.1 AF/y (Groundwater Wells or Trucked-In Water)
State Route 58 Upgrade and Realignment. Proposed upgrade and realign of 10-miles of two-lane highway to a 4-lane divided freeway Hidden River Road to Lenwood Road, in San Bernardino County.	Negligible	None
First Solar, Solar Photovoltaic Project (BLM: CACA 48941). A 5,033-acre, 585 MW solar photovoltaic project proposed on BLM land.	Unknown	Estimated at 58 AF/y (Groundwater Wells)
Horizon Wind Energy, Wind Project (BLM: CACA 46805). A 10,073-acre wind project proposed on BLM land.	Unknown	None

Sources: BLM2010; Caltrans2010; SBCo2010.
Note: Construction of these projects would likely temporarily use water resources over a limited duration of time. Future construction in the Harper Lake area could be limited by the existing Desert Wildlife Management Area, Mojave Ground Squirrel Conservation Area, and Desert Tortoise Critical Habitat.

Cumulative Impacts to Soil and Storm Water

Construction and operation of the AMS project would result in both temporary and permanent changes to the soil and storm water drainage patterns at the AMS project site. Without the use of BMPs that would be incorporated into a final DESCP and construction SWPPP, these changes could incrementally increase local soil erosion and storm water runoff. However, as discussed above, these potential impacts would be prevented or reduced to a level of less than significant through the implementation of BMPs, a final DESCP, and construction SWPPP, and compliance with all applicable erosion and storm water management LORS. As identified in **Soil & Water Table 7**, four projects are proposed for construction within Harper Valley. Existing development consists of SEGS 8 and 9, some agriculture business, and some residences. This development has the potential to increase local soil erosion and storm water runoff. However, this development is also required to comply with all applicable erosion and storm water management LORS. Compliance with these LORS would ensure cumulative impacts would be prevented or reduced to a level of less than significant. With the implementation of **SOIL&WATER-1** and **-2**, staff believes the AMS project would not significantly contribute to the cumulative soil erosion and storm water impacts from other development within the vicinity of the proposed AMS project.

Cumulative Impacts to Wells

The AMS project would not cause a cumulatively considerable impact to water levels in other wells in the Harper Lake model zone. The reasonably foreseeable groundwater use by other proposed projects in the Harper Lake model zone may increase by 60 AF/y (**Soil & Water Table 7)**. This additional groundwater use would increase cumulative future groundwater use from 2,160 AF/y to 2,220 AF/y and is not expected to result in a cumulative lowering of groundwater levels that would exceed the 30-foot threshold for protection of wells in the Harper Lake area. For example, both staff and the applicant assessed model sensitivity to uncertainty in pumping rates by assuming a 10% increase in Harper Lake model zone pumpage. The 10% pumping increase corresponded to an actual increase of about 550 acre-feet per year in background pumping, which is over nine times greater than the estimated 60 acre-feet per year foreseeable increase in background groundwater use. Even with the 10% pumping rate increase, the model results indicate well interferences from project pumping are less than the 30-feet threshold. To provide a baseline of groundwater elevation and document groundwater elevation changes, staff recommends Conditions of Certification **SOIL&WATER-6** and **-7** which would require the project to establish a groundwater monitoring network and to semi-annually monitor and document groundwater use, groundwater levels, and groundwater level trends.

Cumulative Impacts to the Basin Balance

During construction of the AMS project, the groundwater demand would be as high as 1,098 AF/y. Construction of the AMS project is estimated to take 26 months to complete. During operation, the project would use groundwater for potable and plant processes at a maximum rate of approximately 2,160 AF/y. This volume of groundwater use, combined with the additional projects identified in **Soil & Water Table 7** above, could increase total groundwater use in the Harper Lake area by up to 60 AF/y to a total of 2,220 AF/y. Both staff and the applicant assessed the groundwater model sensitivity to uncertainty in pumping rates by assuming a 10% increase in Harper Lake model zone pumpage. The 10% increase corresponded to an actual increase of about 550 acre-feet per year in background pumping; this pumping increase would remove almost 490 acre-feet per year of additional water from storage in the Harper Lake model zone, and about 60 acre-feet per year of storage from the rest of the Centro subarea. The simulated pumping increase is over nine times greater than the foreseeable increase in groundwater use. Assuming the storage change reduction is proportional to the pumping, the estimated 60 acre-feet per year increase in pumping may remove an additional 54 and 6.7 AF/y of groundwater from storage in these two areas, respectively (one-ninth of 490 and 60 acre-feet per year, respectively). Staff believes these amounts are minor and impacts to the basin balance from the foreseeable pumping would be less than significant.

COMPLIANCE WITH FEDERAL, STATE, AND LOCAL LORS

TITLE 22, ARTICLE 3, SECTIONS 64400.80 THROUGH 64445

This section requires monitoring for potable water wells, defined as non-transient, non-community water systems (serving 25 people or more for more than six months); the proposed project would employ approximately 63 fulltime and 10 seasonal employees during operations. Regulated wells must be sampled for bacteriological quality once a month and the results submitted to the California Department of Public Health (CDPH) for review and comment. The wells must also be monitored for inorganic chemicals once and organic chemicals quarterly during the year designated with the year designation based on historical monitoring frequency and laboratory capacity. Condition of Certification **SOIL&WATER-10** would ensure the applicant complies with this requirement.

WATER USE LORS AND STATE POLICY AND GUIDANCE

The Energy Commission has at least five sources for statements of policy relating to water use in California applicable to power plants. They are the California Constitution, the Warren-Alquist Act, the Commission’s restatement of the State’s water policy in the 2003 Integrated Energy Policy Report (“IEPR”), the State Water Resources Control Board (“SWRCB” or “Board”) resolutions (in particular Resolutions 75-58 and 88-63), and the Genesis Solar Project Committee’s water-issues order as guidance for interpreting all of the above.

California Constitution

Article X, section 2 prohibits the waste or unreasonable use, including unreasonable method of use, of water, and it requires all water users to conserve and reuse available water supplies to the maximum extent possible (Cal. Const., art. X, § 2). Groundwater is subject to reasonable use (*Katz v. Walkinshaw* (1903) 141 Cal. 116).

Warren-Alquist Act

Section 25008 of the Energy Commission’s enabling statutes echoes the Constitutional concern, by promoting “all feasible means” of water conservation and “all feasible uses” of alternative water supply sources (Pub. Resources Code § 25008).

Integrated Energy Policy Report

In the 2003 Integrated Energy Policy Report (IEPR or Report), the Energy Commission reiterated certain principles from SWRCB’s Resolution 75-58, discussed below, and clarified how they would be used to discourage use of fresh water for cooling power plants under the Commission's jurisdiction. The Report states that the Commission will approve the use of fresh water for cooling purposes only where alternative water supply sources or alternative cooling technologies are shown to be ''environmentally undesirable" or "economically unsound" (IEPR (2003), p. 41). In the Report, the Commission interpreted "environmentally undesirable" as equivalent to a "significant adverse environmental impact" under CEQA, and "economically unsound" as meaning "economically or otherwise infeasible," also under CEQA (IEPR, p. 41). CEQA and the Commission's siting regulations define feasible as "capable of being accomplished in a successful manner within a reasonable amount of time," taking into account economic and other factors (Cal. Code Regs., tit. 14, § 15364; tit. 20, § 1702, subd. (f)). At the time of publication in 2003, dry cooling was already feasible for three projects—two in operation and one just permitted (IEPR, p. 39).

The Report also notes California's exploding population, estimated to reach more than 47 million by 2020, a population that will continue to use "increasing quantities of fresh water at rates that cannot be sustained" (IEPR, p. 39).

State Water Resources Control Board Resolutions

The SWRCB not only considers quantity of water in its resolutions, but also the quality of water. In 1975, the Board adopted the *Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Power Plant Cooling* (Resolution 75-58). In it, the Board encourages the use of wastewater for power plant cooling. It also determined that water with a TDS concentration of 1,000 mg/L or less should be considered fresh water (Resolution 75-58). One express purpose of that Resolution was to "keep the consumptive use of fresh water for power plant cooling to that *minimally essential*" for the welfare of the state (*Ibid*; emphasis added).

In 1988, the Board determined that water with TDS concentrations of 3,000 mg/L or less should be protected for and considered as potential supplies for municipal or domestic use unless otherwise designated by one of the Regional Water Quality Control Boards (Resolution 88-63).

Order from the Genesis Solar Project Committee

The Genesis Solar Project Committee considered all these sources of policy to arrive at a simple yet flexible determination for water use by power plants under Commission jurisdiction. The Order states:

> The Committee reads [the policies] as requiring projects seeking to use groundwater for power plant cooling to use the least amount of the worst available water, considering all applicable technical, legal, economic, and environmental factors (Genesis Solar Energy Project Committee, Decision and Scoping Order, Feb. 2, 2010).

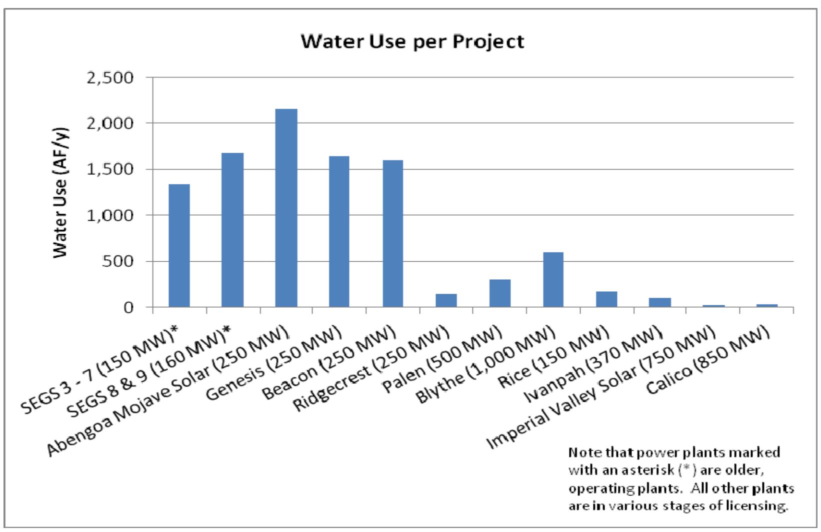
Staff carefully considers all relevant factors when conducting analysis and arriving at recommendations for the Commission. Thus, staff must determine what is the least but nevertheless feasible amount of water available for use, and also the worst, feasible available water that applicant could use for particular purposes on a project.

In several cases, the Commission has accepted conservation programs that conserve water in the region as means of accepting compliance with the water policies. Staff takes this to mean that such conservation programs are an acceptable method to ensure compliance for current projects.

PROPOSED USE OF GROUNDWATER AND WET-COOLING BY THE AMS PROJECT

The AMS project proposes a wet-cooled facility that would use a maximum of 2160 AF/y of groundwater from on-site wells. The Harper Valley Groundwater Basin is the primary natural water supply for the project area. Pumped water would be used for various purposes besides cooling, including domestic use by workers, dust suppression, and mirror washing. Water is the only feasible means of cleaning the mirrors, which must be clean to maintain efficiency of output by parabolic trough solar plants. Cooling tower blowdown would be processed before being used for mirror washing and reused as steam system makeup water. Reject water from the treatment process would be discharged to evaporation ponds. Overall use of the water would be inefficient for this technology, requiring 865 AF/y per 100 MW of capacity, or up to 3.6-acre feet per gigawatt (GW) hour generated. The **Soil & Water Graph 4** presented below shows the water use between the various solar plants currently licensed by the Energy Commission or in the licensing process.

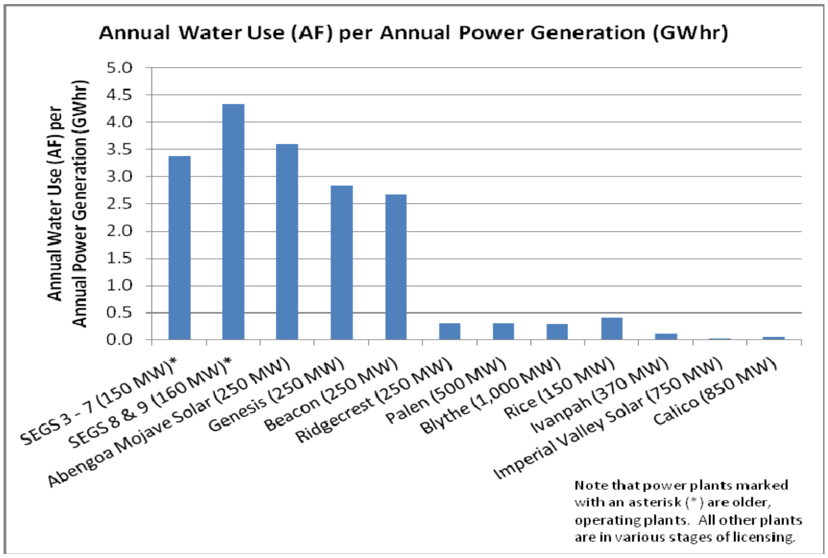
Soil & Water Graph 4
Water Use per Project



Source: CEC2010.

The **Soil & Water Graph 5** below presents the water use per GW hour between various existing and proposed solar and pumped storage plants in the desert region.

Soil & Water Graph 5
Water Use per Project per GWhr



Source: CEC2010

In accordance with the criteria identified in SWRCB Resolution 88-63, the quality of groundwater the AMS project proposes to use is slightly impaired but well below the policy guidance of 3,000 mg/L TDS for evaluating an aquifer as a potential drinking water source. Use of lower quality (e.g., >3,000 TDS) water or reclaimed water appears infeasible.

The Drinking Water Standards found in Title 22 of the California Code of Regulations are the primary and secondary maximum contaminant levels (MCL) which are applied to determine the acceptability of water for delivery to the public by community water systems. Secondary MCLs are based on aesthetics and intended to protect odor, taste, and appearance. The project proposes to use groundwater with a TDS concentration of approximately 1,200 to 1,500 mg/L. These TDS concentrations are above the recommended secondary MCL of 500 mg/L and slightly above the upper secondary MCL of 1,000 mg/L. A water supply with TDS concentrations exceeding the upper secondary MCL could not be provide community water without treatment. Staff notes however, that the Ryken well which is the source of this water quality data, is likely improperly screened across a perched water zone that is high in TDS which may cause increased TDS concentrations in the groundwater (uQal). The TDS concentrations in the groundwater near the Ryken well could be lower than 1,000 mg/L. Therefore, the current anticipated water quality only slightly exceeds the upper secondary MCL and staff believes that with limited treatment or with construction of a properly screened well, groundwater could possibly be used as a municipal supply.

The use of groundwater for wet cooling compounds the environmental concerns because the applicant proposes to use evaporation ponds for disposal of the wastewater generated by the wet cooling process. Potential impacts from the use of evaporation ponds could be mitigated consistent with state and local LORS. However, this method of wastewater disposal is not consistent with the Energy Commission's policy that encourages the use of ZLD systems that eliminate wastewater discharge (protecting biological resources) and inherently conserve water. The commission has previously adopted staff's testimony on water conservation to bring a project's proposed use of groundwater for wet cooling into conformity with LORS.

Staff reviewed recent power plant siting case decisions of the Energy Commission to determine whether additional evaluation of the conformity of the project with the state water policy was appropriate. Based on the Commission's decisions in the Panoche Energy Center (06-AFC-5) and Starwood-Midway Project (06-AFC-10), and staff's FSA for the Sentinel Energy Project (07-AFC-03), staff concludes that the Commission has also considered the intent of the policy in determining a project's conformity with the policy. The Energy Commission's findings in these cases appeared to conclude that a project proposing to use a fresh water source that is of higher quality than the most degraded source reasonably available to the project, can comply with the policy where the project also includes measures that would accomplish conservation of water of a greater quantity and higher quality than the project would use. Water conservation quantities required in the Final Decisions for Panoche Energy Center and Starwood-Midway, and as supported in staff's FSA in Sentinel Energy Project cases relative to the project's maximum annual water use were 109 percent, 100+ percent, and 150 percent, respectively.

Similarly, in this case the applicant has proposed to conform with Energy Commission water policy by implementing a water conservation plan. This plan would annually sequester a volume of groundwater in the Harper Lake area equal to the annual volume of groundwater used by the AMS project. Under this conservation plan, the 1:1 sequestration is estimated to average annually 1,700 AF/y and would be no more than 2,032 AF/y. The groundwater sequestered would come from the applicant's FPA. Sequestration of this water would cause this volume of groundwater to remain in the HVGB where it would not be used for any other purpose.

Over the life of the AMS project, up to 60,960 acre-feet of groundwater could be and therefore remain in the groundwater subbasin. **Soil and Water Table 8** illustrates how the sequestration would affect the AMS project's FPA.

Soil & Water Table 8
Proposed Sequestration and Its Effect on FPA

Annual FPA (80%) =	4,192		FPA Sequestered Annually			Remaining FPA that can be Used by the AMS Project, Sold, or Banked			Value of the Remaining FPA if Sold at $340 per AF
Annual Maximum Pumping	2,160		Under Maximum Pumping	2,032		Under Maximum Pumping + Sequestration	0		$0
Estimated Annual Average Pumping	1,700		Under Average Pumping	1,700		Under Average Pumping + Sequestration	792		$269,280
Annual FPA (60%) =	**3,493**		**FPA Sequestered Annually**			**Remaining FPA that can be Used by the AMS Project, Sold, or Banked**			**Value of the Remaining FPA if Sold at $340 per AF**
Annual Maximum Pumping	2,160		Under Maximum Pumping	1,333		Under Maximum Pumping + Sequestration	0		$0
Estimated Annual Average Pumping	1,700		Under Average Pumping	1,700		Under Average Pumping + Sequestration	93		$31,733

Note: FPA not used or sequestered could be used, banked, or sold by the AMS project.

The upper half of **Soil and Water Table 8** shows the effect on the AMS project's FPA under the current 20% ramp down. The lower half of the table shows the effect on the FPA if an additional 20% ramp down is initiated in the future by the Watermaster. Under both ramp down scenarios, the AMS project would not have enough FPA to sequester the maximum possible volume of groundwater that could be used: there would be a shortfall of 128 AF/y under the current 20% ramp down and 827 AF/y under an additional 20% ramp down.

The proposed sequestration would result in significant benefits to the HVGB by maintaining groundwater in storage for future uses. Staff believes sequestration as a means of water conservation would be consistent with and conform to the intent of the Energy Commission water policy. Staff notes, however, that sequestration may not conserve groundwater for other immediate or near term beneficial uses since there does not appear to be a competing demand for the sequestered supply. In addition, as shown in Table 8 above, the applicant does not currently have water rights and FPA sufficient to offset and sequester the project water use during some years. Therefore, a 1:1 offset of project water use may not be achieved over the life of the project. Staff believes that since the full amount of water use cannot be sequestered, the applicant should be required to implement additional water conservation measures to achieve compliance with Energy Commission water policy. Staff also believes the fact that the applicant has not proposed use of ZLD to conserve water and will be using a supply that has the potential to be considered a municipal supply are further evidence the applicant would not be in complete conformance with Energy Commission water policy. To achieve full compliance with the water policy, staff has proposed Conditions of Certification **SOIL&WATER-11** and **SOIL&WATER-12.**

With the implementation of Conditions of Certification **SOIL&WATER-11** and **SOIL&WATER-12**, staff concludes that the AMS project would conform to LORS. Condition of Certification **SOIL&WATER-11,** as proposed by the applicant ,would require the AMS project to annually sequester the volume of groundwater used by the AMS project on a 1 to 1 basis when possible. Condition of Certification **SOIL&WATER-12** would require the AMS project to contribute funds annually to the MWA turf replacement, toilet replacement water conservation program, or similar program implemented by the Mojave Water Agency. Under the turf replacement program, the MWA has estimated that conservation of one acre-foot of groundwater costs approximately $340. With a $50,000 contribution to this water conservation program annually, as it is currently administered, could result in annual water savings of about 147 AF/y, cumulatively increasing over the life of the AMS project. Conservation of about 147 AF/y, cumulatively over the life of the AMS project, is about equal to the volume of FPA that would not be sequestered under maximum pumping conditions under the current 20% adjudication ramp down. Additional water conservation may be achieved to some degree by the tamarisk eradication requirement of **BIO-16**.

NOTEWORTHY PUBLIC BENEFITS

Staff has not identified any noteworthy public benefits of the proposed project that are associated with soil and water resources.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Staff received comments from the County of San Bernardino and the public regarding soil and water resources.

DEFENDERS OF WILDLIFE

April 15, 2010

Comment: In a letter dated December 17, 2009, the Mojave Basin Area Watermaster assumed that 50% of irrigation water returned to the groundwater with the remaining 50% consumed by evapotranspiration and that the proposed project would consume 100% of the water it used. Please clarify if staff used these assumptions in their analysis.

> Response: Staff did use these assumptions in their analysis. Please refer to **Soil & Water Table 4**.

Comment: “We recommend that CEC staff address opportunities for overall water conservation in the basin, and consider that existing groundwater supplies will need to support existing and proposed renewable energy projects in the Harper Lake Basin. We recommend that such conservation be linked to a goal of partial recovery of the wetland at Harper Dry Lake through groundwater connectivity rather than relying exclusively on delivering pumped groundwater to the marsh via pipeline. Water conservation measures developed through mitigation or alternatives to the proposed project, such as dry cooling or hybrid cooling, should result in faster recovery of the groundwater aquifer and be made unavailable for allocation by the Watermaster. In such a scenario, Abengoa could be credited for reduction in use of groundwater they are entitled to use under allocation by the Watermaster."

Response: The staff assessment required the applicant to propose a water conservation plan and presented the applicant with a number of water conservation options, including the use of a dry-cooled system. The plan that the applicant chose would essentially limit future water use in the subbasin. This plan would require the AMS project to sequester its FPA in an amount equal to the amount of groundwater the project pumped annually up to the amount of FPA they have in reserve. The plan further provides that for years when the project's FPA is less than the volume of groundwater pumped by the project, the AMS project would contribute funds to a Mojave Water Agency water conservation program (up to $50,000 annually) to match the shortfall between the volume of groundwater pumped and the project's FPA available for sequestration. The volume of groundwater sequestered and conserved by the AMS project could be credited to the AMS project if further reductions in FPA are required by the Watermaster (see Conditions of Certification **SOIL&WATER-11** and **-12**).

Groundwater in the water supply aquifer currently occurs at about 125 to 145 feet bgs, which is substantially deeper than the bottom of the lakebed. Groundwater in the water supply aquifer is connected to other subbasins in the Mojave Basin area that are currently in various states of decline. Also, a presumably low-quality perched water zone, which has limited connection with the deeper water supply aquifer, and may or may not be connected with water in the marsh, occurs in the Harper Lake area that would degrade the relatively higher quality water supply aquifer water if it came into contact with it. Because of the impairment to groundwater quality this perched zone can cause, staff has recommended that on property controlled by the AMS project, all wells that are screened across both zones be properly abandoned (see Condition of Certification **SOIL&WATER-4**).

Staff did consider water conservation mechanisms that might provide water for additional solar development in the Harper Lake area. However, land available for future solar development is limited in this area, primarily by the existing solar development, SEGS 8 and 9, the proposed AMS project, the quality of the biological habitat surrounding the AMS project, and by the BLM Area of Critical Environmental Concern land designation.

MR. JOE RAMIREZ

April 7, 2010

Comment: Mr. Ramirez is concerned about how the project's proposed groundwater use would affect groundwater levels in his well.

Response: The potential impact to groundwater levels in a well based on average well construction conditions in the subbasin were modeled. Based on this modeling, no significant impacts would occur to wells in the subbasin. The criteria for a significant impact conservatively assumed that well pumps are installed at the top of well screens and would require an additional 25 feet of groundwater above the pumps to maintain well pump cooling and efficiency. Please refer to the *Potential Project Impacts to Groundwater Levels* section and Appendix B for additional discussion on potential impacts to groundwater levels. The simulated results show that groundwater levels would increase up to 2 feet in some wells and decrease a maximum of 19 feet in other wells. To ensure that there would not be a significant impact to groundwater levels, staff has recommended Conditions of Certification **SOIL&WATER-6**. This condition of certification would require the project to monitor groundwater levels for the life of the project to ensure that actual groundwater level changes correspond with simulated results. If significant impacts to a water supply well are indentified, possible mitigation measures are presented in **SOIL&WATER-5**.

CONCLUSIONS

Based on the assessment of the proposed AMS project, the Energy Commission staff finds that:

- The proposed use of groundwater for industrial cooling would not significantly impact existing groundwater levels in the HVGB wells, the basin balance, or the quality of groundwater in the basin. Staff has proposed Conditions of Certification **SOIL&WATER-6** and **-7** to establish pre-construction baselines for groundwater elevation and quality that can be quantitatively compared against simulated and observed levels during ongoing monitoring in the project pumping wells and near potentially impacted existing wells. These results would be used to avoid, minimize, or mitigate impacts to other wells and to the Harper Lake marsh from a reduction or degradation in the quantity or quality of groundwater available in other wells and extracted to support the Harper Lake marsh.
- The proposed project would not significantly increase or decrease erosion rates within its watershed if Conditions of Certification **SOIL&WATER-1** and **-2** are implemented as proposed during construction and operation.
- The proposed on-site drainage management design would perform adequately and potential impacts to onsite structures, downgradient property, and the Harper Lake bed would be mitigated if Conditions of Certification **SOIL&WATER-1** and **-3** are implemented as proposed.
- Requirements to mitigate potential impacts related to discharges of HTF to land treatment units, brines to evaporation ponds, and stormwater are provided for in Condition of Certification **SOIL & WATER - 2**.
- The proposed method of sanitary wastewater disposal by a septic system and leach field would have no significant impacts provided the requirements of Condition of Certification **SOIL&WATER-9** are met.
- Staff believes that construction and operation of the project would not result in immitigable project-specific direct, or indirect or cumulative significant impacts to soil or water resources with the adoption of the recommended conditions of certification.
- Based on the elements of the proposed project submitted by the applicant, staff believes the project would comply with all applicable federal, state, and local LORS

with the adoption of the recommended conditions of certification. Two of these conditions, **SOIL&WATER-11** and **-12**, are recommended to ensure compliance with the state's water policies as discussed further below.

- o The applicant has proposed to use groundwater for evaporative cooling when other cooling technologies exist. Staff believes the proposed use of groundwater for evaporative cooling would not comply with the state's water policies. However, the implementation of Conditions of Certification **SOIL&WATER-11** and **-12**, however, which would require the project owner to implement and support a water conservation program for the life of the project, staff concludes that the AMS project would conform to LORS.
- o The applicant has proposed the use of evaporation ponds as the preferred method of wastewater disposal. Staff believes potential impacts related to the use of evaporation ponds to dispose of the industrial wastewater could be mitigated through effective application of state and local LORS. However, this method of wastewater disposal is not consistent with the Energy Commission's policy that encourages the use of ZLD systems that eliminate wastewater discharge and inherently conserve water. Therefore, staff finds that this method of wastewater disposal does not comply with the state's water policies. However, as discussed above, with the implementation of Conditions of Certification **SOIL&WATER-11** and **-12,** staff concludes that the AMS project would conform to LORS.

The state has expressed a strong interest in developing its solar energy resources. However, the construction and operation of solar energy facilities requires the use of water, which state policy also protects. The Energy Commission must balance the state's interest in promoting solar energy development with its interest in conserving and protecting the state's water resources. Of the solar thermal projects currently proposed for the Mojave and Colorado deserts, only the AMS project and the Genesis project propose to use groundwater for power plant cooling. Staff recognizes the state's long-term interest in maximizing solar power generation, but also believes the use of water for power plant cooling is contrary to the state's long-term interest in minimizing adverse environmental impacts and ensuring conformity with state water policy. This will be an especially critical issue in the renewable development areas that will be identified in the DRECP. Later this year, Energy Commission staff plans to file a request with the Energy Commission for an Order Instituting an Informational Proceeding to address this issue further, outside this siting case.

MITIGATION MEASURES/PROPOSED CONDITIONS OF CERTIFICATION

DRAINAGE EROSION AND SEDIMENTATION CONTROL PLAN

SOIL & WATER-1 Prior to site mobilization, the project owner shall obtain the Compliance Project Manager's (CPM) approval for a site specific DESCP that ensures protection of water quality and soil resources of the project site and all linear facilities for both the construction and operation phases of the project. This plan shall address appropriate methods and actions, both temporary and permanent, for the protection of water quality and soil resources, demonstrate no increase in off-site flooding potential, and identify all monitoring and maintenance activities. The project owner shall complete all engineering plans, reports, and documents necessary for the CPM to conduct a review of the proposed project and provide a written evaluation as to whether the proposed grading, drainage improvements, and flood management activities comply with all requirements presented herein. The plan shall be consistent with the grading and drainage plan as required by Condition of Certification **CIVIL-1** and shall contain the following elements:

- **Vicinity Map:** A map shall be provided indicating the location of all project elements with depictions of all major geographic features to include watercourses, washes, irrigation and drainage canals, major utilities, and sensitive areas.
- **Site Delineation:** The site and all project elements shall be delineated showing boundary lines of all construction areas and the location of all existing and proposed structures, underground utilities, roads, and drainage facilities. Adjacent property owners shall be identified on the plan maps. All maps shall be presented at a legible scale
- **Drainage:** The DESCP shall include the following elements:

    a. Topography. Topography for off-site areas are required to define the existing upstream tributary areas to the site and downstream to provide enough definition to map the existing storm water flow and flood hazard. Spot elevations shall be required where relatively flat conditions exist.

    b. Proposed Grade. Proposed grade contours shall be shown at a scale appropriate for delineation of on-site ephemeral washes, drainage ditches, and tie-ins to the existing topography. A clear indication of on-site storm water containment features (berm, etc.) should also be delineated.

    c. Hydrology. Existing and proposed hydrologic calculations for on-site areas and off-site areas that drain to the site; include maps showing the drainage area boundaries and sizes in acres, topography and typical overland flow directions, and show all existing, interim, and proposed drainage infrastructure and their intended direction of flow.

    d. Hydraulics. Provide hydraulic calculations to support the selection and sizing of the on-site drainage network, diversion facilities and BMPs.

    e. Containment. Description of on-site storm water containment features. Indicate how the project will maintain a “no discharge” status.

- **Watercourses and Critical Areas:** The DESCP shall show the location of all on-site and nearby watercourses including washes, irrigation and drainage canals, and drainage ditches, and shall indicate the proximity of those features to the construction site. Maps shall identify high hazard flood prone areas.

- **Clearing and Grading:** The plan shall provide a delineation of all areas to be cleared of vegetation and areas to be preserved. The plan shall provide elevations, slopes, locations, and extent of all proposed grading as shown by contours, cross-sections, cut/fill depths or other means. The locations of any disposal areas, fills, or other special features shall also be shown. Existing and proposed topography tying in proposed contours with existing topography shall be illustrated. The DESCP shall include a statement of the quantities of material excavated at the site, whether such excavations or fill is temporary or permanent, and the amount of such material to be imported or exported or a statement explaining that there would be no clearing and/or grading conducted for each element of the project. Areas of no disturbance shall be properly identified and delineated on the plan maps.
- **Soil Wind and Water Erosion Control:** The plan shall describe soil treatments to be used during construction and operation of the proposed project for both road and non-road surfaces including specifically identifying all chemical based dust palliatives, soil bonding, and weighting agents appropriate for use at the proposed project site that would not cause adverse effects to vegetation; BMPs shall include measures designed to prevent wind and water erosion including application of chemical dust palliatives after rough grading to limit water use. All dust palliatives, soil binders, and weighting agents shall be approved by the CPM prior to use.
- **Project Schedule:** The DESCP shall identify on the topographic site map the location of the site-specific BMPs to be employed during each phase of construction (initial grading, project element construction, and final grading/stabilization). BMP implementation schedules shall be provided for each project element for each phase of construction.
- **Best Management Practices:** The DESCP shall show the location, timing, and maintenance schedule of all erosion- and sediment-control BMPs to be used prior to initial grading, during project element excavation and construction, during final grading/stabilization, and after construction. BMPs shall include measures designed to control dust and stabilize construction access roads and entrances. The maintenance schedule shall include post-construction maintenance of treatment-control BMPs applied to disturbed areas following construction.
- **Erosion Control Drawings:** The erosion-control drawings and narrative shall be designed, stamped and sealed by a professional engineer or erosion-control specialist.
- **Agency Comments:** The DESCP shall include copies of recommendations from the County of San Bernardino and RWQCB.
- **Monitoring Plan:** Monitoring activities shall include routine measurement of the volume of accumulated sediment in the on-site containment berms, drainage ditches, and storm water diversions. The monitoring plan shall be part of the channel maintenance plan in Condition of Certification **SOIL&WATER-3.**

Verification: The DESCP shall be consistent with the grading and drainage plan as required by Condition of Certification **CIVIL-1**, and relevant portions of the DESCP shall be submitted to the Chief Building Official (CBO) for review and approval. In addition, the project owner shall do all of the following:

1. No later than sixty (60) days prior to start of site mobilization, the project owner shall submit a copy of the DESCP to the County of San Bernardino and the RWQCB for review and comment. The CPM shall consider comments received from San Bernardino County and RWQCB and approve the DESCP based on comments as appropriate.

2. During construction, the project owner shall provide an analysis in the monthly compliance report on the effectiveness of the drainage, erosion, and sediment control measures and the results of monitoring and maintenance activities.

3. Once operational, the project owner shall provide in the annual compliance report information on the results of storm water BMP monitoring and maintenance activities. The project owner shall also indicate what maintenance activities were completed to maintain the project's on-site storm water flow.

4. Provide the CPM with two (2) copies each of all monitoring or compliance reports.

WASTE DISCHARGE REQUIREMENTS

SOIL&WATER-2 The project owner shall comply with the Waste Discharge Requirements (WDRs) established in Soil and Water Resources Appendices C, D, and E for the construction and operation of the surface impoundments (evaporation ponds), land treatment units, and storm water management system. These requirements relate to discharges, or potential discharges, of waste that could affect the quality of waters of the state, and were developed in consultation with staff of the State Water Resources Control Board and/or the applicable California Regional Water Quality Control Board (hereafter "Water Boards"). It is the Commission's intent that these requirements be enforceable by both the Commission and the Water Boards. In furtherance of that objective, the Commission hereby delegates the enforcement of these requirements, and associated monitoring, inspection and annual fee collection authority, to the Water Boards. Accordingly, the Commission and the Water Board shall confer with each other and coordinate, as needed, in the enforcement of the requirements. The project owner shall pay the annual waste discharge permit fee associated with this facility to the Water Boards. In addition, the Water Boards may "prescribe" these requirements as waste discharge requirements pursuant to Water Code Section 13263 solely for the purposes of enforcement, monitoring, inspection, and the assessment of annual fees, consistent with Public Resources Code Section 25531, subdivision (c).

Verification: No later than sixty (60) days prior to any wastewater or storm water discharge or use of land treatment units, the AMS project shall provide documentation to the CPM, with copies to the Lahontan RWQCB, demonstrating compliance with the WDRs established in Appendices C, D, and E. Any changes to the design, construction, or operation of the ponds, treatment units, or storm water system shall be requested in writing to the CPM, with copies to the Lahontan RWQCB, and approved by the CPM, in consultation with the Lahontan RWQCB, prior to initiation of any changes. The AMS project shall provide to the CPM, with copies to the Lahontan RWQCB, all monitoring reports required by the WDRs, and fully explain any violations, exceedances, enforcement actions, or corrective actions related to construction or operation of the ponds, treatment units, or storm water system.

CHANNEL MAINTENANCE PROGRAM

SOIL&WATER-3 The AMS project shall develop and implement a Channel Maintenance Program for routine maintenance of the AMS Project storm water channels. The program shall include all channel maintenance as needed to protect the integrity of the channels from erosion and sedimentation.

A. Purpose and Objectives. The program goals shall be to maintain storm water channels over the life of the project to meet their original design capacity for flood protection and conveyance and maintain groundwater recharge. Channels must have adequate capacity to convey the maximum designed flood stage flow and still maintain two feet of freeboard.

B. Channel Maintenance Area. The channel maintenance area shall be defined as the AMS project engineered channels, which would extend to the top of the channel bank and include access roads and easements on top of the banks.

C. Channel Maintenance Activities

i. Sediment Removal. Sediment shall be removed if: (1) the effective channel flood capacity has been reduced to less than the design discharge; (2) appurtenant hydraulic structures are prevented from functioning as intended; or (3) a permanent, non-erodible barrier to instream flows has developed.

ii. Vegetation Management. Vegetation shall be managed in and adjacent to the channels to maintain hydraulic capacity. Vegetation management shall include control of invasive and nonnative vegetation.

iii. Bank Protection and Grade Control Repairs. Bank protection and grade control structure repairs shall be conducted by the AMS project to repair eroding banks, incising toes, scoured channel beds, and as preventative erosion protection. The AMS project shall implement instream repairs when channel damage: (1) causes or could cause significant damage to the AMS project, adjacent property, or the structural elements of the channels; (2) is a public safety concern; (3) negatively affects groundwater recharge; or (4) negatively affects channel mitigation vegetation.

iv. Routine Channel Maintenance. Routine channel maintenance shall include: trash and debris removal to maintain channel design capacity;

repair and installation of fences, gates and signs; and grading and other repairs to restore the original contour of access roads and levees (if applicable).

D. Channel Maintenance Plan and Reporting

1. Channel Maintenance Plan. The Channel Maintenance Plan shall include: (1) the maintenance standards for each project channel; (2) policies to guide decision-making to ensure the maintenance standards are enforced; (3) procedures and BMPs to implement to ensure implementation of the policies; and (4) procedures and BMPs for sediment management, vegetation management, trash and debris removal, fence repairs, and access road maintenance.

2. Channel Maintenance Reporting. The following plans and reports shall be submitted to the CPM each year as part of the Annual Compliance Report:

   a. Channel Maintenance Workplans. These workplans shall describe the planned "major" maintenance activities and extent of work to be accomplished.

   b. Annual Channel Maintenance Report. This report shall specify which maintenance activities were completed during the year including type of work, location, and measure of the activity (e.g. cubic yards of sediment removed). This report shall also include an evaluation of the effectiveness of both resource protection and maintenance methods used throughout the year.

Verification: At least sixty (60) days before the start of project operation, the AMS project shall submit to the CPM a Channel Maintenance Plan for review and approval. The AMS project shall provide written notification to the CPM at least sixty (60) days in advance of any planned changes to the Channel Maintenance Plan.

In addition, the project owner shall:

1. Implement the Channel Maintenance Plan in Item D (Channel Maintenance Plan and Reporting);

2. Ensure that the AMS project Construction and Operations Managers receive training on the Channel Maintenance Plan; and

3. As part of the AMS project Annual Compliance Report, submit an Annual Channel Maintenance Report that specifies which maintenance activities were completed during the year including type of work, location, and measure of the activity (e.g. cubic yards of sediment removed).

PROJECT GROUNDWATER WELLS

SOIL&WATER-4 Pre-Well Installation. The project owner shall construct and operate up to two on-site groundwater wells that produce water from the Harper Valley Groundwater Basin and two backup wells. The project owner shall ensure that the wells are completed in accordance with all applicable state and local water well construction requirements. If the perched water table is present where new wells will be constructed, the project wells shall be designed to prevent cross-connection between the lower quality perched groundwater and the upper aquifer. Prior to the start of well construction activities, the project owner shall submit for review and comment a well construction packet to the County of San Bernardino, in accordance with the County of San Bernardino Code Title 2, Division 3, Chapter 6, Article 5, containing the documentation, plans, and fees normally required for the county's well permit, with copies to the CPM. The project shall not construct a well or extract and use groundwater until the CPM provides approval to construct and operate the well.

Post-Well Installation. The project owner shall provide documentation to the CPM that the well has been properly completed. In accordance with California's Water Code section 13754, the driller of the well shall submit to the DWR a Well Completion Report for each well installed. A copy of the Well Completion Report shall be included in the documentation submitted to the CPM.

Groundwater Well Abandonment. On property controlled by the project owner, the project owner shall protect groundwater resources by abandoning all groundwater wells that are constructed in such a manner that the screen interval of the well intercepts both the poor quality perched water and deeper aquifer water (uQal). These groundwater wells shall be abandoned in accordance with all applicable state and local water well abandonments requirements, including the California Department of Water Resources Bulletins 74-81 & 74-90. Prior to the start of well construction activities, the project owner shall submit for review and comment a well abandonment packet to the County of San Bernardino, in accordance with the County of San Bernardino Code Title 3, Division 3, Article 3, containing the documentation, plans, and fees normally required for the county's well abandonment permit, with copies to the CPM. The project shall not abandon a well until the CPM provides approval.

Verification: The project owner shall ensure the Well Completion Reports are submitted and shall ensure compliance with all State and county water well standards and requirements for the life of the wells. The project owner shall do all of the following:

1. No later than sixty (60) days prior to the construction of the on-site groundwater wells, the project owner shall submit a Groundwater Monitoring and Management Plan to the County of San Bernardino for review and comment (see Condition of Certification **SOIL&WATER-6**).

2. No later than sixty (60) days prior to the abandonment and construction of the on-site groundwater wells, the project owner shall submit to the CPM a copy of the water well abandonment and construction packet submitted to the County of San Bernardino for review and comment.

3. No later than thirty (30) days prior to the construction of the on-site water supply wells, the project owner shall submit a copy of any written comments received from the County of San Bernardino indicating whether the proposed well abandonment and construction activities comply with all county well requirements and meet the requirements established by the county's water well permit program.

4. No later than sixty (60) days after installation of each well at the project site, the project owner shall provide to the CPM copies of the Well Completion Reports submitted to the DWR by the well driller. The project owner shall submit to the CPM, together with the Well Completion Report, a copy of well drilling logs, water quality analyses, and any inspection reports.

5. During well construction and for the operational life of the well, the project owner shall submit two (2) copies to the CPM for review and approval any proposed well construction or operation changes.

6. The project owner shall provide the CPM with (2) two copies of all monitoring and other reports required for compliance with the County of San Bernardino water well standards and operation requirements.

7. No later than fifteen (15) days after completion of the on-site water supply wells, the project owner shall submit documentation to the CPM confirming that well drilling activities were conducted in compliance with Title 23, California Code of Regulations, Chapter 15, Discharges of Hazardous Wastes to Land, (23 CCR, sections 2510 et seq.) requirements and that any on-site drilling sumps used for project drilling activities were removed in compliance with 23 CCR section 2511(c).

CONSTRUCTION AND OPERATIONS WATER USE

SOIL&WATER-5 The proposed project's use of groundwater for all construction and operations activities shall not exceed 2,160 acre-feet per year. The quantity of the groundwater used for project construction and operation shall be reported to ensure compliance with this condition. Prior to the use of groundwater for construction, the project owner shall install and maintain metering devices as part of the water supply and distribution system to document project water use and to monitor and record in gallons per day the total volume(s) of water supplied to the project from this water source. The metering devices shall be operational for the life of the project.

Verification: Beginning six (6) months after the start of construction, the project owner shall prepare a semi-annual summary report of the amount of water used for construction purposes. The summary shall include the monthly range and monthly average of daily water usage in gallons per day.

At least sixty (60) days prior to the start of construction of the proposed project, the project owner shall submit to the CPM a copy of evidence that metering devices have been installed and are operational.

The project owner shall prepare an annual summary report, which will include maximum daily and monthly usage in gallons per day and the total monthly and annual usage in acre-feet. Following the first year of operation, the annual summary report will summarize the annual usage in tabular form. For calculating the total water use, the term “year” will correspond to the date established for the annual compliance report submittal.

GROUNDWATER LEVEL MONITORING, MITIGATION, AND REPORTING

SOIL&WATER-6 The project owner shall submit a Groundwater Monitoring and Reporting Plan to the CPM for review and approval. This plan shall consist of two parts as defined by Conditions of Certification **SOIL&WATER-6** and **-7**. **SOIL&WATER-6** describes the requirements for establishing a groundwater well monitoring network and monitoring groundwater levels in that network. **SOIL&WATER-7** describes the requirements for monitoring groundwater quality in the network. Mitigation for impacts related to project induced groundwater level declines or degradation in groundwater quality are provide in each condition of certification. All work and reporting under these conditions of certification shall be conducted under the supervision of a licensed California professional geologist or engineer.

The Groundwater Level Monitoring and Reporting Plan shall provide detailed methodology for monitoring background and site groundwater levels. Monitoring shall include pre-construction, construction, and project operation conditions. The primary objective for the monitoring is to establish a baseline of pre-construction groundwater level trends that can be quantitatively compared against observed and simulated trends near the project pumping wells and near potentially impacted existing wells during project construction and over the life of project operation. The project owner shall:

A. Prior to Project Construction

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

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

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

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

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

2. Monitoring Plan. Submit a Groundwater Level Monitoring and Reporting Plan to the CPM for review and approval at least sixty (60) days prior to construction. This plan shall include at a minimum:

   a. The monitoring plan and network of monitoring wells shall make use of two of the four project production wells (once installed), all monitoring wells installed to comply with Waste Discharge Requirements for the evaporation ponds and land treatment unit associated with the project, and the BLM marsh water supply well. In addition, and at least three additional existing wells in the Harper Lake area shall be incorporated into the program. The final well selection shall be based on access being granted by the owners and by BLM and that the wells are deemed by the CPM to be of suitable location and construction to satisfy the requirements for the monitoring program. Some Harper Lake area wells are already monitored, and these wells can be included as part of the network if they meet the objectives of the monitoring program.

   b. A scaled map showing the project site, boundary, location of all wells within the monitoring area, and location of wells selected for the monitoring network. The map shall also include relevant natural (e.g., faults, playa lake, etc.) and man-made features that are existing and proposed as part of the AMS project.

   c. Available well construction information, drilling and well installation methods, and borehole lithology for all wells in the monitoring area.

   d. For monitoring network wells, report the results of a wellhead elevation survey that record: the location and elevation of the well; the location and elevation of the top of the well casing reference point for all water level measurements (the measurement point); and the coordinate system and datum for the survey measurements.

   e. A description of how groundwater measurements will be collected and reported. All groundwater level measurements shall be made to the nearest 1/100 of a foot.

   f. A description of the groundwater level measurements and reporting protocols and quality assurance/quality control plan.

   g. Information about the AMS project wells shall be added to a revised plan submitted to the CPM for review and approval within sixty (60) days after the project wells are installed.

   h. A description of the reporting requirements presented below, including a statistical analyses conducted on the data collected, the thresholds employed to determine impact significance, and a description of the mitigation required for significant water level impacts should they occur.

i. A schedule for measuring water levels in all wells in the monitoring network.

j. The plan shall be signed and stamped by a licensed California professional geologist or engineer.

3. Monitoring. Before the start of project construction, collect groundwater levels from all existing wells within the monitoring network, in accordance with the requirements in the Groundwater Level Monitoring and Reporting Plan, to establish pre-construction conditions.

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

B. During Construction

5. Collect groundwater levels within the monitoring network on a quarterly basis throughout the construction period. Perform statistical trend analysis for groundwater levels data. Assess the significance of apparent trends using appropriate statistical analysis and compare to observed background trends in other monitored wells in the subbasin.

6. Within sixty (60) days of measuring groundwater levels in network wells, submit to the CPM a report of pre-project groundwater levels, present a summary of available climatic information (monthly average temperature and rainfall records from the nearest weather station), and provide a comparison and assessment of water level data relative to the spatial trends simulated by the USGS Mojave River Basin Model (USGS2001). This report shall also contain a tabular summary of the wells, current and historical water level measurements, and dates of water level measurements; a map of the groundwater elevation contours and calculated gradients; and conclusion and recommendations of a licensed California professional geologist or engineer.

C. During Operation

7. On a quarterly basis for the first year of operation and semi-annually thereafter for the following four years, collect groundwater level measurements from all wells identified in the groundwater monitoring network. Quarterly operational parameters (i.e., pumping rate and days on which pumping occurred) of the groundwater supply wells shall be monitored.

8. On an annual basis, perform statistical trend analysis on water levels, compare water levels and trends to pre-project conditions, present a summary of available climatic information (monthly average temperature and rainfall records from the nearest weather station), and provide a comparison and assessment of water level data relative to the assumptions and spatial trends simulated by the USGS Mojave River Basin Model (USGS2001). The magnitude and significance of any trends shall be evaluated. Based on comparisons between pre-project, project, and background water level trends, the project owner shall estimate the groundwater level change attributed to project pumping. These calculations shall be supported using a tabular summary of the wells, current and historical water level measurements, a map of the groundwater elevation contours; calculated gradients; and conclusion and recommendations of a licensed California professional geologist or engineer.

D. Mitigation

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

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

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

Increased Cost for Energy	=	(change in lift/total hydraulic head) x (total energy consumption times costs/unit of energy)
Where:		
change in lift (ft)	=	calculated change in water level in the well
total hydraulic head (ft)	=	(elevation head) + (discharge pressure head)
elevation head (ft)	=	(wellhead discharge pressure gauge elevation) – (water level elevation in well during pumping)
discharge pressure head (ft)	=	(pressure in pounds per square inch at wellhead discharge gauge) x (2.31 to convert psi to feet of water)

The project owner shall submit to the CPM for review and approval the documentation showing which well owners must be compensated for increased energy costs and that the proposed amount is sufficient compensation to comply with the provisions of this condition.

i. Any reimbursements (either lump sum or annual) to impacted well owners shall be only to those well owners whose wells were in service within six months of the Commission decision and within the 20-foot contour interval established in Item A above.

ii. The project owner shall notify all owners of the impacted wells within one month of the CPM approval of the compensation analysis for increase energy costs.

iii. Compensation shall be provided on either a one-time lump-sum basis, or on an annual basis, as described below.

Annual Compensation. Compensation provided on an annual basis shall be calculated prospectively for each year by estimating energy costs that will be incurred to provide the additional lift required as a result of the project. With the permission of the impacted well owner, the project owner shall provide energy meters for each well or well field affected by the project. The impacted well owner to receive compensation must provide documentation of energy consumption in the form of meter readings or other verification of fuel consumption. For each year after the first year of operation, the project owner shall include an adjustment for any deviations between projected and actual energy costs for the previous calendar year.

One-Time Lump-Sum Compensation. Compensation provided on a one-time lump-sum basis shall be based on a well-interference analysis, assuming the maximum project-pumping rate of 2,160 AF/y. Compensation associated with increased pumping lift for the life of the project shall be estimated as a lump sum payment as follows:

i. The current cost of energy to the affected party considering time of use or tiers of energy cost applicable to the party's billing of electricity from the utility providing electric service, or a reasonable equivalent if the party independently generates their electricity;

ii. An annual inflation factor for energy cost of 3%; and

iii. A net present value determination assuming a term of 30 years and a discount rate of 9%;

b. Well Screen Exposure. If groundwater monitoring data indicate project pumping has lowered water levels below the top of the well screen, and the well yield is shown no longer meet pre-project demand, compensation shall be provided to diagnose and treat and well screen encrustation. Reimbursement shall be provided at an amount equal to the customary local cost of performing the necessary diagnosis and maintenance for well screen encrustation. Should well yield reductions be reoccurring, the project owner shall provide payment or reimbursement for either periodic maintenance throughout the life of the project or replacement of the well.

c. Well Yield. If project pumping has lowered water levels to significantly impact well yield so that it can no longer meet its intended purpose, causes the well to go dry, or cause casing collapse, payment or reimbursement of an amount equal to the cost of deepening or replacing the well shall be provided to accommodate these effects. Payment or reimbursement shall be at an amount equal to the customary local cost of deepening the existing well or constructing a new well of comparable design and yield (only deeper). The demand for water, which determines the required well yield, shall be determined on a per well basis using well owner interviews and field verification of property conditions and water requirements compiled as part of the pre-project well reconnaissance. Well yield shall be considered significantly impacted if it is incapable of meeting 150% of the well owner's maximum daily demand, dry-season demand, and annual demand – assuming the pre-project well yield documented by the initial well reconnaissance met or exceeded these yield levels. The contribution of project pumping to observed decreases in observed well yield shall be determined by interpretation of the groundwater monitoring data collected and shall take into consideration the effect of other nearby pumping wells, basin-wide trends, and the condition of the well prior to the commencement of project pumping.

d. The project owner shall notify any owners of the impacted wells within one month of the CPM approval of the compensation analysis.

e. Pump Lowering. In the event that groundwater is lowered as a result of project pumping to an extent where pumps are exposed but well screens remain submerged, the pumps shall be lowered to maintain production in the well. The project shall reimburse the impacted well owner for the costs associated with lowering pumps in proportion to the project's contribution to the lowering of the groundwater table that resulted in the impact.

f. Deepening of Wells. If the groundwater is lowered enough as a result of project pumping that well screens and/or pump intakes are exposed, and pump lowering is not an option, such affected wells shall be deepened or replacement wells constructed. The project shall reimburse the impacted well owner for all costs associated with deepening existing wells or constructing replacement wells in proportion to the project's contribution to the lowering of the water table that resulted in the impact.

E. Monitoring Program Evaluation:

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

Verification: The project owner shall do all of the following:

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

2. During project construction, the project owner shall submit to the CPM quarterly reports presenting all the data and information required in Item B above. The project owner shall submit to the CPM all calculations and assumptions made in development of the report data and interpretations.

3. No later than sixty (60) days after commencing project operation, the project owner shall provide to the CPM, for review and approval, documentation showing that any mitigation to private well owners during project construction was satisfied, based on the requirements of the property owner as determined by the CPM.

4. During project operation, the project owner shall submit to CPM, applicable quarterly, semi-annual, and annual reports presenting all the data and information required in Item C above. The project owner shall submit to the CPM all calculations and assumptions made in development of report data and interpretations, calculations, and assumptions used in development of any reports.

5. The project owner shall provide mitigation as described in Item D above, if the CPM's inspection of the monitoring information confirms project-induced changes to water levels and water level trends relative to measured pre-project water levels, and well yield has been lowered by project pumping. The type and extent of mitigation shall be determined by the amount of water level decline and site-specific well construction and water use characteristics. The mitigation of impacts will be determined as set forth in Item D above.

6. No later than 30 days after CPM approval of the well drawdown analysis, the project owner shall submit to the CPM for review and approval all documentation and calculations describing necessary compensation for energy costs associated with additional lift requirements.

7. The project owner shall submit to the CPM all calculations, along with any letters signed by the well owners indicating agreement with the calculations, and the name and phone numbers of those well owners that do not agree with the calculations.

8. If mitigation includes monetary compensation, the project owner shall provide documentation to the CPM that compensation payments have been made by March 31 of each year of project operation or, if a lump-sum payment is made, payment shall be made by March 31 of the following year. Within 30 days after compensation is paid, the project owner shall submit to the CPM a compliance report describing compensation for increased energy costs necessary to comply with the provisions of this condition.

9. After the first 5-year operational and monitoring period, and every subsequent 5-year period, the project owner shall submit a 5-year monitoring report to the CPM for review and approval. This report shall contain all monitoring data collected and provide a summary of the findings and a recommendation about whether the frequency of water level measurements should be revised or eliminated.

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

GROUNDWATER QUALITY MONITORING, MITIGATION, AND REPORTING

SOIL&WATER-7 A water quality baseline of pre-construction conditions shall be established for all wells in the monitoring network established by Condition of Certification **SOIL&WATER-6**, including all monitoring wells that are installed to comply with Waste Discharge Requirements for the evaporation ponds and land treatment unit associated with the project, the existing BLM well and any retrofitted or newly installed BLM marsh water supply well. The primary objectives for the monitoring is to establish pre-construction and project related groundwater quality impacts that can be quantitatively evaluated to avoid, minimize, or mitigate significant adverse impacts to wells in the network from potential degradation in the quality of groundwater.

A. Plan. The project owner shall submit a Groundwater Quality Monitoring and Reporting Plan to the CPM for review and approval at least sixty (60) days prior to project construction. The Groundwater Quality Monitoring and Reporting Plan shall be a part of the Groundwater Monitoring and Reporting Plan required under Condition of Certification **SOIL&WATER-6**, and shall include at a minimum:

1. A compilation of historical water quality data that can be used to establish baseline water quality conditions and compare with project water quality monitoring.

2. Where insufficient historical water quality data is available, identify additional sampling and analysis that will be completed prior to project construction to establish pre-project trends in water quality.

3. A description of the methodology for monitoring background and groundwater quality in all wells that are within the monitoring network established in Condition of Certification **SOIL&WATER-6**.

4. A description of the water quality analysis to be conducted on water samples collected from each well in the monitoring network. This description will include the purpose of each water quality analysis.

5. A description of the groundwater sample collection method for each analysis to be performed.

6. A description of the quality assurance/quality control that will be built into the sample collection and reporting protocol.

7. A description of the reporting requirements presented below, including a statistical analyses that will be performed on the data collected and a description of the mitigation that would be required for significant water quality impacts.

8. A schedule for monitoring all wells in the monitoring network.

B. Report During Pre-Construction. At least sixty (60) days prior to project construction, all groundwater quality monitoring data shall be submitted to the CPM for review and approval. The report shall include the following:

9. An assessment of pre-project groundwater quality with groundwater samples analyzed for TDS, chloride, nitrates, major cations and anions, and oxygen-18 and deuterium isotopes. These analyses, and particularly the stable isotope data, can be useful for identifying partially evaporated water sources and assessing their contributions to the quality of water produced by wells.

10. For the BLM marsh water supply well, at least two (2) groundwater samples shall be collected and analyzed for TDS, sodium, selenium, and oxygen-18 and deuterium isotopes. These analyses, and particularly the stable isotope data, can be useful for identifying partially evaporated water sources and assessing their contributions to the quality of water produced by wells.

11. The data shall be tabulated, summarized, and submitted to the CPM for review and approval. The data summary shall include the estimated range (minimum and maximum values), average, and median for each constituent analyzed. The data shall also be analyzed using the Mann-Kendall test for trend to assess whether pre-project water quality trends, if any, are statistically significant.

C. Monitor. During project construction and operation, the project owner shall semi-annually monitor the quality of groundwater semi-annually. The monitoring shall include:

12. Collection of groundwater samples from all monitoring network wells and analysis of these samples for TDS, chloride, nitrates, cations and anions, and oxygen-18 and deuterium isotopes. The BLM marsh water supply well shall also be analyzed for sodium and selenium. These analyses, and particularly the stable isotope data, can be useful for identifying partially evaporated water sources and assessing their contributions to the quality of water produced by wells.

D. Reporting During Construction and Operation. During project construction and operation, the project owner shall submit water quality reports semi-annually to the CPM and BLM. The groundwater quality data shall be tabulated, summarized, and analyzed to compare water quality to pre-project conditions. This analysis shall include analyses of trends and for contrast with the pre-project data as follows:

13. Water quality trends shall be analyzed using the Mann-Kendall test. Trends in the data shall be compared and contrasted to pre-project trends, if any.

14. If no significant water quality trends exist in the water quality data or the data set is insufficient to assess trends, the water quality data shall be combined for each well and contrasted to the pre-project well water quality data set.

15. The contrast between pre-project and water quality mean or median concentrations shall be compared using an Analysis of Variance (ANOVA). A parametric ANOVA (for example, an F-test) can be conducted on the two data sets if the residuals between observed and expected values are normally distributed and have equal variance, or the data can be transformed to an approximately normal distribution. If the data cannot be represented by a normal distribution, then a nonparametric ANOVA shall be conducted (for example, the Kruskal-

Wallis test). If a statistically significant difference is identified between the two data sets, the monitoring data are inconsistent with random differences between the pre-project and baseline data indicating a significant water quality impact from project pumping may be occurring.

16. If based on the water quality data the CPM and BLM determines that the quality of the water produced by the marsh water-supply well has been impacted by project pumping (exceeds pre-project constituent concentrations in TDS, chloride, nitrates, sodium, or selenium concentrations for three consecutive years) such that the water quality adversely affects the well's intended purpose, the project owner shall provide treatment or a new water supply to either meet or exceed pre-project water quality conditions.

E. **Monitoring Program Evaluation.** After the first five-year operational and monitoring period, and every subsequent 5-year period, the CPM shall evaluate the data and determine if the groundwater quality data collection frequencies and constituent list monitored should be revised or eliminated. Revision or elimination of any monitoring program elements shall be based on the consistency of the data collected.

Verification: The project owner shall complete the following:

1. At least sixty (60) days prior to construction, a Groundwater Quality Monitoring and Reporting Plan in compliance with Item A shall be submitted to the CPM for review and approval.

2. At least thirty (30) days prior to the start of construction, a pre-construction groundwater quality report in compliance with Item B shall be submitted to the CPM for review and approval.

3. Semi-annually, by March 31 and September 31, the project owner shall submit Groundwater Quality Reports in compliance with Item D to the CPM for review and approval and to the BLM for review.

4. After the first 5-year operational and monitoring period, and every subsequent 5-year period, the project owner shall submit a 5-year monitoring report to the CPM, for review and approval, that contains all groundwater quality data collected and provides a summary of the findings and a recommendation about whether the frequency of groundwater quality data collection should be revised or eliminated.

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

WASTEWATER COLLECTION SYSTEM REQUIREMENTS

SOIL&WATER-8 The project owner shall recycle and reuse all process wastewater streams to the extent practicable. Prior to transport and offsite disposal of any facility operation wastewaters that are not suitable for treatment and reuse on-site, the project owner shall test and classify the stored wastewater to determine proper management and disposal requirements. The project manager shall ensure that the wastewater is transported and disposed of in accordance with the wastewater's characteristics and classification and all applicable LORS (including any CCR Title 22 Hazardous Waste and Title 23 Waste Discharges to Land requirements).

Verification: Prior to transport and offsite disposal of any facility operation wastewaters that are not suitable for treatment and reuse on-site, the project owner shall test and classify the stored wastewater to determine proper management and disposal requirements. All records of this testing and classification shall be maintain at the project site. The project manager shall ensure that the wastewater is transported and disposed of in accordance with the wastewater's characteristics and classification and all applicable LORS (including any CCR Title 22 Hazardous Waste and Title 23 Waste Discharges to Land requirements).

SEPTIC SYSTEM AND LEACH FIELD REQUIREMENTS

SOIL&WATER-9 Prior to the start of construction of the sanitary waste system, the project owner shall submit to the County of San Bernardino for review and comment, and to the CPM for review and approval, plans for the construction and operation of the project's proposed sanitary waste septic system and leach field. These plans shall comply with the requirements set forth in County of San Bernardino Code Title 3, Division 3, Chapter 8, Waste Management, Article 5, Liquid Waste Disposal and Title 6, Division 3, Chapter 3, and the Uniform Plumbing Code. Project construction shall not proceed until the CPM has approved the plans. The project owner shall remain in compliance with the San Bernardino County codes requirements for the life of the project.

Verification: Sixty (60) days prior to the start of commercial operations, the project owner shall submit to the County of San Bernardino appropriate fees and plans for review and comment for the construction and operation of the project's sanitary waste septic system and leach field. A copy of these plans shall be simultaneously submitted to the CPM for review and approval. The plans shall demonstrate compliance with the sanitary waste disposal facility requirements of County of San Bernardino Codes Title 3, Division 3, Chapter 8, Waste Management, Article 5, Liquid Waste Disposal and Title 6, Division 3, Chapter 3, and the Uniform Plumbing Code.

NON-TRANSIENT, NON-COMMUNITY WATER SYSTEM

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

Verification: The project owner shall obtain a permit to operate a non-transient, non-community water system with the County of San Bernardino at least sixty (60) days prior to commencement of operations at the site. In addition, the project owner shall submit to the CPM a monitoring and reporting plan for production wells operated as part of the domestic water supply system prior to plant operations. The plan will include reporting requirements including monthly, quarterly, and annual submissions.

The project owner shall designate a California Certified Water Treatment Plant Operator as well as the technical, managerial, and financial requirements as prescribed by State law. The project owner will supply updates on an annual basis of monitoring requirements, any submittals to County of San Bernardino as well and proof of annual renewal of the operating permit.

WATER POLICY COMPLIANCE

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

- Sequester means that the project owner shall exercise option rights as identified in the AFC (totaling 10,478 BAP) and retain and refrain from exercising its groundwater FPA use rights which it is otherwise lawfully entitled to exercising under the Mojave Basin Adjudication.
- The maximum annual volume of groundwater that could be sequestered is 2,032 acre-feet and at no time can be more than the difference between the FPA volume and the annual volume of groundwater pumped.
- Sequestration shall continue annually for the life of the project owner.
- Sequestered FPA would count towards any additional ramp down that is imposed by the Watermaster pursuant to the Mojave Basin Adjudication.
- The annual sequestration of FPA is not intended to affect the Watermaster's implementation of the Mojave Basin Adjudication.
- Sequestered water would not be considered by the Energy Commission to be produced water subject to any replacement water obligation under the Mojave Basin Adjudication.

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

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

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

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

Verification: The project owner shall do the following:

1. The project owner shall submit to the CPM the following documentation as part of the Annual Compliance Report:
    a. A copy of the receipt from the MWA for the annual contribution; and
    b. An accounting of the following:
        i. The annual and cumulative volume of groundwater used by the project in acre-feet per year;
        ii. The annual and cumulative volume of FPA sequestered by the project in acre-feet per year;
        iii. The numerical difference between annual and cumulative totals in Items i and ii above; and
        iv. The annual and cumulative monetary contribution and estimated annual and cumulative volume of water conserved by the project owner's contribution to MWA's turf replacement program, high-efficiency toilet program, or other water conservation program approved by the CPM.
2. If the project owner proposes to reduce the amount of the annual contribution based on the water conservation achieved through previous contributions, the project owner shall provide a plan demonstrating how the adjusted amount will ensure the water conservation program meets the requirements of this condition. The plan shall be provided for CPM review and approval 60 days prior to the annual contribution anniversary date.

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SOIL AND WATER RESOURCES - APPENDIX A

Acronyms Used in the Soil and Water Resources Section

AMS	Abengoa Mojave Solar project	gpd/ft	gallons per day per foot
amsl	above mean sea level	gpm	gallons per minute
AF	acre-feet	IEPR	Integrated Energy Policy Report
AF/y	acre-feet per year	lbs	pounds
BLM	Bureau of Land Management	LID	Low Impact Development
bgs	below ground surface	LORS	laws, ordinances, regulations, and standards
BMP	Best Management Practices	MCL	maximum contaminant level
CDPH	California Department of Public Health	mg/L	milligrams per liter
CEQA	California Environmental Quality Act	mph	miles per hour
cfs	cubic feet per second	MOU	Memorandum of Understanding
CPM	Compliance Project Manager	MW	megawatt
DESCP	Drainage, Erosion, and Sediment Control Plan	NEPA	National Environmental Policy Act
DRECP	Desert Renewable Energy Conservation Plan	NPDES	National Pollutant Discharge Elimination System
DTSC	Department of Toxic Substances Control	RCRA	Resource Conservation and Recovery Act
DWR	Department of Water Resources	REC	Recognized Environmental Condition
ESA	Environmental Site Assessment	ROC	Record of Conversation
FEMA	Federal Emergency Management Agency	RWQCB	Regional Water Quality Control Board
ft/day	feet per day	SWPPP	Storm Water Pollution Prevention Plan
fps	feet per second	SWRCB	State Water Resources Control Board
FSA	Final Staff Assessment	TDS	total dissolved solids
ft/ft	feet per foot	µS/cm	microsiemens per centimeter
ft/yr	feet per year	USCS	Unified Soil Classification System
GW	gigawatt	WWTP	wastewater treatment plant
gpd	gallons per day		

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SOIL AND WATER RESOURCES - APPENDIX B

HARPER LAKE MODELING REVIEW FOR THEABENGOA MOJAVE SOLAR PROJECT

The proposed Abengoa Mojave Solar Project site is located in the Harper Lake Basin, which is effectively a semi-closed basin located northwest of the Mojave River. The Harper Lake Basin lies in the Centro Subarea of the Mojave Water Agency management area of the Mojave Desert (CSU Fullerton, September 2007). Layne Christensen Company applied numerical groundwater-flow modeling to assess potential impacts resulting from the proposed extraction and use of groundwater for construction and power plant cooling (ESH 2009f). They employed a pre-existing, three-dimensional numerical groundwater-flow model of the Mojave River Basin developed by the U.S. Geological Survey (USGS 2001) to conduct their impact assessment (herein referred to as “the model”). Specifically, they utilized the model to simulate groundwater-level and storage changes in response to pumping from extraction wells for plant construction (2 years) and plant operation (30-years). The California Energy Commission requested review of model construction, assumptions, parameters, calibration, sensitivities, results, and validity.[7] Additionally, the Commission requested modeling analyses to project groundwater changes attributable to proposed power-plant groundwater use.

BACKGROUND ON GROUNDWATER-FLOW MODELING

The process of numerical groundwater-flow modeling involves first developing a conceptual model of the physical system and then applying a mathematical model to represent it quantitatively. The conceptual model is a clear, qualitative description of the natural system and its operation including water sources (recharge), flow directions, and sinks (discharge). The mathematical model utilizes equations to simulate the physical processes described by the conceptual model. The potential complexity of processes and variety of boundary conditions typically require numerical procedures to determine an approximate solution to the mathematical groundwater-flow equations. The Mojave River Basin model is based on the numerical mathematical model MODFLOW (USGS, 1988); MODFLOW is a widely accepted model code that has been verified to produce numerically stable solutions (Anderson and Woessner, 1991).

[7] The terms “verification” and “validation” are often used interchangeably in hydrologic modeling. Some consider a “valid” groundwater-flow model as meaning it has been adequately demonstrated that the model simulates the cause and effect relationships within a specific groundwater basin. For example, the model adequately simulates the magnitude and distribution of water level changes in response to a change in recharge and pumpage. This type of validation is typically accomplished by conducting a post-audit after the modeling study is completed. A post-audit assesses whether conditions predicted by the model is confirmed by new field data that has been collected. Stamos and others (USGS, 2001) conducted a post-audit on the Mojave River Basin model by comparing observed and simulated water levels for the period 1995-1999. They concluded the match between observed and simulated water levels was good, and the model could be used to predict the response of the aquifer system to stresses that are similar in type and magnitude to those used during the calibration process. As part of this model review, we extended the post-audit and compared observed and simulated water levels in the Harper Lake area and its vicinity during the period 1995-2008. The results of our post-audit are described in this appendix under the section “Model Results.”

In applying models to real world groundwater-flow systems, errors can potentially arise from the following sources.

- Numerical deficiencies from errors associated with the equation solvers. These errors introduce problems with computational accuracy and precision.
- Conceptual deficiencies (i.e., erroneous basin geometry, incorrect boundary conditions, neglecting important processes, including inappropriate processes, and so forth).
- Inadequacies in parameterization (values selected to represent water transmitting and storage properties) and poorly defined stresses (specified distribution and magnitude of inflows and outflows like recharge and pumping).

The most common errors in model construction are attributed to conceptual deficiencies and inadequate/poorly defined parameterization and stresses. Although Layne Christensen Company developed and describe a conceptual model for the Harper Lake Basin in Appendix A: “Basin Conceptual Model” of the Application for Certification (AS 2009a), the conceptual model utilized in their modeling and impact assessment is represented by the U.S. Geological Survey Mojave River Basin Groundwater Model (USGS 2001). We first describe the conceptual model of the Harper Lake Basin as represented by the U.S. Geological Survey model, and then assess the modeling assumptions, simulation results, and their inherent sensitivity to uncertainty in model input. We then summarize simulated water level and groundwater storage changes due to construction and power-plant groundwater use.

CONCEPTUAL MODEL

The Harper Lake Basin is part of the Centro Subarea of the Mojave River Basin, which is one of the adjudicated subareas overseen by the Mojave Water Agency. The Harper Lake Basin boundary, as mapped by the California Department of Water Resources, is not coincident with the Harper Lake groundwater subarea delineated within the numerical model (herein referred to as the Harper Lake model zone). The Harper Lake model zone is smaller in area than California Department of Water Resources’ Harper Lake Basin boundary.

For the purposes of this report, we focused our assessment primarily on the Harper Lake model zone as defined in the groundwater-flow model (USGS 2001). The Harper Lake model zone is delineated by the Lockhart Fault in the southwest and the contact between alluvium and bedrock to the north, east, and south. The water-bearing sediments are unconsolidated to semi-consolidated alluvial materials of Quaternary age ranging in size from coarse gravel to clay. The materials tend to become more consolidated with depth. Groundwater is generally unconfined, although confined conditions have been reported near Harper (dry) Lake.

Perched water-table conditions reportedly exist near Harper (dry) Lake (USGS 2001). A perched water-table is a special case of an unconfined aquifer whereby the perched groundwater is separated from the main groundwater system by low permeability strata and an underlying unsaturated zone (Todd 1980). The model represents the main groundwater system that underlies the perched water-table.

Since data was first available in 1916, water levels have consistently indicated that groundwater flow is towards Harper (dry) Lake (CSU Fullerton, 2007). Under pre-development conditions, groundwater discharged to Harper (dry) Lake, but since around the 1950's groundwater has been developed and extracted for primarily agricultural uses. The pumping and consumption of groundwater lowered water levels and removed groundwater from storage such that discharge from the regional aquifer to the lakebed is assumed no longer significant.

Distributed recharge from precipitation is considered minimal in the Harper Lake model zone because precipitation does not adequately meet evapotranspiration and soil-moisture requirements. Since agricultural development in the late 1940's, distributed recharge has occurred artificially from irrigation return-flow.

The hydraulic communication between the Harper Lake model zone and adjacent areas of the Centro subarea is limited to flow across the Lockhart Fault, located southwest of Harper (dry) Lake, and flow within the Hinkley Valley (a narrow alluvial valley that connects the Harper Lake model zone to the eastern portion of the Centro subarea). Previous investigations estimated inflow from Hinkley Valley ranging from 22 to about 3,000 acre-feet per year (CSU Fullerton, 2007); inflow across the Lockhart Fault has not been previously reported. These groundwater flows from the Centro subarea originate primarily as infiltration of surface water flows into the flood plain aquifer of the Mojave River (river leakage).

In summary, the Harper Lake model zone is generally characterized as an unconfined groundwater system that has limited hydraulic connection with the regional Mojave River Basin. Subsurface flows across the Lockhart Fault and through the Hinkley Valley are the primary inflows, and agricultural consumption of pumped groundwater is the primary outflow. Groundwater consumption over the past 50 or more years has exceeded inflow, resulting in the gradual decline of groundwater levels and storage. Following adjudication of the basin in the mid- to late 1990's, groundwater consumption has decreased resulting in a gradual water level rise in some wells and stabilization of the historical storage decline.

MODEL CONSTRUCTION

Assumptions

We reviewed the modeling assumptions reported by the USGS (2001) and those incorporated by Layne Christensen (ESH 2009f). The key assumptions relative to simulating groundwater-flow in the Harper Lake model zone are summarized below.

- Simulation period. The USGS calibrated model simulated steady-state groundwater-flow conditions in 1930, and transient groundwater-flow conditions during the period 1931-1994 (USGS 2001). The steady-state 1930 groundwater levels are the initial conditions for the 1931-1994 transient simulation. Additionally, the USGS updated the recharge and pumpage data sets to extend the simulation through 1999. For the purposes of this analysis, Layne Christensen (ESH 2009f) updated and extended the data sets to simulate conditions during the period 2000-2050.
- The aquifer extent is assumed to coincide with the Harper Lake model zone boundary, and no-flow boundaries are utilized around and below the model zone to

represent the contact between water bearing sediments and bedrock (the quantity of water exchanged between the aquifer and bedrock is assumed small). The two exceptions are the Lockhart Fault, which impedes the exchange of groundwater between the Harper Lake model zone and adjacent areas of the Centro subarea, and groundwater movement from the Centro subarea through the Hinkley Valley.

- Model grid. The model is a rectangular grid of 2,000 by 2,000 feet square cells. Each cell represents approximately a 92-acre part of the region, and the parameters assigned to each cell represent the average value for the real-world groundwater system. Similarly, the simulated groundwater level represents the average groundwater level for the entire cell; water levels at individual wells and at different locations within the area represented by the cell can be significantly different from the average groundwater level.
- Model layers. The regional aquifer is unconfined and in the vertical direction represented by two model layers; model layer 1 represents the upper part of the saturated regional alluvial aquifer (assumed 100 feet thick), and model layer 2 represents the lower part of the saturated regional alluvial aquifer (assumed 700 feet thick). Simulated pumping wells extract water from the lower part of the regional aquifer (layer 2).
- Model convergence. The model simulations are assumed to converge when the residuals in hydraulic head and volumetric fluxes meet the user's specified criteria. The recommended error criterion for groundwater levels should be one to two orders of magnitude smaller than the accuracy level desired, and the error in the water balance is ideally less than 0.1%, but an error of about 1% is usually considered acceptable (Anderson and Woessner, 1991). The model simulations reviewed by staff employed a water level closure criterion of 1-foot and have typical mass balance errors of less than 0.2%. Model tests conducted by staff indicated that decreasing the closure criterion from 1.0- to 0.1-foot had a negligible effect on simulated water levels (the differences between simulated water levels averaged 0.02-foot or less). Staff therefore concluded simulated water levels are probably accurate to the nearest foot or less.
- Constant transmissivity. Transmissivity values are constant for both model layers to ensure numerical stability of the model. However, this approach fails to account for the decrease in transmissivity that occurs as a result of a decline in water level (for example, the drawdown caused by pumping wells can reduce the saturated thickness of the unconfined aquifer and decrease the effective aquifer transmissivity). Ignoring these transmissivity changes introduces errors. In the model simulations we considered, the maximum drawdown near the proposed project pumping wells was never greater than 20 feet. A drawdown of 20-feet represents less than a 3% reduction in saturated thickness, and less than a 1% reduction in effective transmissivity[8]. We therefore concluded the drawdown effect on simulated

[8] The thicknesses of layers 1 and 2 are assumed 100 and 700 feet, respectively. In the vicinity of the proposed project, the transmissivity values specified for layers 1 and 2 are 500 and 3,500 ft^2/day, respectively. Hence, because the transmissivity of layer 1 is relatively low, simulated drawdown within layer 1 has a small effect on the effective transmissivity of the entire aquifer (layers 1 and 2 combined). Additionally, all pumping is assumed to extract groundwater from the deeper deposits represented by layer 2 which does not experience any dewatering or change in effective transmissivity.

transmissivity is small and employing constant transmissivity values is a reasonable assumption for the model simulations considered.

- Constant storage coefficient. Water removed from storage in unconfined and confined aquifers are assumed to discharge instantaneously with decline in water levels. Accordingly, there is no delayed storage response and the simulated storage coefficients do not vary with time.
- Perched water table. In the Harper Lake model zone, perched water-table conditions reportedly exist near Harper (dry) Lake. Model calibration results indicated that perched groundwater is not a significant source of recharge to the regional aquifer (USGS 2001).
- Distributed water table recharge. Distributed recharge from rainfall and artificial water sources (for example, irrigation return flows) is applied to the simulated water table in model layer 1. Distributed recharge from direct precipitation is assumed minimal because precipitation does not adequately meet evapotranspiration and soil-moisture requirements. Recharge from precipitation therefore occurs primarily as infiltration of runoff from select washes and mountains (mountain-front recharge). In the greater Mojave River Basin, mountain-front recharge can be significant; however, mountain-front recharge is considered negligible in the Harper Lake model zone.

  Irrigation-return flows occur beneath irrigated areas located primarily north of Harper (dry) Lake, where the perched water table is absent (USGS 2001). For the period 2000 through 2050, simulated irrigation-return flows were assumed constant and equal to 1999 conditions (about 1,500 acre-feet per year)[9]. These return flows represent almost 20% of the combined 2008 pumping rate for wells located in the Harper Lake model zone.
- Mojave River recharge. Leakage from the Mojave River is represented with a stream-flow and routing boundary condition, which simulates stream-aquifer interactions and tracks the amount of flow in the river. Leakage from the Mojave River is a principal source of recharge to the regional groundwater basin, and leakage that occurs in the Centro subarea is most relevant to Harper Lake model zone groundwater. The modeled Mojave River parameters were determined by the USGS (2001) and are based on geologic properties of the stream bed materials and historical flow conditions (flow rates and the number of days of flow). As a result, the model employs temporally variable river flow and stream bed conductance during the 1931-1994 calibration and 1995-1999 post-audit periods. For the 2000-2050 simulation period, Layne Christensen assumed constant annual stream flow conditions equal to historical 1962 conditions. They chose 1962 because the simulated stream inflow (62,580 acre-feet) was considered approximately the same as the average value for the 1931-1999 simulation (71,600 acre-feet).

[9] In the Harper Lake model zone, agricultural water use has been declining and a proportional decline in irrigation-return flow can be expected. Assuming irrigation return flow during the period 2000-2050 is constant likely over-estimates recharge if agricultural water use continues to decline. However, the percentage of pumped groundwater that is consumed is greater than the percentage that becomes return flow; hence, the storage benefit resulting from a reduction in agricultural pumpage is greater than the corresponding reduction in irrigation return flow.

We compared simulated net Mojave River leakage during the historical 1931-1994 calibration and the 2009-2050 projection periods. The 1931-1994 average net river leakage to the Centro subarea (25,180 AF/yr) is greater than both 1962 (14,840 AF/yr) and the 2009-2050 projection period (19,790 AF/yr). Since 1962, additional flows have been added to the river and resulted in greater leakage (for example, discharge from the California State Water Project at the Mojave Water Agency's Morongo basin pipeline, and discharge from the Victor Valley Wastewater Authority sewage pipeline). Because 1962 flow conditions do not include these additional inflows, the simulated future leakage is likely conservative (i.e., actual leakage during 2009-2050 will likely be greater than simulated by repeating 1962 flow conditions).

- Groundwater pumpage. Groundwater pumpage is the principal source of discharge from the aquifer system. In the Harper Lake model zone, groundwater is used to meet agricultural and domestic water needs (domestic pumpage is considered substantially less than agricultural pumpage). The USGS (2001) estimated total pumpage for the historical 1931-1999 simulation period. For the period 2000-2050, Layne Christensen repeated estimated 1999 pumpage for all model areas except the Harper Lake model zone. In the Harper Lake model zone, spatial and temporal variability in annual pumpage during 2000-2008 was simulated using well locations and annual pumping rates reported by the Mojave Water Agency (ESH 2009f). After 2008 (i.e., 2009-2050 simulation period), Harper Lake model zone pumpage was assumed constant and equal to 2008 conditions.
- Groundwater discharge from dry lakes. The model employs drain boundaries to simulate groundwater discharge from five dry lakes in the Mojave River Basin. Drain boundaries simulate groundwater discharge only; discharge is simulated when the groundwater level is greater than the average altitude of the dry lake surface, and ceases when the groundwater level is less than the dry lake surface. The average altitude of Harper (dry) Lake was specified as 2,020 feet above mean sea level, and the drain conductance controlling the discharge rate was estimated by model calibration to be 1.0 ft^2 per day (USGS 2001).

  Employing drain boundaries having elevations equal to the lakebed surface may ignore potential groundwater discharge to the atmosphere from a shallow water table. Detailed evapotranspiration studies in Death Valley indicate average annual groundwater discharge from dry, salt encrusted and bare-soil playa lakebeds at 0.13 to 0.15 foot per year, respectively (DeMeo 2003). The water table underlying the areas studied by DeMeo (2003) ranged from 5 to 10 feet below land surface. Simulated water levels beneath Harper (dry) Lake ranges from 30 to 60 feet below the lakebed surface, and therefore discharge from an underlying water table, if any, would be associated with the perched water table.
- The model employs evapotranspiration boundary conditions to simulate phreatophyte transpiration along the Mojave River and evaporation from bare-soil areas in the river channel. Groundwater discharge from evapotranspiration boundary conditions varies depending on the simulated depth to water beneath and near the river. The hydraulic communication between the Harper Lake model zone and Centro subarea is limited and therefore simulated evapotranspiration from beneath and near the Mojave River likely has a negligible effect on groundwater in the Harper

Lake model zone. Conversely, groundwater consumption in the Harper Lake model zone likely has a similarly negligible effect on evapotranspiration from beneath and near the Mojave River.

- The downstream end of the Mojave River basin model employs a general-head boundary condition to simulate underflow from the Mojave River and groundwater discharge from the regional basin. The characteristics of this boundary were determined by the USGS (2001), and due to its significant distance from the Centro subarea (over 40 miles), variability in discharge at this boundary is assumed relatively insignificant to groundwater conditions in the Harper Lake model zone.

Parameters

The two aquifer properties specified in the model are transmissivity and storage coefficient (specific yield and specific storage). Transmissivity is a measure of flow through a strip of aquifer of unit width under a unit hydraulic gradient. The storage coefficient is the volume of water released or added to storage per unit surface area per unit change in groundwater level. In unconfined aquifers, the storage coefficient is the specific yield, which is a measure of the water drained from the saturated aquifer material under the force of gravity. In confined aquifers, the storage coefficient is the specific storage, which is a measure of the water released from compression of the aquifer structure and expansion of the water in response to the decline in pressure. The specific storage is typically two to four orders of magnitude less than the specific yield (Todd 1980).

Transmissivity

Transmissivity is a measure of the aquifer's ability to transmit water. There is almost always uncertainty in the magnitude and distribution of transmissivity owing to the inherent uncertainty of natural heterogeneous systems. The transmissivity distribution in the model was determined by model calibration (USGS 2001). In layer 1 of the Harper Lake model zone, the transmissivity ranges from 500 ft^2/day near Harper (dry) Lake to 10,000 ft^2/day in the Hinkley Valley. In layer 2, the transmissivity is everywhere 3,500 ft^2/day (due to a local high in the underlying bedrock surface, layer 2 is inactive where Hinkley Valley groundwater exits into the Harper Lake model zone). The modeled transmissivity values are generally within the range of previously reported transmissivity values for the regional aquifer system (300 to 13,400 ft^2/day, ESH 2009f). Simulated inflow to the Harper Lake model zone during 1931-1994 averaged 1,720 acre-feet per year and is within the range of 22 to almost 3,000 acre-feet per year estimated by previous studies (CSU Fullerton, 2007); the most recent (2007) study cited by CSU Fullerton (2007) was reported by Aquifer Science and Technology and their estimate was 1,468 acre-feet per year.

Due to potential uncertainty in transmissivity, model simulations considered a range in transmissivity values. Uncertainty was considered by conducting parallel simulations that uniformly multiplied Harper Lake model zone transmissivity values by factors of 0.5 and 1.5 (a 50% change in modeled transmissivity).

Storage Coefficient

The USGS (2001) calibrated value for the specific yield of the regional aquifer was 0.12, which agrees with previously reported values (ESH 2009f). The confined storage coefficient employed by the USGS (2001) was 7.0×10^{-6}, which for the assumed 700-feet thick aquifer represented by layer 2 corresponds to a specific storage of 1×10^{-8}. This is an uncharacteristically low specific storage (typical values for California alluvial basins are on the order of 1×10^{-6}). Model tests conducted by staff indicated simulated water levels in the Harper Lake model zone are substantially more sensitive to changes to specific yield than changes to specific storage. There is uncertainty in the magnitude and distribution of specific yield and specific storage, and uncertainty was considered by conducting parallel simulations that multiply specific yield and specific storage values by factors of 0.75 and 1.25 (a 25% change in modeled storage coefficient)..

Faults

The Horizontal Flow Barrier Package is employed to simulate the hydrologic effects of internal faulting within the Mojave River groundwater system. It represents faults as thin, vertical, low-permeability geologic features located at the boundary between two adjacent model cells.

In the Harper Lake model zone, two faults are simulated (the Lockhart and Mt. General faults). These barriers are defined in the model by their hydraulic characteristic, which is the hydraulic conductivity of the fault divided by the width of the fault ($time^{-1}$); the hydraulic characteristic was determined by model calibration. Model calibration efforts concluded that the upper portion of the Lockhart Fault (layer 1) did not significantly influence horizontal groundwater movement, whereas the lower portion of the fault (layer 2) had a calibrated hydraulic characteristic of 1×10^{-4} ft^2/day (USGS 2001). The upper and lower portions of the Mt. General Fault both had calibrated hydraulic characteristics of 1×10^{-8} ft^2/day.

There likely is uncertainty in the magnitude of the hydraulic characteristic, and the effects of this uncertainty was considered by conducting parallel simulations that multiplied and divided the hydraulic characteristic by a factor of 10.0.

MODEL RESULTS

For the purposes of this assessment, staff utilized a modified version of the USGS Mojave River Basin model provided by the project applicant (EHS 2010h). Staff modified the project applicant’s update to improve agreement between USGS reported simulated water levels. **Soil & Water Appendix B Table 1** below compares 1999 water levels at six well locations simulated by the USGS (2001) and simulated by the model version provided by the applicant (EHS 2010h). The water levels simulated by the applicant’s version are on average about eight feet greater than simulated by the USGS. Staff corrected this discrepancy by replacing the initial water levels utilized by the applicant’s model with the actual values provided by the USGS (Steven Phillips, December 29, 2009, written communication). After completing this modification, the discrepancy between the two models was corrected. Staff utilized this modified version to assess the USGS calibration for the Harper Lake model zone and project future water level and groundwater storage changes due to water use by the proposed Abengoa Mojave Solar (AMS) project.

Soil & Water Appendix B Table 1
Comparisons between Water Levels Simulated by USGS (2001) and Applicant and Staff Versions of the Model

Well ID	Cell (row, column)	1999 Water Level (stress period 138)		
		USGS (2001)	Applicant (2/2010)	Staff (2/2010)
11N/4W-19E2	24,48	1,933	1,939	1,933
11N/4W-19J1	25,51	1,930	1,936	1,930
11N/4W-28R1	29,56	1,947	1,953	1,947
11N/4W-31J3	31,51	1,955	1,969	1,955
11N/4W-32A2	29,54	1,937	1,944	1,937
11N/5W-24L1	25,47	1,933	1,940	1,933

Calibration and 1995-2008 Post Audit

Simulated and observed groundwater levels at well locations in and near the Harper Lake model zone are plotted in **Soil and Water Appendix B Figure 1**. The observed and simulated hydrographs are generally consistent with the conceptual model; since the 1950's, observed and simulated water levels decline in response to groundwater consumption by agriculture but most begin to recover starting in the 1990's as a result of the adjudication settlement and declining agricultural demand for water. There is considerable spatial variability in the absolute differences between observed and simulated water level magnitudes and trends. Because simulated recharge is small, and the simulated transmissivity distribution in the Harper Lake model zone is fairly uniform, the differences between observed and simulated water levels are likely due to the uncertainty between actual and simulated groundwater pumping. This is most evident in wells 11N/4W-19L1 and -31H1, and 11N/5W-13H1 and -24A1. Prior to the 1970's, the water levels in these wells suggest the simulated annual pumping patterns are substantially different from the longer-term average trend simulated by the model.

The Mojave River Basin groundwater-flow model was calibrated by the USGS (2001), and the model simulates generally greater Harper Lake model zone water levels than observed. In the Harper Lake model zone, the reported root mean squared error[10] (RMSE) for 1992 transient conditions was about 25 feet (USGS 2001). In the USGS' 1995-1999 post-audit, the RMSE in the Harper Lake model zone for the 1998 transient simulation increased slightly to 30.5 feet. Staff conducted their own post audit by comparing available observed Harper Lake model zone water level data. Data was compared for the 1995-2008 period, effectively extending the USGS post audit by an additional ten years. The resulting RMSE for the entire 14 year period combined is 39 feet, indicating that the average error in projected water levels relative to observed values was almost 40 feet.

Because subsurface inflow from the Hinkley Valley and across the Lockhart Fault are the primary recharge sources, simulated inflow and water levels are sensitive to the

[10] The root mean squared error, or standard deviation, is the average of the squared differences between observed and simulated heads. It is a measure of the average error in the calibrated model.

specified transmissivity and fault hydraulic characteristic. However, adjusting these inputs had only a modest impact on the RMSE. Increasing and decreasing transmissivity by 50% resulted in RMSE values of 35 and 45, respectively. Similarly, increasing and decreasing the hydraulic characteristic of the fault by 100% resulted in RMSE values of 39 and 41, respectively.

The greatest absolute differences between simulated and observed water levels occur southwest of Harper (dry) Lake, where on average simulated water levels are 40 to more than 60 feet higher than observed (the proposed power plant is located in this general southwest area). However, simulated water levels are below the drain boundary elevations representing the dry lakebed, and no other head-dependent boundaries exist in the Harper Lake model zone that can affect groundwater storage. Because staff's assessment considered relative water level changes (for example, the change in water levels between two time periods), the absolute differences noted between observed and simulated water levels is likely not important. Rather, the relative magnitudes of simulated water level changes are important and determined mostly by simulated water level trends.

Soil & Water Appendix B Table 2
Comparison between Observed and Simulated Water Level Trends[a], 1995-2008

Well Number[b]	Post Audit Trend (ft/yr) Alpha= 0.05		
	Observed	Simulated	Obs/Sim
10N/03W-04H2	(-0.29)[c]	(0.21)	
10N/04W-10D1	0.82	0.84	1.0
10N/04W-33D1	-0.70	-0.17	4.1
11N/03W-07D1	(-5.08)	(-0.77)	
11N/03W-16D1	(-0.41)	(-1.28)	
11N/03W-28L1	(-0.54)	0.38	
11N/03W-28R2	-1.09	-0.41	2.7
11N/03W-30G1	--[d]	--	
11N/04W-29R1	2.35	3.33	0.7
11N/04W-30N1	1.66	2.41	0.7

a) Staff employed the Mann-Kendall test to determine statistically significant trends (95% confidence level) and the Sen's nonparametric estimator of slope to determine the water level change per unit time. For each well, the test first determined the slope of water level plotted versus time, then tested whether the slope was significantly non-zero at the 95% confidence level.
b) Well locations shown in **Soil and Water Appendix B Figure 1**.
c) Slopes in (parentheses) are not significant at alpha = 0.05.
d) '—' Insufficient data for trend analysis.

Staff compared observed and simulated trends in 10 wells having water level data for the 1995-2008 post-audit period (**Soil & Water Appendix B Table 2**). Data from five of the ten wells (50%) indicate statistically significant trends; although water levels in the remaining five wells also suggest trends, they are not statistically significant. The significant trends indicate water levels are increasing at three locations and decreasing at two locations. This means Harper Lake model zone pumping declines have caused water levels and groundwater storage to increase in some areas but they continue to decrease in others. The increasing water levels are observed in wells located southwest of Harper (dry) Lake, whereas the declining water levels are located in wells near Hinkley Valley and south of the Lockhart fault

The ratio between statistically significant observed and simulated water level trends ranges from 0.7 to 4.1 (average value of 1.8); simulated trends are therefore generally too steep (more positive) in the three wells where observed water levels are rising and too shallow (less negative) in the two wells where observed water levels are declining. This suggests that simulated inflows are too positive, and projected water level changes may be less than actual water level changes. A range in expected water level changes that represent the uncertainty in aquifer parameters, pumping rates, and other hydrogeologic conditions is therefore recommended to provide a margin of safety when making conclusions based on model results.

Scenarios Considered for Impact Assessment

All use of wells within a groundwater basin contributes toward a lowering of water levels at other well locations. The overlap of drawdown among two or more wells is considered significant when it changes conditions in and around an existing well affecting its yield. Staff utilized the model to simulate drawdown as a result of project groundwater use. In this analysis, drawdown is considered the change in water levels relative to the baseline (pre-project or existing) conditions. For environmental reviews conducted by the Energy Commission, the baseline is generally established as the time when the Application for Certification is submitted, which was 2009 for the AMS project. The most recent data available for staff’s assessment was from 2008, and therefore staff considered 2008 as representing baseline.

Staff’s impact assessment simulated changes in groundwater conditions during the period 2009-2050. Project wells are assumed to operate continuously beginning in 2011. During the two-year construction period, the wells are assumed to pump at their maximum design rate until construction is completed at the end of 2012. The project is assumed to begin operation in 2013 and continue for 30 years until project shut-down occurs at the end of 2042. Simulated annual conditions prior to project construction (2009-2010) and following project operation (2043-2050) are assumed equal to simulated 2008 conditions.

Uncertainty affects all models owing to the inherent uncertainty of natural heterogeneous systems. Staff reduced potential uncertainty effects by conducting sensitivity tests with the model. The sensitivity tests are parallel simulations that adjusted aquifer parameters, pumping rates, and river flows to bracket potential uncertainty in simulated drawdown and impact. For example, water level changes were simulated using Harper Lake model zone transmissivity values adjusted by plus and minus 50%. The transmissivity test results provided a range in drawdown and impacts owing to possible uncertainty in modeled transmissivity. Similar parallel simulations were completed to assess possible uncertainty in aquifer storage coefficients, fault conductance, pumping rates and Mojave River leakage. The sensitivity tests considered are as follows:

- Assumed 50% uncertainty in aquifer transmissivity modeled by multiplying transmissivity values by 0.5 and 1.5.
- Assumed 25% uncertainty in aquifer storage coefficient modeled by multiplying storage coefficients by 0.75 and 1.25.
- Assumed 100% uncertainty in vertical anisotropy modeled by multiplying the vertical hydraulic conductivity by 0.1 and 10.0.
- Assumed 100% uncertainty in fault permeability modeled by multiplying the hydraulic characteristic by 0.1 and 10.0.
- Assumed 10% uncertainty in future, non-project pumping (background pumping) modeled by multiplying background pumpage by 10.0.
- Assumed uncertainty in river leakage by specifying 1994 river flows rather than 1962 flows.[11]

RESULTS

Staff utilized the model to simulate projected water level changes owing to project pumping for construction and power plant cooling. The project applicant estimated that about 1,100 acre-feet of groundwater is required to complete construction, and at most approximately 64,800 acre-feet of groundwater is required for power plant operation over the 30-year life of the project. Total groundwater use over the life of the project is therefore almost 66,000 acre-feet. For the purposes of this assessment, simulated drawdown was calculated to assess potential well interferences at twenty-nine locations representing a sampling of the spatial distribution and extent of wells located in the Harper Lake model zone (**Soil and Water Appendix B Figure 1**).

Construction Pumping

Simulated project construction pumping begins in 2011 and continues through 2012. The project applicant estimated that almost 990 acre-feet of groundwater is required during the first six months of construction for grading, and 115 acre-feet is required for the remaining 18 months of construction (total groundwater use of 1,105 acre-feet over the two year construction period). However, Layne Christensen simulated an average annual construction rate of 3,780 acre-feet per year over the two-year period. The assumed higher pumping rate represents the maximum feasible pumping rate and was utilized to simulate maximum impacts to groundwater. The total simulated volume of groundwater extracted for construction is 7,560 acre-feet, which represents over seven times more water used than the applicant estimated will actually be required for construction. Simulated drawdown and well interferences owing to project construction pumping are therefore likely greater than expected actual changes.

[11] River discharge in 1994 (about 26,500 af) was similar to the median discharge during 1930-1994 (28,800), and simulated 1994 river conditions include more recent inflows that did not exist in 1962 (i.e., wastewater inflows, imported water introduced by the Morongo pipeline, and others).

Simulated drawdown owing to project construction pumping is summarized below in **Soil & Water Appendix B Table 3**. Simulated drawdown at 29 well locations spatially distributed across the Harper Lake model zone range from -4 to 11 feet; simulated water levels at some locations are recovering even with project pumping as a result of pumping decreases in the subarea (**Soil and Water Appendix B Figure 1**), and the negative drawdown indicates simulated water levels continue to increase at some locations after 2008. The sensitivity tests help account for potential uncertainty in model results and indicate maximum drawdown range from -2 to 18 feet.

Soil & Water Appendix B Table 3
Summary of Simulated Construction Drawdown[a]

Well	Distance to Pumping Well PW-1 (miles)	Distance to Pumping Well PW-2 (miles)	Drawdown (feet)	Maximum from Sensitivity Tests	
				Drawdown (feet)	Test Name[b]
10N/03W-04H2	8.0	6.4	-4	-2	Riv(94)
10N/04W-10D1	3.0	1.6	0	3	0.1*Kv
10N/04W-33D1	6.5	5.7	1	1	10*Fault
10N/05W-03J1	3.8	4.9	1	1	1.1*W
11N/03W-7D1	6.1	5.5	1	3	0.5*T
11N/03W-16D1	7.3	6.4	1	4	0.5*T
11N/03W-28L1	7.4	6.0	-2	1	0.5*T
11N/03W-28R2	7.8	6.4	-2	1	0.5*T
11N/03W-30A1	5.5	4.1	-1	1	0.5*T
11N/03W-30G1	5.5	4.1	-1	1	0.5*T
11N/03W-34F1	8.1	6.6	-3	0	0.5*T
11N/04W-04R1	4.4	4.8	1	2	0.5*T
11N/04W-06E1	4.4	5.6	0	1	0.5*T
11N/04W-19E2	1.7	3.3	-1	3	0.1*Kv
11N/04W-19J1	1.1	2.5	3	6	0.1*Kv
11N/04W-19L1	1.5	3.0	0	4	0.1*Kv
11N/04W-19Q1	0.9	2.5	4	8	0.1*Kv
11N/04W-28R1	1.8	0.6	6	11	0.1*Kv
11N/04W-29R1	0.7	0.9	9	15	0.1*Kv
11N/04W-30N1	1.2	2.8	2	7	0.1*Kv
11N/04W-31A1	1.3	2.8	3	8	0.1*Kv
11N/04W-31H1	0.6	1.7	11	18	0.1*Kv
11N/04W-31J3	1.0	1.7	5	9	0.1*Kv
11N/04W-32A1	0.9	0.8	10	16	0.1*Kv
11N/04W-32A2	0.9	0.7	10	16	0.1*Kv
11N/04W-35G1	3.4	1.8	0	0	0.1*Kv
11N/05W-13H1	2.8	4.3	-1	1	0.1*Kv
11N/05W-24A1	2.0	3.6	-1	2	0.1*Kv
11N/05W-24L1	2.1	3.7	-2	1	0.1*Kv

a: Simulated present-day (2008) water level minus the simulated water level at the end of the project period (2042). Negative drawdown indicates water levels at the end of the project period are greater than present-day water levels.
b: Riv(94) replaces 1962 river flows with 1994 values; Kv is vertical hydraulic conductivity; Fault is the hydraulic characteristic; T is transmissivity; and, W is wells (or pumping rate).

Thirty-Year Project Pumping

Simulated project pumping begins in 2013 and continues through 2042. The simulated annual pumping rate is 2,160 acre-feet per year. The simulated water level changes include the pumping effects for power plant cooling, and therefore represent the combined impact from both construction and power plant operation.

Simulated drawdown owing to project construction and power plant pumping are summarized below in **Soil & Water Appendix B Table 4**. Simulated drawdown at 29 well locations distributed spatially across the Harper Lake model zone range from -10 to 16 feet; simulated water levels at some locations are recovering as a result of pumping decreases in the subarea (**Soil & Water Appendix B Figure 1**), and the negative drawdown indicates simulated water levels 2008 continue to increase even with project construction and operational pumping. The sensitivity tests help account for potential uncertainty in the model results and indicate maximum drawdown at the same locations range from -2 to 19 feet.

Soil & Water Appendix B Table 4
Summary of Simulated Project Pumping Drawdown[a]

Well	Distance to Pumping Well PW-1 (miles)	Distance to Pumping Well PW-2 (miles)	Drawdown (feet)	Maximum from Sensitivity Tests	
				Drawdown (feet)	Test Name[b]
10N/03W-04H2	8.0	6.4	-10	-2	0.5*T
10N/04W-10D1	3.0	1.6	6	8	0.5*T
10N/04W-33D1	6.5	5.7	6	7	0.5*T
10N/05W-03J1	3.8	4.9	5	6	0.5*T
11N/03W-07D1	6.1	5.5	5	19	0.5*T
11N/03W-16D1	7.3	6.4	1	19	0.5*T
11N/03W-28L1	7.4	6.0	-6	7	0.5*T
11N/03W-28R2	7.8	6.4	-6	6	0.5*T
11N/03W-30A1	5.5	4.1	-2	9	0.5*T
11N/03W-30G1	5.5	4.1	-2	9	0.5*T
11N/03W-34F1	8.1	6.6	-8	3	0.5*T
11N/04W-04R1	4.4	4.8	8	15	0.5*T
11N/04W-06E1	4.4	5.6	8	11	0.5*T
11N/04W-19E2	1.7	3.3	5	8	0.75*Sc
11N/04W-19J1	1.1	2.5	9	13	1.1*W
11N/04W-19L1	1.5	3.0	7	9	1.1*W
11N/04W-19Q1	0.9	2.5	10	13	1.1*W
11N/04W-28R1	1.8	0.6	11	14	0.5*T
11N/04W-29R1	0.7	0.9	15	18	1.1*W
11N/04W-30N1	1.2	2.8	8	11	0.75*Sc
11N/04W-31A1	1.3	2.8	9	12	0.75*Sc
11N/04W-31H1	0.6	1.7	16	19	0.75*Sc
11N/04W-31J3	1.0	1.7	11	14	0.75*Sc
11N/04W-32A1	0.9	0.8	15	18	0.5*T
11N/04W-32A2	0.9	0.7	16	19	1.1*W
11N/04W-35G1	3.4	1.8	4	8	0.5*T
11N/05W-13H1	2.8	4.3	5	7	1.1*W
11N/05W-24A1	2.0	3.6	4	7	0.75*Sc
11N/05W-24L1	2.1	3.7	3	6	0.75*Sc

a: Simulated present-day water level (2008) minus the simulated water level at the end of the project (2042). Negative drawdown indicates water levels at the end of the project period are greater than present-day water levels.
b: T is transmissivity; Sc is storage coefficient; and, W is wells (or pumping rate).

Groundwater Storage Changes

Soil & Water Appendix B Figure 2 shows simulated water level changes at individual wells without and with AMS project pumping. Without the project, continued pumping at 2008 rates results in water levels in Harper Lake model zone wells remaining steady or gradually increasing over the 32-year planning period. The increase in pumping introduced by the project causes simulated water levels in most Harper Lake model zone wells to decline and groundwater storage to decrease. **Soil & Water Appendix B Figure 3** shows the mapped difference between simulated 2042 water levels with and without proposed project pumping (the difference herein is referred to as the "impact"). After 32-years of project pumping (two years pumping for construction water use and 30-years operational water use), the impact propagates throughout most of the Harper Lake model zone and into the adjacent southwestern portions of the Centro subarea.

Soil & Water Appendix B Table 5 below summarizes the groundwater budget changes in the Harper Lake model zone and compares simulated inflow (subsurface flow across the Lockhart Fault and through the Hinkley Valley), groundwater storage, and pumping. Without project pumping, the negative storage change in **Soil & Water Appendix B Table 5** indicates groundwater flow is out of the dynamic groundwater-flow system and into aquifer storage (i.e., Harper Lake model zone pumping is less than total simulated inflow thereby adding water to groundwater storage and causing water levels to increase). In contrast, with project pumping the storage change is positive and indicates groundwater flow is out of storage and into the dynamic groundwater-flow system (i.e., Harper Lake model zone pumping is greater than total inflow thereby removing groundwater from storage and causing water levels to decrease).

Soil & Water Appendix B Table 5
Summary of Simulated Inflows and Storage Changes,
2011-2042 (acre-feet per year)

Scenario	Pumping	Irrigation Returns	Lockhart Fault	Hinkley Valley	Storage Change
Without Project	-5,490	1,050	1,150	3,850	-570
With Project	-7,750	1,050	1,510	3,900	1,290
Change	-2,260[a]	0	360	50	1,860

a: Two years pumping 3,780 acre-feet per year, and 30 years pumping 2,160 acre-feet per year resulting in an annual weighted average pumping rate of 2,260 acre-feet per year.

Soil & Water Appendix B Table 5 indicates that project pumping removes 1,860 acre-feet per year of groundwater from storage in the Harper Lake model zone; about 570 acre-feet per year that otherwise would have increased storage, and 1,290 acre-feet per year of water stored in place prior to the start of project construction. The remaining 400 acre-feet per year of project pumping is supplied by removing water in storage from the rest of the Centro subarea (not reported in **Soil & Water Appendix B Table 5**).

Soil & Water Appendix B Table 6 compares the simulated storage changes due to project pumping represented by the water level change mapped in **Soil & Water Appendix B Figure 3**. Simulated storage changes were compared to accessible and total groundwater storage in place within the Harper Lake zone and remaining Centro subarea.[12] Staff utilized simulated water levels and the well construction information summarized in **Soil & Water Table 5** to estimate accessible groundwater in place (the water within the saturated zone between the water table and bottom of existing wells) and total storage in place (the water within the saturated zone between the water table and base of the aquifer represented by the model). Results indicated that project pumping consumes about 3% of the accessible groundwater in place within the Harper Lake model zone, about 1% of the total storage volume in place within the Harper Lake model zone, and less than 0.1% of the total storage volume in place within the remainder of the Centro subarea.

Soil & Water Appendix B Table 6
Simulated Total Storage Volumes and Storage Reductions

	Harper Lake Model Zone (59,500 acre-feet storage reduction)		Centro Subarea[a] (12,500 acre-feet storage reduction)	
	Total storage volume (acre-feet)	Storage volume reduction as a percent of total	Total storage volume (acre-feet)	Storage volume reduction as a percent of total
Water table to average well bottom	1,740,500	3.4	---	---
Water table to aquifer bottom	4,945,550	1.2	13,533,300	0.09

a: Excludes Harper Lake model zone, which is located within the larger Centro subarea.

Soil & Water Appendix B Figure 4 compares simulated groundwater storage changes relative to the accessible storage both in terms of volume and as a percent. The simulated storage change is less than 5% (about 3%) of the groundwater currently accessible in the Harper Lake model zone, and therefore project pumping is considered to have a negligible effect on groundwater storage.

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[12] Total simulated storage volume was estimated using results from the groundwater-flow model. First, the simulated saturated thickness in each model cell was calculated by subtracting the elevation of the bottom of the aquifer from the simulated water table elevation. The unsaturated and saturated aquifer thickness represented by the model is 800 feet; accordingly, the bottom of the modeled aquifer was determined for each model cell by subtracting 800 feet from land surface elevation. Land surface elevation was determined using a Digital Elevation Model (DEM) obtained from the U.S. Geological Survey geographic data distribution website (seamless.usgs.gov). The DEM used in this analysis had a cell size of 10 meters. The land surface elevation for each model cell was determined by averaging the elevation of all DEM cells within each model cell using ArcMap GIS software. The volume of groundwater was then calculated for each cell by multiplying the saturated thickness by the cell area and its modeled specific yield. The resulting water volumes for each cell were then summed to estimate total storage volume. Similarly, accessible storage in the Harper Lake model zone was estimated by subtracting the average well depth (365 feet below ground surface) from the simulated groundwater elevation in each model cell, and then multiplying this thickness by the model cell area and specific yield. Data was not available to calculate average well depth in the rest of the Centro subarea, and therefore accessible storage could not be estimated for this portion of the model area.

CONCLUSIONS

Layne Christensen Company applied numerical groundwater-flow modeling to assess potential impacts resulting from the proposed extraction and use of groundwater for construction and power plant cooling (ESH 2009f). They employed a pre-existing, three-dimensional numerical groundwater-flow model of the Mojave River Basin developed by the U.S. Geological Survey (USGS 2001) to conduct their impact assessment. The USGS version simulated groundwater conditions from 1931 through 1999 and, for the purposes of their analysis, Layne Christensen updated and extended the data sets to simulate conditions during the period 2000-2050. Their updated data sets assumed the following.

- Simulated irrigation-return flows (about 1,050 acre-feet per year) were assumed constant and equal to 1999 conditions.
- Annual simulated stream flow conditions were assumed constant and equal to historical 1962 conditions. They chose 1962 because the simulated stream inflow (62,580 acre-feet) was considered approximately the same as the average value for the 1931-1999 simulation (71,600 acre-feet).
- Spatial and temporal variability in annual pumpage during 2000-2008 was simulated using well locations and annual pumping rates reported by the Mojave Water Agency (ESH 2009f). After 2008 (i.e., 2009-2050), annual pumpage was assumed constant and equal to 2008 conditions.

Staff revised the project applicant's update to improve agreement between simulated water levels reported by the USGS(2010). Historical Harper Lake model zone water levels simulated by the applicant's model version are on average about eight feet greater than simulated by the USGS. Staff corrected this discrepancy by replacing the initial water levels utilized by the applicant's model with the actual values provided by the USGS. After completing this modification, the discrepancy between the two models was corrected and staff utilized the modified version to assess the USGS calibration for the Harper Lake model zone and groundwater changes resulting from the proposed Abengoa Mojave Solar Plant.

Model construction and simulated water level trends are generally consistent with the conceptual model; since the 1950's, water levels decline in response to groundwater consumption by agriculture but begin to recover starting in the 1990's as a result of the adjudication settlement and declining agricultural demand for water (**Soil & Water Appendix B Figure 1**). The model simulations employed a water level closure criterion of 1-foot and have typical mass balance errors of less than 0.2%. Model tests conducted by staff indicated that simulated water levels are accurate to the nearest foot or less.

Staff compared observed and simulated water levels and trends in ten wells having water level data for the 1995-2008 period. The resulting RMSE for the 14 year period combined is 39 feet, indicating that the average error in projected water levels relative to observed values was almost 40 feet. Data from five of the ten wells indicate statistically significant trends; water levels are increasing at three locations and decreasing at two locations. The ratio between observed and simulated statistically significant trends ranges from 0.7 to 4.1 (average value of 1.8); simulated trends are therefore generally too steep (more positive) in the three wells where observed water levels are rising and too shallow (less negative) in the two wells were observed water levels are declining. This suggests that simulated inflows are too positive, and projected water level changes may be less than actual water level changes. A range in expected water level changes that represent the uncertainty in aquifer parameters, pumping rates, and other hydrologic conditions was therefore implemented to provide a margin of safety regarding simulated well interferences and potential impacts to groundwater. The sensitivity tests considered were as follows.

- Assumed 50% uncertainty in aquifer transmissivity modeled by multiplying transmissivity values by 0.5 and 1.5.
- Assumed 25% uncertainty in aquifer storage coefficient modeled by multiplying storage coefficients by 0.75 and 1.25.
- Assumed 100% uncertainty in vertical anisotropy modeled by multiplying the vertical hydraulic conductivity by 0.1 and 10.0.
- Assumed 100% uncertainty in fault permeability modeled by multiplying the hydraulic characteristic by 0.1 and 10.0.
- Assumed 10% uncertainty in future, non-project pumping (background pumping) modeled by multiplying background pumpage by 10.0.
- Assumed uncertainty in river leakage by specifying 1994 river flows rather than 1962 flows.

The most recent data available for staff's assessment was from 2008, and therefore staff considered 2008 as representing baseline groundwater conditions. Staff summarized the simulated groundwater conditions regarding groundwater impacts from project pumping.

- For project construction, simulated drawdown at 29 well locations range from -4 to 11 feet; observed water levels at some locations are recovering as a result of pumping decreases in the subarea (**Soil & Water Appendix B Figure 2**), and the negative drawdown indicates simulated water levels in 2012 are greater than 2008 even with project construction pumping. Sensitivity tests to account for potential uncertainty in model input indicate maximum drawdown may range from -2 to 18 feet.
- For project pumping (combined two-years of construction pumping and 30 years of operational pumping), simulated drawdown at 29 well locations range from -10 to 16 feet; observed water levels at some locations are recovering as a result of pumping decreases in the subarea (**Soil & Water Appendix B Figure 2**), and the negative drawdown indicates simulated water levels in 2042 are greater than 2008 even with project pumping. Sensitivity tests to account for potential uncertainty in model input indicate maximum drawdown at the same locations may range from -2 to 19 feet.
- Proposed project pumping removes 1,860 acre-feet per year of groundwater from storage in the Harper Lake model zone; about 570 acre-feet per year of water that otherwise would have contributed to increased aquifer storage and 1,290 acre-feet per year from storage in place prior to the start of project construction in 2011.

Hence, by 2042 approximately 59,500 acre-feet of groundwater is removed from storage by the project (41,300 acre-feet of water stored in place and an additional 18,200 acre-feet of water that would have been added to storage). As a result, model results indicate future water levels will decline during the construction and operation period of the project (2011-2042).

- Simulated water level decline occurs in both the Harper Lake model zone and across the Lockhart Fault into other portions of the Centro subarea (**Soil & Water Appendix B Figure 3**). Simulated project pumping removes 1,860 acre-feet per year of groundwater from storage in the Harper Lake model zone and 400 acre-feet per year from the remaining portions of the Centro subarea. Over the 32-year life of project construction and operation, simulated pumping will remove 59,500 and 12,800 acre-feet of groundwater from these two areas, respectively. These simulated storage reductions represent 1% of the simulated total storage volume in place within the Harper Lake model zone and less than 0.1% of the total simulated storage volume in place within the remaining portions of the Centro subarea (**Soil & Water Appendix B Table 6**). The simulated storage change is less than 5% (about 3%) of the groundwater currently accessible for extraction from the Harper Lake model zone (**Soil & Water Appendix B Figures 4**), and therefore project pumping is considered to have a negligible effect on groundwater storage.

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SOIL AND WATER RESOURCES - APPENDIX C

FACTS FOR WASTE DISCHARGE REQUIREMENTS

1. REASON FOR ACTION AND REGULATORY AUTHORITY

The Discharger submitted a Report of Waste Discharge/Joint Technical Document (hereafter collectively referred to as the RWD) with the California Energy Commission (Energy Commission) and Lahontan Regional Water Quality Control Board (Lahontan Water Board). The Energy Commission will coordinate reviews and approvals with the regulatory agencies to ensure that the proposed project meets the California Environmental Quality Act (CEQA) requirements and conforms with the Porter-Cologne Water Quality Control Act. The Energy Commission will certify this project and has included waste discharge requirements (WDRs) as conditions of certification in accordance with the Warren-Alquist Act[13]. The WDRs are not being proposed by staff of the Regional Board to its Board for consideration and adoption at this time. Once the Energy Commission certifies the proposed project, the Board of the Lahontan Water Board under Section 13263 of the Water Code may prescribe these requirements as WDRs solely for the purpose of enforcement, annual fee collection, inspection and monitoring, and related purposes, but any action of the Board of the Regional Board under Section 13263 of the Water Code must be consistent with the Warren-Alquist Act, including without limitation the non-reviewability provision of subdivision (c) of Section 25531 of the Public Resources Code.

The applicant filed an Application for Certificate (AFC) with the Energy Commission in July 2009. The applicant is proposing the construction and operation of a 250-megawatt (MW) solar power plant from twin, independently-operable solar fields, each feeding a 125-MW power island.

Under the Warren-Alquist Act, and Governor's Executive Order S-14-08, the Energy Commission has the authority to streamline permitting for renewable energy generation facilities. The Energy Commission implements this "in lieu of" process by incorporating the regulatory requirements and conditions of the various local and State agencies in its certification process. All necessary State and local permits for this Facility, including those permits typically issued by the Water Board, can be issued to the applicant through the Energy Commission's certification process.

[13] The Warren-Alquist State Energy Resources Conservation and Development Act is the enabling legislation for the California Energy Commission. The Act is codified as Public Resources Code (PRC), Section 25000 et seq. PRC Section 25500 establishes the Commission's authority to certify all sites and related facilities for thermal power plants with power ratings of 50 megawatts or more. The section further declares that "the issuance of a certificate by the commission shall be in lieu of any permit, certificate, or similar document required by any state, local or regional agency, or federal agency to the extent permitted by federal law, for such use of the site and related facilities, and shall supersede any applicable statute, ordinance, or regulation of any state, local, or regional agency, or federal agency to the extent permitted by federal law."

In a February 26, 2010 letter, the U.S. Army Corps of Engineers (USACE) determined that the ephemeral drainages on the site are not waters of the United States (U.S.). However, the drainages affected by the Facility are waters of the State, as defined by California Water Code (Water Code) section 13050, and are subject to State requirements in accordance with Water Code section 13260 and to the Water Quality Control Plan for the Lahontan Region (Basin Plan). All actions impacting or potentially impacting these drainages, construction and industrial activities, will be regulated through these requirements, which will be incorporated in the Energy Commission's certification process.

2. WASTE DISCHARGE REQUIREMENTS HISTORY

The Facility is a new project. There are no previous Lahontan Water Board actions at this Facility or location. These requirements for waste discharge address storm water and groundwater requirements for the Facility.

3. CLIMATE

The Mojave Desert has a typical desert climate, i.e., extreme daily temperature changes, low annual precipitation, strong seasonal winds, and mostly clear skies. The annual highest temperature in the Mojave Desert exceeds 100 degrees Fahrenheit. Winter temperatures are more moderate, with mean maximum temperatures in the 60s and lows in the 30s.

Nearby City of Barstow has a total average annual precipitation of less than 6 inches. Over 70% of the precipitation occurs between December and March. However, occasional heavy precipitation occurs in the summer due to thunderstorms.

4. SITE GEOLOGY

A. Setting

The Facility is located in Harper Valley at the northwest edge of the Mojave Desert Geomorphic Province. Shallow deposits consist of Holocene (11,000 years and younger) alluvium, lacustrine, and playa deposits. Deeper deposits consist of older alluvium. The Holocene and older alluvium are comprised of mixtures, layers, and lenses of silt, sand, and gravel. The lacustrine and playa deposits are generally finer grained, consisting of sands, silts, and clays. These deposits overlie igneous or metamorphic basement rocks at depth. The elevation of the Facility ranges from 2,010 feet to 2,020 feet above mean sea level.

B. Faulting and Seismicity

The Facility is located in a seismically active region of southern California and within the influence of several active fault systems (northeast-trending Garlock fault to the north and the northwest-trending San Andreas Fault to the south). The northwest-trending Lenwood-Lockhart-Old Woman Springs fault is located approximately 2,300 feet southwest of the Facility.

C. Soils

Most of the Facility is covered by soil types that have rapid (i.e., high) permeability and negligible to low runoff potential. The exceptions are areas underlain by clay loams, which have moderate runoff potential and moderate to moderately slow permeability (i.e., low permeability). Clay loam soils are present in the northeast portion of the Facility and are slightly to moderately saline.

5. GROUNDWATER

The Facility is located in the central portion of the Harper Valley groundwater basin (Department of Water Resources [DWR] groundwater basin No. 6-47). The Harper Valley groundwater basin is divided into several subbasins based on the presence of bedrock barriers and faults that influence groundwater movement.

The Facility site overlies the Harper Lake groundwater sub-basin. Depth to perched groundwater is approximately 50 feet below ground surface (bgs) in the vicinity of Harper Lake. Depth to the regional groundwater table measured at the Facility ranged from approximately 150 to 170 feet below ground surface. Since agriculture use ceased in the 1980s, groundwater levels are slowly recovering. A groundwater depression still exists in the northeastern portion of the site. The groundwater flow direction in the sub-basin is generally toward Harper Lake. The primary source of water to the groundwater basin is from surface infiltration at the base of the mountains and in ephemeral washes. Additionally, there may be some groundwater flow into the Harper Lake subbasin from the adjacent subbasins.

In accordance with State Water Resources Control Board (State Water Board) Resolution No. 75-58, *Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Powerplant Cooling* and Resolution No. 77-01, *Policy with Respect to Water Reclamation in California*, the applicant has evaluated alternative water sources for Facility operation.

In the vicinity of Harper Lake, some groundwater wells produce water with total dissolved solids (TDS) greater than 1,500 milligrams per liter.

6. SURFACE WATER

Surface water flow in Harper Valley is to Harper Lake, a saline wet playa. The playa is a flat, unvegetated area in the lowest part of this undrained valley. All drainages in this portion of the valley exist as ephemeral washes.

7. LAND USES AND EXISTING SITE CONDITIONS

The approximately 1,765-acre site is on previously disturbed fallow agricultural land.

8. STORM WATER DISCHARGES

Under pre-development conditions, the Facility site has a low gradient (between 1 and 3%) and storm water moves via sheet flow to Harper Lake.

The following requirements regulate waste discharges in storm water runoff and other discharges associated with Facility construction activity and industrial storm water runoff.

A. <u>Construction Storm Water Management</u>

The applicant estimates that the construction phase will last six months, during which time the entire Facility site would be regraded and an unnamed wash will be rerouted and channelized. Site drainage would be managed in accordance with the best management practices (BMPs) as described in the Drainage, Erosion, and Sediment Control Plan (DESCP) and Final Storm Water Pollution Prevention Plan (SWPPP) to be prepared by the project owner in accordance with these WDRs (see Soil and Water Appendix D).

The applicant has proposed a channel design that would convey the 100-year flood event (21,232 cubic feet per second) between the northern (Alpha) field and southern (Beta) field without overtopping the banks. The channel will redirect flows to Harper Lake.

B. <u>Post-Construction Storm Water Management</u>

The applicant proposes to manage storm water, erosion and sedimentation at the completed Facility through a comprehensive system of source controls, treatment BMPs, and site design. At a minimum, the applicant proposes to adhere to San Bernardino County's detention and retention requirements.

Onsite storm water would be contained onsite. Offsite flow in the unnamed wash would be conveyed across the site, without any input from onsite flows, and discharged into Harper Lake. The power block would drain via sheet flow away from equipment foundations to the solar field. Good housekeeping and prompt removal of spills and leaks would be implemented to minimize storm water contact with contaminated materials.

9. RECEIVING WATERS

The receiving waters are the minor surface waters of the Lockhart Hydrologic Area (Hydrologic Subunit 628.42) and groundwaters of the Harper Valley Ground Water Basin (DWR No. 6-47).

10. LAHONTAN BASIN PLAN

The Lahontan Water Board adopted a Water Quality Control Plan for the Lahontan Basin (Basin Plan), which became effective on March 31, 1995. These Facts, Requirements, and Monitoring and Reporting for Groundwater implement the Basin Plan.

11. BENEFICIAL USES -SURFACE WATERS

The Basin Plan designates beneficial uses for surface waters in each watershed of the Lahontan region. Beneficial uses of surface waters within the Facility area and vicinity that could be impacted by the Facility include:

a. Municipal and Domestic Water Supply (MUN)

b. Agricultural Supply (AGR)

c. Groundwater Recharge (GWR)

d. Flood Peak Attenuation/Flood Water Storage (FLD)

e. Water Contact Recreation (REC-1)

f. Non-Contact Water Recreation (REC-2)

g. Warm Freshwater Habitat (WARM)

h. Cold Freshwater Habitat (COLD)

i. Wildlife Habitat (WILD)

j. Water Quality Enhancement (WQE)

12. BENEFICIAL USES -GROUNDWATERS

The Basin Plan designates beneficial uses for groundwaters in each watershed of the Lahontan region. Beneficial uses of groundwaters within the Facility area and vicinity that could be impacted by the Facility include:

a. Municipal and Domestic Water Supply (MUN)

b. Agricultural Supply (AGR)

c. Industrial Surface Supply (IND)

d. Freshwater Replenishment (FRSH)

13. NON-DEGRADATION

The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16 (*Statement of Policy with Respect to Maintaining High Quality of Waters in California*). Resolution No. 68-16 requires that existing quality of waters be maintained unless degradation is justified based on specific findings or facts. The Basin Plan implements, and incorporates by reference, state antidegradation policies. The permitted discharge is consistent with the antidegradation provision of Resolution No. 68-16 because either the permitted discharge will not be released into the environment or because adherence to these requirements will result in minor, if any, adverse impacts to water quality.

In accordance with State Water Board Resolution No. 68-16 and the Basin Plan, the following conditions must be met prior to any degradation of water of the State:

a. Any change in water quality must be consistent with maximum benefit to the people of the State;

b. The degradation will not unreasonably affect present and anticipated beneficial uses;

c. The degradation will not result in water quality less than that prescribed in the Basin Plan;

d. Discharges must use the best practicable treatment or control to avoid pollution or nuisance and maintain the highest water quality consistent with maximum benefit to the people of the State.

14. OTHER CONSIDERATIONS AND REQUIREMENTS FOR DISCHARGE

Pursuant to Water Code section 13241, these requirements take into consideration:

a. *Past, present, and probable future beneficial uses of water*.

These requirements identify past, present and probable future beneficial uses of water as described in Facts Nos. 11 and 12. The proposed discharge will not adversely affect present or probable future beneficial uses of water, including domestic water supply, agricultural supply, industrial supply, and freshwater replenishment.

b. *Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto*.

Facts Nos. 3 through 8 describe the environmental characteristics and quality of water from this hydrographic unit.

c. Water quality conditions that could reasonably be achieved through the coordinated control of all factors that affect water quality in the area.

These requirements will not result in any significant changes to groundwater quality. Adverse effects to surface water quality will be minimized.

d. *Economic considerations*.

These requirements authorize the applicant to implement closure and post-closure maintenance actions at the Facility as proposed by the applicant. These requirements accept the applicant's proposed actions as meeting the best practicable control method for protecting water quality from impacts from the Facility.

e. *The need for developing housing within the region*.

The Discharger is not responsible for developing housing within the region.

f. *The need to develop and use recycled water*.

The Energy Commission and the applicant are evaluating the feasibility of using recycled water as the water source for Facility operations.

15. DESCRIPTION OF SURFACE IMPOUNDMENTS (EVAPORATION PONDS)

The four proposed surface impoundments would be lined evaporation ponds used for disposal of process wastewater generated primarily as spent cooling water and process water. The surface impoundments would be waste management units. The anticipated total dissolved solids (TDS) concentration of the wastewater is approximately 60,000 milligrams per liter (mg/L). Wastewaters would be co-mingled in the surface impoundments, which provide a combined evaporation surface of approximately 20 acres (four surface impoundments each with a nominal surface area of five acres). The collective operating capacity of the surface impoundments would be designed to accommodate an annual discharge rate of 24 gallons per minute (0.035 million gallons per day).

Saturated or equilibrium concentrations of impounded wastewaters result in precipitation of solids out of solution. For safety and operational purposes, accumulated solids would be to be removed from the surface impoundments when the solids reach a depth of two feet above the bottom of the impoundment. The surface impoundments must be designed to contain the 1,000-year, 24-hour precipitation storm event (pursuant to California Code of Regulations (CCR), title 27, section 20310) while maintaining the mandatory 2-foot freeboard requirement.

16. SURFACE IMPOUNDMENTS CONSTRUCTION DESIGN

The proposed design for the four surface impoundments, from the surface downwards, consists of the following:

a. A hard surface/protective layer with granular fill/free draining sub-base over geotextile;

b. A primary 60-mil high-density polyethylene (HDPE) liner;

c. An interstitial leak detection and removal system (LDRS) comprising a geomembrane geonet and collection piping;

d. A secondary 40-mil HDPE liner; and

e. A base layer consisting of one foot of onsite screened soil below the lower liner, which contains no particles larger than one-quarter inch and which is compacted to 95% of the maximum dry density per ASTM D1557, or a 6-inch sand layer to prevent punctures.

f. A leak detection system consisting of continuous carrier pipes installed at the sides and low point of each surface impoundment at a depth of approximately five feet below the secondary liner. A neutron probe will be pulled through the pipes to assess the moisture content of the vadose soil. The background moisture content, and subsequent approved action level that will indicate a leak, will be established after the surface impoundments have been constructed, but prior to any liquids being placed in the surface impoundments.

17. LEACHATE COLLECTION AND REMOVAL SYSTEM (LCRS)

In accordance with CCR, title 27, section 21600, subdivision (b)(8)(C), there is an LCRS proposed to be located beneath the primary liner in the surface impoundment. Additionally, an LCRS would be located between the primary and secondary liners underlying each surface impoundment. The LCRS consists of a layer of geonet sloped to a leak detection sump in each surface impoundment. The leak detection sump would include a 16-inch diameter leak-detection-and-removal-well fitted with an electronic leak sensor and a submersible pump to allow removal of collected fluids. The pump would discharge back into the surface impoundment. The discharge pipe shall be equipped with a recording flow totalizer to allow monitoring of the amount of fluid removed over time and calculation of leakage rates. The inspection and maintenance requirements for the LCRS are outlined in the April 2010 Report of Waste Discharge (ROWD).

18. ACTION LEAKAGE RATE OF SURFACE IMPOUNDMENT LINERS

The Action Leakage Rate (ALR) is the allowable leakage from the primary liner system above which spill prevention, control, and countermeasure (SPCC) plan actions are triggered (April 2010 ROWD). According to Code of Federal Regulations, title 40, section 264.222, the ALR is defined as "…the maximum design flow rate that the leak detection system can remove without the fluid head on the bottom liner exceeding 1 foot." The ALR must also include an adequate safety margin to allow for variability in the containment system design (e.g. liner and collection pipe slope, interstitial fill hydraulic conductivity, thickness of drainage material, etc.). The estimated ALR for the surface impoundments, as documented in the April 2010 ROWD, is 2,750 gallons per acre per day. This is based on one standard hole per acre, a drainage layer geonet with hydraulic conductivity of 0.06 meters per second and a 50% safety factor. The assumption underlying this ALR calculation would be verified in the actual constructed surface impoundments. Based on a 5.0-acre pond, each surface impoundment would have an ALR of 13,750 gallons per day. However, the ALR would need to have field verification because this rate would vary depending on actual drainage material used and its hydraulic conductivity. A final ALR would be submitted to the Energy Commission based on field analysis. A large hole in the geomembrane may cause a rapid large leakage rate (RLLR) of approximately 9,500 gallons per acre per day. This would equate to a RLLR of 47,500 gallons per day per surface impoundment. The RLLR is provided for informational purposes only. The recording flow totalizer at each sump would be monitored at least daily to determine the leakage rate through the primary liner. If the leakage rate exceeds the ALR, then the appropriate actions in the SPCC Plan would be implemented.

LAND TREATMENT UNITS

19. DESCRIPTION OF LAND TREATMENT UNITS

Each of the two Land Treatment Units (LTUs) would be a waste management unit and would cover an area of approximately 75 feet by 150 feet. The LTU would not incorporate a liner containment system or LCRS, but would be constructed with a prepared base consisting of 2 feet of compacted, low permeability, lime-treated material. This base would serve as a competent platform for land treatment activities, and would serve to slow the rate of surface water infiltration in the treatment area.

The compacted and native soil beneath the LTU is designated as a “treatment zone” to a depth of 5 feet. Although the LTU will be taking vehicle traffic, no hard surface would be required, as there is no liner system to protect. A staging area is allocated in the LTU for storage of heat transfer fluid (HTF)-impacted soils while they are being characterized. Soil characterized as hazardous would be removed from the site; therefore, no additional liner system would be required in the LTU for the hazardous waste. The staging area would have temporary plastic sheeting placed beneath the soil piles during characterization and plastic sheeting placed over the piles during precipitation events.

Each LTU would be surrounded on all sides by two-feet high reinforced concrete walls. These walls and site grading would control and prevent run-on of storm water into the LTU or run-off of storm water from the unit. CCR, title 27, section 20250 (b)(5) prescriptive requirements require that no waste shall migrate below the treatment zone.

Approximately 2,292,000 gallons of HTF (Therminol VP-1 [diphenyl ether (73.5%) and biphenyl (26.5%)]) would be utilized at any one time within the Facility. However, the anticipated volume of soil within the LTU contaminated with HTF would not exceed 750 cubic yards. Based on available operation data from other sites, it is anticipated that approximately 750 cubic yards (on average) of HTF-affected soil may be treated per year. Larger or smaller quantities could be generated during some years, depending on the frequency and size of leaks and spills. A SPCC plan would be developed for the Facility.

Storm water may occasionally accumulate in the LTU. This storm water can be pumped to the surface impoundments only after visual observation establishes that the water is free from HTF product and sheen. Based on conditions at similar sites in the area, it is anticipated that such discharge, if necessary, would only occur approximately once every three to five years.

20. WASTE MANAGEMENT UNITS CLASSIFICATION

Pursuant to CCR, title 27, section 20250, the surface impoundments and the land treatment unit are classified as Class II waste management units. Pursuant to CCR, title 27, section 20310, the units would be located outside of the 100-year flood plain and seismic hazard zones. In addition, the base of the waste management units would have a greater than five-foot separation to the underlying groundwater because the depth to groundwater is typically greater than 150 feet bgs.

21. WASTE CLASSIFICATION

A. Wastewater

The anticipated wastewater concentrations have been compared to the Soluble Threshold Limit Concentrations (STLCs) as reported in the CCR, title 22, section 66261.24 “Characteristics of Toxicity,” and compared to Toxicity Characteristic Leaching Procedure (TCLP) values as reported in the Code of Federal Regulations (CFR) Part 261, section 261.24. The anticipated concentration of chemical constituents in wastewater discharging into the surface impoundments would be less than the STLC and TCLP for all reported parameters. Therefore, the wastewater would not be considered a hazardous waste under State or Federal regulations.

B. Residual Solids

Hazardous wastes, per California Health and Safety Code section 25208 (Toxic Pits Cleanup Act), are prohibited from being either discharged into, being stored or accumulating via evaporative process within the surface impoundments. The nonhazardous wastewater discharged to the surface impoundments is hereby classified as a liquid designated waste. Residual solids remaining after evaporation are expected (April 2010 ROWD) to contain inorganic salts below hazardous waste levels.

The Water Code section 13173 defines a designated waste as:

1. Hazardous waste that has been granted a variance from hazardous waste management requirements pursuant to Health and Safety Code, section 25143 or,

2. Nonhazardous waste that consists of, or contains, pollutants that, under ambient environmental conditions at a waste management unit, could be released in concentrations exceeding applicable water quality objectives, or that could reasonably be expected to affect beneficial uses of the waters of the state as contained in the appropriate state water quality control plan.

C. HTF-contaminated soil

The Department of Toxic Substances Control will determine a hazardous waste concentration (in milligrams of HTF per kilogram of soil) for HTF-contaminated soil. HTF-contaminated soil would be considered inert if the concentration is less than or equal to 100 milligrams per kilogram (mg/kg) or is 1/100 of the hazardous waste level, whichever is more conservative. (The hazardous waste concentration at another similar site for HTF-contaminated soil is 10,000 mg/kg). HTF-contaminated soil at concentrations between the hazardous waste concentration and the inert concentration is classified as designated waste.

The wastewater discharged into the surface impoundments would be expected to be nonhazardous; however, the wastewater would contain pollutants (e.g., TDS, fluoride, selenium, and chromium) that could exceed water quality objectives if released, or that could be expected to affect the beneficial uses of waters of the state. Therefore, the wastewater would be classified as a “designated waste.” This classification is consistent with CCR, title 27, section 20210.

GROUNDWATER MONITORING NETWORK

22. GROUNDWATER MONITORING NETWORK (GMN)

The April 2010 ROWD proposes a Groundwater Monitoring Network (GMN) of six monitoring wells: three would monitor the Alpha Block waste management units and three would monitor the Beta Block waste management units. Each pair of two surface impoundments and a land treatment unit would have one upgradient and two down- gradient monitoring wells.

MONITORING PROGRAMS

23. STATISTICAL METHODS

Statistical analysis of monitoring data is necessary for the earliest possible detection of a statistically significant evidence of a release of waste from the Facility. CCR, title 27 requires statistical data analysis. The Monitoring and Reporting Program (MRP) includes methods for statistical analysis. The monitoring parameters listed in the MRP are believed to be the best indicators of a release from the Facility.

24. DETECTION MONITORING PROGRAM

Pursuant to CCR, title 27 section 20420, the applicant has proposed a detection monitoring program for the Facility. The detection monitoring program for the surface impoundments consists of monitoring the LCRS, moisture detection network (neutron probe network), and monitoring wells for the presence of liquid and/or constituents of concern. The program to monitor the LCRS and water bearing media for evidence of a release, as well as the monitoring frequency, is specified in the MRP. The detection monitoring program for the Land Treatment Unit consists of collecting and analyzing samples of the native soil in, and underneath, the treatment zone for the presence of HTF. The frequency of monitoring is specified in the MRP.

25. EVALUATION MONITORING PROGRAM

An Evaluation Monitoring Program (EMP) is required, pursuant to CCR, title 27 section 20425, to evaluate evidence of a release if detection monitoring and/or verification procedures indicate evidence of a release.

26. CORRECTIVE ACTION PROGRAM

A Corrective Action Program (CAP) to remediate detected releases from the surface impoundments or land treatment unit may be required pursuant to CCR, title 27, section 20430, if results of an EMP warrant a CAP. The applicant submitted a CAP as part of the April 2010 ROWD.

27. CLOSURE AND POST-CLOSURE MAINTENANCE PLAN FOR THE SURFACE IMPOUNDMENTS

The applicant submitted a Preliminary Evaporation Pond Closure Plan as part of the April 2010 ROWD.

28. REASONABLY FORESEEABLE RELEASE FOR THE SURFACE IMPOUNDMENTS

The applicant submitted a CAP to address a reasonably foreseeable release. The scenario presented in the CAP is a dike failure in which the applicant is required to remediate and clean up soil that may become contaminated due to a release from the surface impoundments.

29. CLOSURE AND POST-CLOSURE MAINTENANCE PLAN FOR THE LAND TREATMENT UNIT

The applicant submitted a Preliminary Land Treatment Unit Closure Plan as part of the April 2010 ROWD.

30. REASONABLY FORESEEABLE RELEASE FOR THE LAND TREATMENT UNIT

The applicant submitted a CAP to address a reasonably foreseeable release from the Land Treatment Unit. The scenario presented in the CAP for the Land Treatment Unit is a release to native soil underlying the treatment zone.

Corrective action includes excavation and proper disposal of HTF-contaminated soil from the Land Treatment Unit and replacing the excavation with clean native soil.

31. NARRATIVE AND NUMERICAL WATER QUALITY OBJECTIVES

The Basin Plan incorporates narrative and numerical water quality objectives that apply to all ground and surface waters within the Lahontan Region. In general, where more than one objective is applicable, the stricter objective applies.

SOIL AND WATER RESOURCES - APPENDIX D

REQUIREMENTS FOR WASTE DISCHARGE

I. DISCHARGE SPECIFICATIONS

A. Storm Water Discharges

Waste in discharges of storm water to waters of the State must be reduced or prevented to achieve the best practicable treatment level using controls, structures, and management practices. The applicant shall comply with all substantive portions of the requirements (with the exception of purely administrative requirements, e.g., filing a Notice of Intent) contained in State Water Board's *Waste Discharge Requirements For Discharges of Storm Water Discharges Associated With Construction Activity, General Permit No. CAS00002* and *Waste Discharge Requirements For Discharges of Storm Water Associated With Industrial Activities, General Permit No. CAS00001* and all subsequent revisions and amendments.

These requirements do not preclude the applicant from requirements imposed by municipalities, counties, drainage districts, and other local agencies regarding discharges of storm water to separate storm sewer systems or other water, conveyances and water bodies under their jurisdiction.

B. Receiving Water Limitations

Surface Water and Groundwater Objectives

Receiving water limitations are narrative and numerical water quality objectives contained in the Water Quality Control Plan for the Lahontan Basin (Basin Plan) for all surface waters and groundwaters of the Lahontan Region. As such, they are required to be met. The discharge of waste to surface waters shall not cause, or contribute to, a violation of the following water quality objectives for waters of the Lockhart Hydrologic Unit.

Surface Water

a. Ammonia

Ammonia concentrations shall not exceed the values listed in Tables 3-1 to 3-4 of the Basin Plan for the corresponding conditions in these tables. Tables 3-1 to 3-4 of the Basin Plan are incorporated into these requirements by reference.

b. Bacteria, Coliform

i. Waters shall not contain concentrations of coliform organisms attributable to anthropogenic sources, including human and livestock wastes.

ii. The fecal coliform concentration during any 30-day period shall not exceed a log mean of 20/100 milliliter (ml), nor shall more than 10% of all samples collected during any 30-day period exceed 40/100 ml. The log mean shall ideally be based on a minimum of not less than five samples collected as evenly spaced as practicable during any 30-day period. However, a log mean concentration exceeding 20/100 ml, or one sample exceeding 40/100 ml, for any 30-day period shall indicate violation of this objective even if fewer than five samples were collected.

c. *Biostimulatory Substances*

Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect the water for beneficial uses.

d. *Chemical Constituents*

i. Waters designated as MUN (a beneficial use of surface water of the Lockhart Hydrologic Unit) shall not contain concentrations of chemical constituents in excess of the maximum contaminant level (MCL) or secondary MCL based upon drinking water standards specified in provisions of the CCR, Title 22, Division 4, Chapter 15, hereby incorporated by reference into these requirements. This incorporation-by-reference is prospective including future changes to the incorporated provisions as the changes take effect.

ii. Waters shall not contain concentrations of chemical constituents in amounts that adversely affect the water for beneficial uses.

e. *Chlorine, Total Residual*

For the protection of aquatic life, total chlorine residual shall not exceed either a median value of 0.002 milligrams per liter (mg/L) or a maximum value of 0.003 mg/L. Median values shall be based on daily measurements taken within any six-month period.

f. *Color*

Waters shall be free of coloration that causes nuisance or adversely affects the water for beneficial uses.

g. *Dissolved Oxygen*

i. The dissolved oxygen concentration as percent saturation shall not be depressed by more than 10%, nor shall the minimum dissolved oxygen concentration be less than 80% of saturation.

ii. For waters with the beneficial uses of WARM (a beneficial use of surface water in the Lockhart Hydrologic Area), the minimum dissolved oxygen concentration shall not be less than that specified in Table 3-6 of the Basin Plan. Table 3-6 of the Basin Plan is incorporated herein by reference.

h. Floating Materials

i. Waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect the water for beneficial uses.

ii. The concentrations of floating material shall not be altered to the extent that such alterations are discernible at the 10% significance level.

i. Oil and Grease

i. Waters shall not contain oils, greases, waxes or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect the water for beneficial uses.

ii. The concentration of oils, greases, or other film or coat generating substances shall not be altered.

j. Pesticides

i. For the purposes of these requirements, pesticides are defined to include insecticides, herbicides, rodenticides, fungicides, piscicides and all other economic poisons. An economic poison is any substance intended to prevent, repel, destroy, or mitigate the damage from insects, rodents, predatory animals, bacteria, fungi, or weeds capable of infesting or harming vegetation, humans, or animals (California Agriculture Code 12753).

ii. Pesticide concentrations, individually or collectively, shall not exceed the lowest detectable levels, using the most recent detection procedures available. There shall not be an increase in pesticide concentrations found in bottom sediments. There shall be no detectable increase in bioaccumulation of pesticides in aquatic life.

iii. Waters designated as MUN shall not contain concentrations of pesticides or herbicides in excess of the limiting concentrations set forth in the CCR, Title 22, Division 4, Chapter 15. This incorporation-by-reference is prospective including future changes to the incorporated provisions as the changes take effect.

k. pH

i. In fresh waters with designated beneficial use of WARM, changes in normal ambient pH levels shall not exceed 0.5 pH units.

ii. The California Energy Commission recognizes that some waters of the Lahontan Region may have natural pH levels outside of the 6.5 to 8.5 range. Compliance with the pH objective for these waters will be determined on a case-by-case basis.

l. Radioactivity

i. Radionuclides shall not be present in concentrations, which are deleterious to human, plant, animal, or aquatic life nor which result in the accumulation of radionuclides in the food web to an extent, which presents a hazard to human, plant, animal, or aquatic life.

ii. Waters designated as MUN shall not contain concentrations of radionuclides in excess of the limits specified by the more restrictive of the CCR Title 22 Division 4, Article 5 sections 64441 et seq. This incorporation-by-reference is prospective including future changes to the incorporated provisions as the changes take effect.

m. Sediment

The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect the water for beneficial uses.

n. Settleable Materials

Waters shall not contain substances in concentrations that result in deposition of material that causes nuisance or that adversely affects the water for beneficial uses. The concentration of settleable materials shall not be raised by more than 0.1 milliliter per liter.

o. Suspended Materials

i. Waters shall not contain suspended materials in concentrations that cause nuisance or that adversely affect the water for beneficial uses.

ii. The concentration of total suspended materials shall not be altered to the extent that such alterations are discernible at the 10% significance level.

p. Taste and Odor

Waters shall not contain taste or odor-producing substances in concentrations that impart undesirable tastes or odors to fish or other edible products of aquatic origin, that cause nuisance, or that adversely affect the water for beneficial uses. The taste and odor shall not be altered.

q. Temperature

i. The natural receiving water temperature of all waters shall not be altered unless it can be demonstrated to the satisfaction of the California Energy Commission that such an alteration in temperature does not adversely affect the water for beneficial uses.

ii. For waters designated WARM, water temperature shall not be altered by more than five degrees Fahrenheit above or below the natural temperature.

r. Toxicity

i. All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life.

ii. The survival of aquatic life in surface waters subjected to a waste discharge, or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge, or when necessary, for other control water that is consistent with the requirements for “experimental water” as defined in the most recent edition of *Standard Methods for the Examination of Water and Wastewater* (American Public Health Association, et al.).

s. Turbidity

Waters shall be free of changes in turbidity that cause nuisance or adversely affect the water for beneficial uses. Increases in turbidity shall not exceed natural levels by more than 10%.

Groundwater

The discharge of waste to groundwaters shall not cause, or contribute to, a violation of the following water quality objectives for waters of the Harper Valley Groundwater Basin.

Bacteria, Coliform

In groundwaters designated as MUN (a beneficial use of groundwater of the Harper Valley Ground Water Basin), the median concentration of coliform organisms over any seven-day period shall be less than 1.1/100 milliliters.

Chemical Constituents

i. Groundwaters designated as MUN shall not contain concentrations of chemical constituents in excess of the maximum contaminant level (MCL) or secondary MCL based upon drinking water standards specified in provisions of the CCR, Title 22, Division 4, Chapter 15, hereby incorporated by reference into these requirements. This incorporation-by-reference is prospective including future changes to the incorporated provisions as the changes take effect.

ii. Groundwaters shall not contain concentrations of chemical constituents in amounts that adversely affect the water for beneficial uses.

Radioactivity

Groundwaters designated as MUN shall not contain concentrations of radionuclides in excess of the limits specified by the more restrictive of the CCR Title 22 Division 4, Article 5 sections 64441 et seq. This incorporation-by-reference is prospective including future changes to the incorporated provisions as the changes take effect.

Taste and Odor

Waters shall not contain taste or odor-producing substances in concentrations that cause nuisance or that adversely affect beneficial uses. For groundwaters designated MUN, at a minimum, concentrations shall not exceed adopted secondary MCLs based upon drinking water standards specified in provisions of the CCR, Title 22, Division 4, Chapter 15, hereby incorporated by reference into these requirements. This incorporation-by-reference is prospective including future changes to the incorporated provisions as the changes take effect.

II. PROHIBITIONS AND REQUIREMENTS

The discharge of wastes associated with the Facility must not violate the following waste discharge prohibitions. These waste discharge prohibitions do not apply to discharges of storm water when wastes in the discharge are controlled through the application of management practices or other means and the discharge does not cause a violation of water quality objectives. The California Energy Commission expects that control measures would be implemented in an iterative manner as needed to meet applicable receiving water quality objectives.

A. Regionwide Prohibitions

1. The discharge of waste,[i] which causes violation of any narrative water quality objective contained in the Basin Plan, including the Nondegradation Objective, is prohibited.

2. The discharge of waste, which causes a violation of any numeric water quality objective contained in the Basin Plan, is prohibited.

3. Where any numeric or narrative water quality objective contained in the Basin Plan is already being violated, the discharge of waste which causes further degradation or pollution is prohibited.

4. The discharge of untreated sewage, garbage, or other solid wastes into surface waters of the Lahontan Region is prohibited. (For the purposes of

Definitions:

[i] "Waste" is defined to include any waste or deleterious material including, but not limited to, waste earthen materials (such as soil, silt, sand, clay, rock, or other organic or mineral material) and any other waste as defined in the California Water Code § 13050(d).

this prohibition, "untreated sewage" is that which exceeds secondary treatment standards of the Federal Water Pollution Control Act, which are incorporated in the Basin Plan in Section 4.4 under "Surface Water Disposal of Sewage Effluent.")

5. For municipal[ii] and industrial[iii] discharges:

   a. The discharge, bypass, or diversion of raw or partially treated sewage, sludge, grease, or oils to surface waters is prohibited.

   b. The discharge of wastewater except to the designated disposal site (as designated in waste discharge requirements) is prohibited.

   c. The discharge of industrial process wastes[iv] to surface waters designated for the Municipal and Domestic Supply (MUN) beneficial use is prohibited. The discharge of industrial process wastes to surface waters not designated for the MUN use may be permitted if such discharges comply with the General Discharge Limitations in Section 4.7 of the Basin Plan and if appropriate findings under state and federal anti-degradation regulations can be made.

   Prohibitions 5(b) and 5(c) do not apply to industrial storm water. For control measures applicable to industrial storm water, see Section 4.3 of this Basin Plan, entitled "Stormwater Runoff, Erosion, and Sedimentation."

   Prohibitions 5(b) and 5(c) do not apply to surface water disposal of treated groundwater. For control measures applicable to surface water disposal of treated ground water, see the current applicable Lahontan Regional Board.

B. Facility Discharge Prohibitions

1. Activities and waste discharges associated with the Facility must not cause or threaten to cause a nuisance or pollution as defined in Water Code section 13050.

2. The discharge or deposition of any wastes into channels, surface water, or any place where it would be discharged or deposited where it would be

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(ii) "Municipal waste" is defined in Section 4.4 of the Basin Plan.

(iii) "Industry" is defined in Section 4.7 of the Basin Plan.

(iv) "Industrial process wastes" are wastes produced by industrial activities that result from one or more actions, operations, or treatments which modify raw material(s) and that may (1) add to or create within the effluent, waste, or receiving water a constituent or constituents not present prior to processing, or (2) alter water temperature and/or the concentration(s) of one or more naturally occurring constituents within the effluent, waste or receiving water. Certain non-stormwater discharges may occur at industrial facilities that are not considered to be industrial process wastes for the purposes of Prohibition 5(c). Examples include: fire hydrant flushing, atmospheric condensates from refrigeration and air conditioning systems, and landscape watering.

eventually transported to surface waters, including the 100-year floodplain, must not contain or consist of any substance in concentrations toxic to animal or plant life.

3. The discharge or deposition of any wastes into channels, surface water, or any place where it would be discharged or deposited where it would be eventually transported to surface waters, including the 100-year floodplain, must not contain or consist of oil or other floating materials from any activity in quantities sufficient to cause deleterious bottom deposits, turbidity, or discoloration in surface waters.

4. The discharge of waste, as defined in the Water Code that causes violation of any narrative water quality objective contained in the Basin Plan is prohibited.

5. The discharge of waste that causes violation of any numeric water quality objective contained in the Basin Plan is prohibited.

6. Where any numeric or narrative water quality objective contained in the Basin Plan is already being violated, the discharge of waste that causes further degradation or pollution (as defined in Water Code Section 13050) is prohibited.

7. The discharge of septic tank pumpings (septage) or chemical toilet wastes to other than a sewage treatment plant or a waste hauler is prohibited.

C. <u>Requirements</u>

The applicant shall develop a final Storm Water Pollution Prevention Program (SWPPP) in accordance with the State Water Board's *General Permit No. CAS00001* and *General Permit No. CAS00002*. This SWPPP, or any future revision to this SWPPP, and the associated Drainage, Erosion, and Sediment Control Plan (DESCP), shall be implemented after approval by the California Energy Commission's Compliance Project Manager (CPM).

1. The applicant must, at all times, maintain appropriate types and sufficient quantities of material on site to contain any spill or inadvertent release of materials that may cause a condition of pollution or nuisance if the materials reach waters of the State.

2. Discharges of wastewater generated by the Facility's operations, including cooling water, are not allowed to be released to the offsite environment.

3. The applicant must permit California Energy Commission staff or their authorized representative upon presentation of credentials:

    a. Entry onto Facility premises.

    b. Access to copy any record required to be kept under the terms and conditions of the Conditions of Certification or equivalent document.

c. Inspection of any treatment equipment, monitoring equipment, or monitoring method required by the Conditions of Certification.

d. Sampling of any discharge or surface water covered by the Conditions of Certification.

4. The applicant must immediately notify the California Energy Commission staff by telephone whenever an adverse condition occurs as a result of this discharge. Such a condition includes, but is not limited to, a violation of the conditions of the Conditions of Certification, a significant spill of petroleum products or toxic chemicals, or damage to control facilities that would cause noncompliance. A written notification of the adverse condition must be provided to the California Energy Commission within two weeks of occurrence. The written notification must identify the adverse condition, describe the actions necessary to remedy the condition, and specify a timetable, subject to any modifications by California Energy Commission staff, for the remedial actions.

5. The applicant must comply with the Monitoring and Reporting Program for Groundwater, included in these requirements.

III. PROVISIONS

A. Special Provisions for Impacts to State Waters

1. The Discharger must comply with terms and conditions of these WDRs. Any noncompliance constitutes a violation of the WDRs pursuant to the Porter-Cologne Water Quality Act (Water Code Section 13000 et seq.), and is grounds for enforcement action by the CEC or the Regional Board.

2. Detailed final grading plans must be provided to the California Energy Commission a minimum of 60 days prior to commencement of construction activities.

3. Construction equipment must be clean and free from oil, grease, and loose metal material and must be removed from service if necessary to protect water quality.

4. No debris, cement, concrete (or wash water therefrom), oil or petroleum products must be allowed to enter into or be placed where it may be washed from the Facility site by rainfall or runoff into waters of the State. When operations are completed, any excess material must be removed from the Facility work area and any areas adjacent to the work area where such material may be transported into waters of the State as defined in Water Code section 13050.

5. No equipment may be operated in areas of flowing or standing water; no fueling, cleaning, or maintenance of vehicles or equipment must take place within any areas where an accidental discharge to waters of the

State may occur; construction materials and heavy equipment must be stored outside of the flow of the waters of the State. When work within the boundaries of waters of the State is necessary, the entire streamflow must be diverted around the work area, temporarily, as needed to control waste discharge.

B. Special Provisions for Storm Water

1. The applicant must ensure that storm water discharges and non-storm water discharges do not cause or contribute to an exceedance of any applicable water quality standards.

2. Post-construction storm water flows emanating from the Facility site must not exceed predevelopment levels. Runoff from newly constructed impervious areas that is greater than background levels must be treated and detained to predevelopment runoff levels. Methods such as *low impact development* may be used to achieve this requirement (see State Water Board Resolution No. 2008-0030). Detention and/or infiltration facilities for a 10-year, one-hour storm event fulfills this requirement for the purposes of these requirements.

3. The applicant must implement Best Management Practices (BMPs) to prevent or reduce the discharge of wastes associated with water contacting construction materials or equipment.

4. The applicant must provide effective cover, mulch, fiber blankets, or other erosion control for soils disturbed by construction activities.

5. The applicant must provide BMPs for erosion stabilization for all areas of disturbed soil regardless of time of year, including erosion from rainfall, non-storm water runoff, and wind.

6. The applicant must stabilize from erosion all finished slopes, open space, utility backfill, and graded or filled lots within two weeks from when excavation or grading activity has been completed.

7. The applicant must control runon from offsite areas, route flows away from disturbed areas in a manner that does not cause onsite or offsite erosion, and provide controls to minimize runon and problems from storm water flows into active or disturbed Facility areas from offsite areas.

8. The applicant must, at all times, maintain effective perimeter controls and stabilize all construction entrances/exits sufficiently to control erosion and soil or sediment discharges from the site.

9. The applicant must properly install and effectively maintain all BMPs for storm drain inlets and perimeter controls, runoff control BMPs, and stabilized entrances/exits.

10. The applicant must ensure that construction activity traffic to and from the Facility is limited to entrances and exits that employ effective controls to prevent offsite tracking of soil.

11. The applicant must ensure that all storm drain inlets and perimeter controls, runoff control BMPs, and pollutant control at entrances/exits are maintained and protected from activities that could reduce their effectiveness.

12. The applicant must comply with the following source control requirements:

    a. Develop the Facility in a way that reduces the amount of soil exposed to erosion at any time.

    b. Inspect and remove accumulated deposits of soil at all inlets to the storm drain system at frequent intervals during rainy periods.

    c. Provide buffer strips and/or silt barrier fencing between the active construction area and any water bodies.

    d. Provide “good housekeeping” measures for construction materials, waste management, vehicle storage and maintenance, and landscape materials at all times including, but not limited to, the list of required measures in Attachment A, which is made a part of these requirements.

13. The applicant must maintain, in perpetuity, post-construction control and treatment measures for storm water, or must identify in writing to the California Energy Commission, the entity that is legally responsible for maintaining the post-construction controls at the Facility site.

14. The applicant shall have in place adequate emergency response plans in order to clean up any spill or release of any waste at the Facility.

C. Special Provisions for the Waste Management Units (Surface Impoundments and Land Treatment Units)

1. There shall be no discharge, bypass, or diversion of wastewater from the collection, conveyance, or disposal facilities to adjacent land areas or surface waters.

2. All facilities used for the collection, conveyance, or disposal of waste shall be adequately protected against overflow, washout, inundation, structural damage, or a significant reduction in efficiency resulting from a storm or flood having a recurrence interval of once in 100 years. The surface impoundments and land treatment unit (LTU) shall be designed and maintained with the capacity to capture the 1,000-year, 24-hour storm.

3. The release of wastewater shall not cause the presence of the groundwater monitoring parameters listed in the Monitoring and Reporting

Programs for Groundwater to be in excess of established background levels as described in the April 2010 Report of Waste Discharge (ROWD).

4. The discharge, storage, or evaporative accumulation of hazardous waste to waste management units at the Facility is prohibited.

Special Provisions for Surface Impoundments

1. Only wastewater from cooling water blow down and process water (e.g. the reverse-osmosis system reject water), or storm water that may accumulate in the LTU shall be discharged to the surface impoundments.

2. The discharge of wastewater at the Facility except to the authorized disposal sites (i.e., the surface impoundments) of these requirements is prohibited.

3. All lined facilities shall be effectively sealed to prevent the exfiltration of liquids. For this project, "effectively sealed" facilities are the surface impoundments that are designed and constructed in accordance with the requirements of CCR, title 27.

4. The vertical distance between the liquid surface elevation and the highest part of a surface impoundment dike (i.e. the freeboard), or the invert of an overflow structure, shall not be less than two feet.

Special Provisions for the Leachate Collection and Removal System

1. If liquids are detected in the leachate collection and removal system (LCRS) sumps at a rate equal to or greater than the “Action Leakage Rate” as described in the April 2010 ROWD, then the applicant shall comply with the notice of evidence of response to exceeding the action leakage rate requirements presented in the appropriate section of the Monitoring and Reporting Program for Groundwater included with these requirements.

2. If liquids are detected in the LCRS sumps at rates greater than the “Rapid and Large Leakage Rate” as described in the April 2010 ROWD, the applicants shall immediately notify the California Energy Commission and cease the discharge of waste to the affected impoundment. Discharges of waste to the affected impoundment shall be prohibited until the appropriate repairs are made.

3. The depth of leachate in the leachate collection sump shall be kept at the minimum needed to ensure efficient sump dewatering pump operation.

4. The LCRS shall be operated to function without clogging throughout the life of the project including closure and post closure maintenance periods.

5. The LCRS shall be tested at least once annually to demonstrate proper operation.

6. The LCRS shall be capable of removing twice the maximum anticipated daily volume of leachate from the surface impoundments.

7. Any leachate collected in any LCRS shall be returned to the surface impoundments.

Special Provisions for the Land Treatment Unit

1. Only soil contaminated with Therminol or similarly approved HTF and originating at this Facility shall be accepted for treatment at the Land Treatment Unit.

2. All contaminated soil in the staging area shall be placed on plastic sheeting. All contaminated soil in the staging area shall be covered with plastic sheeting during precipitation events.

3. Soil treated at the Land Treatment Unit may be used as fill material, road base or as a cover at the Facility (excluding any area within the 100-year floodplain) if the following concentration limit is not exceeded:

Parameter	Maximum Concentration of The Composite Sample
Heat Transfer Fluid Therminol (biphenyl, and diphenyl oxide) or related HTF that has similar environmental fate and transport characteristics as Therminol.	100 milligram per kilogram (mg/kg) or 1/100 of the hazardous waste level, whichever is less (i.e., more conservative) (The site-specific hazardous waste level for heat transfer fluid is to be determined.)

ATTACHMENT A

GOOD HOUSEKEEPING BEST MANAGEMENT PRACTICES

1. **Good housekeeping measures for construction materials include:**
   a. Maintaining an inventory of the products used and/or expected to be used and the end products that are produced and/or expected to be produced.

   b. Covering and berming loose stockpiled construction materials (i.e. soil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.).

   c. Storing chemicals in watertight containers or in a bermed storage shed (completely enclosed), with appropriate secondary containment.

   d. Minimizing contact of construction materials with precipitation.

   e. Implementing BMPs to reduce or prevent the offsite tracking of loose construction and landscape materials.

2. **Good housekeeping measures for waste management include:**
   a. Preventing disposal of any rinse/wash waters or materials into the storm drain system.

   b. Berming sanitation facilities (e.g. Porta Potties) and preventing them from being kept within the curb and gutter or on sidewalks or adjacent to a storm drain.

   c. Cleaning or replacing sanitation facilities and inspecting them regularly for leaks and spills.

   d. Covering waste disposal containers when they are not in use and preventing them from overflowing.

   e. Berming and securely protecting stockpiled waste material from wind and rain at all times unless actively being used where spill would enter surface drainage systems.

   f. Addressing procedures to deal with hazardous and non-hazardous spills.

   g. Preparing and implementing a spill response and implementation plan prior to commencement of construction activities, including:
      i. Locations of on-site equipment and materials for cleanup of spills and leaks.

      ii. Procedures to follow in the event of spill or leak that includes immediate cleanup.

      iii. Locations and procedures of disposing of waste materials.

      iv. Identification of and training for spill response personnel.

h. Lining and berming of concrete washout areas so there is no leakage or overflow into the underlying soil and onto the surrounding areas. Washout areas must be positioned away from drain inlets and waterways and be clearly labeled.

3. **Good housekeeping measures for vehicle storage and maintenance include:**

   a. Not allowing oil, grease, or fuel to leak in to the soil.

   b. Placing all equipment or vehicles to be fueled, maintained and/or stored in a designated area fitted with appropriate BMPs.

   c. Cleaning leaks immediately and disposing of leaked materials and sorbents properly.

   d. Fix leaks immediately or remove equipment for service.

4. **To assess the potential pollutant sources and identify all areas of the site where good housekeeping or additional BMPs are necessary to reduce or prevent pollutants in storm water discharges and non-storm water discharges, the applicant must assess and report on the following:**

   a. The quantity, physical characteristic (liquid, powder, solid, etc.), and locations of each potential pollutant source handled, produced, stored, recycled, or disposed of at the site.

   b. The degree to which pollutants associated with those materials may be exposed to and mobilized by contact with storm water.

   c. The direct and indirect pathways that pollutants may be exposed to storm water discharges and non-storm water discharges. This must include an assessment of past spills or leaks, non-storm water discharges, and discharges from adjoining areas.

   d. Sampling, visual observation, and inspection records.

   e. Effectiveness of existing BMPs to reduce or prevent pollutants in storm water discharges and non-storm water discharges.

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SOIL AND WATER RESOURCES - APPENDIX E

MONITORING AND REPORTING PROGRAM FOR GROUNDWATER

I. WATER QUALITY PROTECTION STANDARD

Water Quality Protection Standard is required by Title 27 of the California Code of Regulations (CCR, title 27) to assure the earliest possible detection of a release from the Mojave Solar Project (Mojave) to underlying soil and/or groundwater. The Water Quality Protection Standard shall consist of the list of constituents of concern, the concentration limits, the Point of Compliance and all Monitoring Points. This Water Quality Protection Standard shall apply during the operation, closure, post-closure maintenance period, and during any compliance period. Mojave will initially undergo construction and then will be under a Detection Monitoring Program as documented in the April 2010 Report of Waste Discharge (ROWD).

II. MONITORING

A. Flow Monitoring of Discharges to the Surface Impoundments (four evaporation ponds)

The April 2010 ROWD states that discharge to the surface impoundments is derived from two primary sources (cooling tower blow down water and process wastewater [e.g. reverse-osmosis system reject water]) generated from treatment of water for use at the plant and discharged to the surface impoundments.

The applicant shall monitor the following:

1. The volume, in million gallons per day (mgd), of wastewater delivered to the surface impoundments;

2. The cumulative total of wastewater flow delivered to the surface impoundments, in million gallons per month; and

3. The maximum daily flow rate, in mgd, delivered to the surface impoundments each month.

B. Monitoring of Wastewater Discharges to the Surface Impoundments

Semiannually, the applicant shall record the following:

1. The sources of wastewater delivered to the surface impoundments;

2. The amount and types of chemical additives added to the cooling system water that may be discharged to the surface impoundments; and

3. The analytical results of a composite wastewater grab sample that shall be collected and analyzed at a state-certified laboratory for the parameters in Table II-1.

Table II-1: Wastewater Sampling Parameters

Parameter	U.S. EPA or Standard Method	Reporting Limit Goal	Units
Ammonia (as N)	350.1	100	µg/L
Aluminum	200.7	20	µg/L
Arsenic	6020	2	µg/L
Antimony	6020	10	µg/L
Barium	6020	5	µg/L
Beryllium	6020	2	µg/L
Boron	200.7	140	µg/L
Cadmium	6020	5	µg/L
Calcium	200.7	40,000	µg/L
Chloride	300.0	14,000	µg/L
Chromium (total)	6020	5	µg/L
Cobalt	6020	5	µg/L
Copper	6020	5	µg/L
Fluoride	300.0	500	µg/L
Iron	200.7	20	µg/L
Lead	6020	3	µg/L
Magnesium	200.7	10,000	µg/L
Manganese	200.7	15	µg/L
Mercury	7470A	0.2	µg/L
Molybdenum	6020	10	µg/L
Nickel	6020	5	µg/L
Nitrate as nitrogen	300.0	1,000	µg/L
Nitrite as nitrogen	SM 4500	4	µg/L
Phosphate (total)	365.3	100	µg/L
Potassium	200.7	3,000	µg/L
Selenium	6020	10	µg/L
Silver	6020	5	µg/L
Sodium	200.7	10,000	µg/L
Strontium	200.7	500	µg/L
Sulfate	300.0	10,000	µg/L
Thallium	6020	10	µg/L
Total dissolved solids	SM 2540C	10,000	µg/L
Total alkalinity(as $CaCO_3$)	SM 2320B	10,000	µg/L
Vanadium	6020	5	µg/L
Zinc	6020	10	µg/L
Biphenyl *	8015M	500	µg/L
Diphenyl oxide *	8015M	500	µg/L
Cyclohexamine (20-40%) *	8015M	500	µg/L
Morpholine (1-10%) *	8015M	500	µg/L
pH	Field	+/- 0.1	pH units
Temperature	Field	+/- 0.1	° F or °C

µg/L = micrograms per liter
note * -- Analysis of these constituents is not necessary if storm water from the land treatment unit was not discharged into the surface impoundments

C. Surface Impoundment Monitoring

1. Dikes and Liners

a. Daily, the freeboard shall be measured from the top of the lowest part of the dike to the wastewater surface. If the surface impoundment is dry, indicate that it is empty of wastewater.

b. Monthly, the integrity of the dikes and liners shall be inspected. Should the inspection indicate any damage to the dikes or liners or if an unauthorized discharge has occurred, or is likely to occur, the California Energy Commission shall be notified within 48 hours, followed by confirmation in writing.

2. Leachate Collection and Removal System (LCRS)

a. Weekly, visual inspection for liquid in the leachate collection detection sumps for each surface impoundment shall be conducted. The results of those inspections shall be recorded in a permanent log book.

b. All volume of liquid pumped out of the leakage detection sumps for each surface impoundment shall be recorded along with date, time and discharge location, in a permanent log book kept on-site.

3. Surface Impoundment Wastewater Monitoring

Semiannually, at each surface impoundment, liquid grab samples shall be collected at three (3) sample locations in the surface impoundments spaced approximately equidistant. For each of the four surface impoundments, the three (3) collected samples shall be composited into one sample (four samples total) by the laboratory.

The analytical results of a wastewater grab from each of the four surface impoundments shall be analyzed at a state-certified laboratory for the parameters in Table II-1. The annual samples shall be collected in the last quarter of each year.

4. Surface Impoundment Sludge Monitoring

Annually, in the last quarter of each year, three (3) representative grab samples of the bottom sludge in each surface impoundment, if present, shall be collected, composited and analyzed for the parameters in Table II-2. For each of the four surface impoundments, the three (3) collected samples shall be composited into one sample (four samples total) by the laboratory.

Table II-2: Surface Impoundment Sludge Monitoring

Parameters	Unit
CCR title 22 metals (CAM 17)- Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Copper, Lead, Mercury, Molybdenum, Nickel, Selenium, Silver, Thallium, Vanadium, Zinc	Milligrams per kilogram (mg/kg)
Biphenyl, diphenyl oxide (Therminol or similar)	mg/kg

D. Detection Monitoring

Using approved statistical or non-statistical data analysis methods, and in compliance with CCR, title 27, the applicant shall, for each monitoring event, compare the concentration of each monitoring parameter with its respective concentration limit to determine if there has been a release from the surface impoundments. Monitoring shall be completed in compliance with this Section D as further described below.

1. Unsaturated Zone Monitoring - Neutron Probe

a. Semiannually, the applicant shall check for the presence of excess moisture below the surface impoundment liners using a neutron moisture probe calibrated for use at the site. If excess moisture content is detected, field verification testing shall be performed and the applicant shall notify the California Energy Commission and report physical evidence of a release (see notification procedures below). Field verification testing may include a combination of additional neutron analysis, laboratory analysis of liquids drawn from the neutron probe casing and visual observation to verify existence of a release.

b. Annually, the applicant shall submit documentation of instrument calibration, statistical analysis and performance checks. Performance checks shall be a comparison of semiannual results of neutron moisture. Pre testing with earlier tests made under comparable conditions to verify proper operation of equipment must be documented.

2. Groundwater Monitoring

The groundwater monitoring network is required, as proposed in the April 2010 ROWD, consisting of six new monitoring wells, three wells adjacent to each pair of surface impoundments and associated land treatment unit (one well up gradient and two wells downgradient).

a. Semiannually, samples shall be collected in the groundwater monitoring network and analyzed for the parameters listed in Table II-3.

   The results of the analysis shall be reported in the semiannual report in tabular and graphical form. Each such graph shall be plotted with raw data at a scale appropriate to show trends or variations in water quality. For graphs showing the trends of similar constituents, the scale shall be the same. The data shall also be used to construct an Upper Tolerance Limit to determine evidence of a release and shall be used to evaluate data from the previous three quarters for evidence of a release.

Table II-3
Groundwater Monitoring Well Sampling Parameters

Parameter	U.S. EPA or Standard Method	Reporting Limit Goal	Units
Ammonia (as N)	350.1	100	µg/L
Aluminum	200.7	20	µg/L
Arsenic	6020	2	µg/L
Antimony	6020	10	µg/L
Barium	6020	5	µg/L
Beryllium	6020	2	µg/L
Boron	200.7	140	µg/L
Cadmium	6020	5	µg/L
Calcium	200.7	40,000	µg/L
Chloride	300.0	14,000	µg/L
Chromium (total)	6020	5	µg/L
Cobalt	6020	5	µg/L
Copper	6020	5	µg/L
Fluoride	300.0	500	µg/L
Iron	200.7	20	µg/L
Lead	6020	3	µg/L
Magnesium	200.7	10,000	µg/L
Manganese	200.7	15	µg/L
Mercury	7470A	0.2	µg/L
Molybdenum	6020	10	µg/L
Nickel	6020	5	µg/L
Nitrate as nitrogen	300.0	1,000	µg/L
Nitrite as nitrogen	SM 4500	4	µg/L
Phosphate (total)	365.3	100	µg/L
Potassium	200.7	3,000	µg/L
Selenium	6020	10	µg/L
Silver	6020	5	µg/L
Sodium	200.7	10,000	µg/L
Strontium	200.7	500	µg/L
Sulfate	300.0	10,000	µg/L
Thallium	6020	10	µg/L
Total dissolved solids	SM 2540C	10,000	µg/L
Total alkalinity(as $CaCO_3$)	SM 2320B	10,000	µg/L
Vanadium	6020	5	µg/L
Zinc	6020	10	µg/L
pH	Field	+/- 0.1	pH units
Temperature	Field	+/- 0.1	° F or °C

b. Semiannually, the groundwater potentiometric surface shall be illustrated on a 8.5" x 11" copy of a site plan showing the static water level, in feet below ground surface; the monitoring well locations; the location of the surface impoundments; and the groundwater gradient under each surface impoundment.

c. Prior to sampling, each monitoring well shall be sufficiently purged in accordance with generally accepted sampling practices in order to obtain a representative ground water sample. If any monitoring well is dry for more than a year, a new or modified monitoring well shall be installed.

Groundwater samples must be collected after the wells have been purged in accordance with California Environmental Protection Agency guidance document, *Representative Sampling of Groundwater for Hazardous Substances*, revised February 2008 (see: http://www.dtsc.ca.gov/SiteCleanup/upload/SMP_ Representative_Sampling_GroundWater.pdf). The required stability parameters and criteria from this guidance are summarized in Table II-4.

Table II-4: Stabilization Parameters and Criteria

Parameter	Criteria
temperature	± 3% of reading (minimum of ± 0.2 C)
pH	+/- 0.1
specific electrical conductance	+/- 3%
Oxidation-reduction potential	+/- 10 millivolts
dissolved oxygen	+/- 0.3 milligrams per liter

E. Heat Transfer Fluid Contaminated Soil - Spills or Leaks

1. All spills of heat transfer fluid (HTF) shall be cleaned up within 48 hours. Spills of 20 gallons or more of HTF must be reported to the California Energy Commission within 48 hours. The April 2010 ROWD outlines the procedure for removing contaminated soils from the Facility and temporarily staging the soils within the Land Treatment Unit for hazardous waste testing. Representative soil samples shall be analyzed by a California certified laboratory accredited to conduct the specific analytical method. Disposal of contaminated soil resulting from HTF spills that exceed hazardous waste levels shall be accomplished in accordance with applicable waste disposal regulations.

2. HTF-contaminated soil that does not exceed the hazardous waste levels may be discharged into the Land Treatment Unit. A report for every batch of HTF-contaminated soil discharged into the Land Treatment Unit must include the volume of cubic yards discharged, the sampling method and laboratory analytical reports.

3. Semiannually, the applicant shall report a summary of HTF spills. The summary shall include (1) HTF spill volumes of 20 gallons or greater, (2) locations of spilled HTF, and (3) the dates of spills. The summary shall also include (1) the total volume of contaminated soil resulting from spills regardless of the volume of HTF spilled, (2) the disposition of the contaminated soil, (3) the total volume of contaminated soil, and (4) a breakdown of the total volume by disposition location (e.g., hauled offsite as hazardous waste, discharged to the LTU, or re-used onsite).

F. Land Treatment Unit (LTU) - Heat Transfer Fluid Contaminated Soil

1. After treatment, the HTF-contaminated soil may be reused at the Facility in accordance with “Special Provisions for the Land Treatment Unit” in Section III C. (Special Provisions for the Waste Management Units) in the Requirements for Mojave Solar. Representative soil samples shall be collected for every batch of treated HTF-contaminated soil prior to removal from the LTU. The samples shall be composited according to methods specified in the U. S. Environmental Protection Agency's current version of the manual: "Test Methods for Evaluating Solid Waste" (SW-846). The status and/or results of sample analysis shall be reported semiannually.

   Annually, the applicant shall verify that HTF is not migrating past the five-foot vertical treatment zone underlying the LTU. Four soil samples (one sample from each quadrant of the LTU) shall be collected at a depth of one foot below the five-foot vertical treatment zone and analyzed for the monitoring parameters listed below. The samples shall be collected and composited according to methods specified in the U. S. Environmental Protection Agency's current version of the manual, "Test Methods for Evaluating Solid Waste" (SW-846). If results of any sample analysis indicate that components of HTF are detected, the applicant shall, within two weeks, repeat deeper sample collection at one foot intervals. The applicant shall repeat sample collection until laboratory analytical results show that concentrations are non-detect. If components of HTF are detected beneath the five-foot treatment zone, the applicant shall, within two weeks, report the evidence of release.

   The samples shall be analyzed for the parameters in Table II-5 listed below using a California certified laboratory.

Table II-5: Land Treatment Unit Monitoring Parameters

Monitoring Parameter	Units
Biphenyl, a component of HTF (Therminol or similar)	mg/kg
Diphenyl oxide , a component of HTF (Therminol or similar)	mg/kg

G. Waste Management Unit Monitoring and Maintenance

1. Quarterly the applicant must inspect the condition of the waste management units (four surface impoundments and two land treatment units) to ensure their integrity. The applicant must provide reports on the inspections semiannually. The quarterly inspection must consist of the following:

   a. The applicant must inspect the waste management units for integrity.

   b. The applicant must inspect the drainage features for the entire site including those that will divert water from the site.

2. During the semiannual sampling events, groundwater monitoring wells shall be inspected for damage. Any adverse conditions found in the visual inspection of the wells must be documented and promptly corrected. Documentation of the correction must be submitted with each semiannual report.

III. DATA ANALYSES

All data analyses methods (statistical or non-statistical) shall meet the requirements of CCR, title 27, section 20415, subdivision (e)(9).

A. General Non-statistical Methods

Evaluation of data will be conducted using non-statistical methods to determine if any new releases from the surface impoundments or land treatment units have occurred. Non-statistical analysis shall be as follows.

1. Physical Evidence

Physical evidence can include dike or berm(s) damage or loss, unexplained volumetric changes in the surface impoundments, groundwater mounding, or soil discoloration. Each annual report shall comment on the absence or presence of physical evidence of a release.

2. Time Series Plots

Each annual report must include time series plots for groundwater monitoring parameters. Time series plots are not required for parameters that have never been detected above their method detection limit (as specified by the applicable USEPA Method) or if there are less than four quarters of data. Evidence of a release may include trends of increasing concentrations of one or more constituent over time.

B. General Statistical Analysis Methods

For Detection Monitoring, the applicant shall use statistical methods to analyze the constituents of concern listed in Table II-3 of this Monitoring and Reporting Program that exhibit concentrations that equal or exceed their respective method detection limit in at least 10% of applicable historical samples. The applicant may propose and use any statistical method that meets the requirements of CCR, title 27, section 20415, subdivision (e)(7). The report titled "Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities" (USEPA, 1989) or subsequent versions may also be used to select the statistical test to use for comparing detection monitoring well data to background monitoring data. All statistical methods and programs proposed by the applicant are subject to California Energy Commission approval and must comply with CCR, title 27.

IV. RECORD KEEPING AND REPORTING REQUIREMENTS

A. Scheduled Reports to be Filed with the California Energy Commission

A detection monitoring report shall be submitted to the California Energy Commission. The content of the detection monitoring report shall be as follows:

1. Results of sampling analysis, including statistical limits or each monitoring point;

2. A description and graphical presentation of the velocity and direction of ground water flow under or around the Waste Management Units, based upon water level elevations taken during the collection of the water quality data submitted in the report;

3. A map or aerial photograph showing the locations of observation stations, monitoring points, and background monitoring points;

4. An evaluation of the effectiveness of the leachate collection and recovery system, and of the runoff/runon control facilities; and

5. A letter transmitting the essential points in each report, including a discussion of any requirement violations found since the last report was submitted, and describing actions taken or planned for correcting those violations. If the applicant has previously submitted a detailed time schedule for correcting requirement violations, a reference to the correspondence transmitting this schedule will be satisfactory. If no violations have occurred since the last submittal, this shall be stated in the letter of transmittal.

B. Unscheduled Reports to be Filed

1. Release from the Surface Impoundments

The applicant shall perform the procedures contained in this subsection whenever there is evidence of a release from the surface impoundments.

The applicant shall immediately notify the California Energy Commission verbally whenever a determination is made that there is physical or statistically significant evidence of a release (as determined in compliance with CCR, title 27, section 20164) from a surface impoundment. This verbal notification shall be followed by written notification via certified mail within seven days of such determination. Upon such notification, the applicant may initiate verification procedures or demonstrate that another source other than the Impoundment caused evidence of a release (see below). The notification shall include the following information:

a. The surface impoundment that may have released or be releasing wastewater;

b. General information including the date, time, location, and cause of the release;

c. An estimate of the flow rate and volume of waste involved;

d. A procedure for collecting samples and description of laboratory test to be conducted;

e. Identification of any subsurface water bearing zone affected or threatened;

f. A summary of proposed corrective actions; and

- For statistically significant evidence of a release (as determined in compliance with CCR, title 27, section 20164) - monitoring parameters and/or constituents of concern that have indicated statistically significant evidence of a release from the surface impoundments; or
- For physical evidence of a release - physical factors that indicate physical evidence of a release.

2. Exceeding the Action Leakage Rate

The applicant shall immediately notify the California Energy Commission verbally within twenty-four hours whenever a determination is made that there is a fluid volume in the LCRS sumps in excess of the Action Leakage Rates. This verbal notification shall be followed by written notification via certified mail within seven days of such determination. This written notification shall be followed by a technical report via certified mail within thirty days of such determination. The technical report shall describe the actions taken to abate the adverse condition, and shall describe any proposed future actions to abate the adverse condition.

3. Evaluation Monitoring

Pursuant to California Water Code section 13267, subdivision (b), the applicant shall, within 90 days of verifying a release, submit to the California Energy Commission an amended Report of Waste Discharge proposing an evaluation monitoring program (CCR, title 27, sections 20420, subdivision (k)(5) and 20425). If applicant decides not to conduct verification procedures, or decides not to make a demonstration that a source other than the surface impoundments or land treatment unit are responsible for the release, the release will be considered verified.

4. Preliminary Engineering Feasibility Study Report

The applicant shall, within 180 days of verification of a release or detection, submit to the California Energy Commission a Preliminary Engineering Feasibility Study pursuant to CCR, title 27, section 20420, subdivision (k)(6), that shall contain either corrective action measures that could be taken to achieve background concentration or demonstrate that the waste management units are not the cause of the detection.

V. REPORTING REQUIREMENTS

A. General Provisions

The applicant shall comply with the "General Provisions for Monitoring and Reporting" which is attached to and made part of this Monitoring and Reporting Program.

B. Semiannual Report

Beginning on June 30, 2011, a Semiannual Monitoring Report, including the preceding monitoring information, shall be submitted to the California Energy Commission. Subsequent semiannual monitoring reports shall be submitted to the California Energy Commission by January 30 and June 30 of each year.

C. Annual Report

Beginning on January 30, 2012, and by January 30 of each year, the applicant shall submit an Annual Report to the California Energy Commission including the preceding information and with the following information:

a. evidence that adequate financial assurance for closure, post-closure, and reasonably foreseeable releases is still in effect and may include a copy of the renewed financial instrument or a copy of the receipt for payment of the financial instrument;

b. evidence that the amount is still adequate or increase the amount of financial assurance by the appropriate amount if necessary, due to inflation, a change in the approved closure plan, or other unforeseen events; and

c. a review of the closure plan and a statement that the closure activities described are still accurate or an updated closure plan.

D. Data Analysis Report

The applicant shall, by **January 30 of every year**, submit to the California Energy Commission a Data Analysis Report as specified in Section III (Data Analysis) of this Monitoring and Reporting Program.

E. Electronic Submittal of Information

Pursuant to California Code of Regulations, title 23, section 3890, the applicant shall submit reports, including soil vapor and water data, prepared for the purpose of subsurface investigation or remediation of a discharge of waste to land subject to Division 2 of title 27 electronically over the internet to the State Water Resources Control Board’s Geotracker system. This requirement is in addition to, and not superseded by, any other applicable reporting requirement.

GENERAL PROVISIONS
FOR MONITORING AND REPORTING

1. SAMPLING AND ANALYSIS

   a. All analyses shall be performed in accordance with the current edition(s) of the following documents:

      i. Standard Methods for the Examination of Water and Wastewater

      ii. Methods for Chemical Analysis of Water and Wastes, EPA

   b. All analyses shall be performed in a laboratory certified to perform such analyses by the California Department of Public Health Services or a laboratory approved by the California Energy Commission. Specific methods of analysis must be identified on each laboratory report.

   c. Any modifications to the above methods to eliminate known interferences shall be reported with the sample results. The methods used shall also be reported. If methods other than EPA-approved methods or Standard Methods are used, the exact methodology must be submitted for review and must be approved by the California Energy Commission.

   d. The applicant shall establish chain-of-custody procedures to insure that specific individuals are responsible for sample integrity from commencement of sample collection through delivery to an approved laboratory. Sample collection, storage, and analysis shall be conducted in accordance with an approved Sampling and Analysis Plan (SAP). The most recent version of the approved SAP shall be kept at the Facility.

   e. The applicant shall calibrate and perform maintenance procedures on all monitoring instruments and equipment to ensure accuracy of measurements, or shall insure that both activities will be conducted. The calibration of any wastewater flow measuring device shall be recorded and maintained in the permanent log book described in 2.b, below.

   f. A grab sample is defined as an individual sample collected in fewer than 15 minutes.

2. OPERATIONAL REQUIREMENTS

   a. Sample Results

      The applicant shall maintain all sampling and analytical results including: strip charts; date, exact place, and time of sampling; date analyses were performed; sample collector's name; analyst's name; analytical techniques used; and results of all analyses. Such records shall be retained for a minimum of three years. This period of retention shall be extended during the course of any unresolved litigation regarding this discharge, or when requested by the California Energy Commission.

b. Operational Log

   An operation and maintenance log shall be maintained at the Facility. All monitoring and reporting data shall be recorded in a permanent log book.

3. REPORTING

   a. For every item where the requirements are not met, the applicant shall submit a statement of the actions undertaken or proposed which will bring the discharge into full compliance with requirements at the earliest time, and shall submit a timetable for correction.

   b. The applicant shall provide a brief summary of any operational problems and maintenance activities to the California Energy Commission with each monitoring report. Any modifications or additions to, or any major maintenance conducted on, or any major problems occurring to the wastewater conveyance system, treatment facilities, or disposal facilities shall be included in this summary.

   c. Monitoring reports shall be signed by:

      i. In the case of a corporation, by a principal executive officer at least of the level of vice-president or their duly authorized representative, if such representative is responsible for the overall operation of the facility from which the discharge originates;

      ii. In the case of a partnership, by a general partner;

      iii. In the case of a sole proprietorship, by the proprietor; or

      iv. In the case of a municipal, state or other public facility, by either a principal executive officer, ranking elected official, or other duly authorized employee.

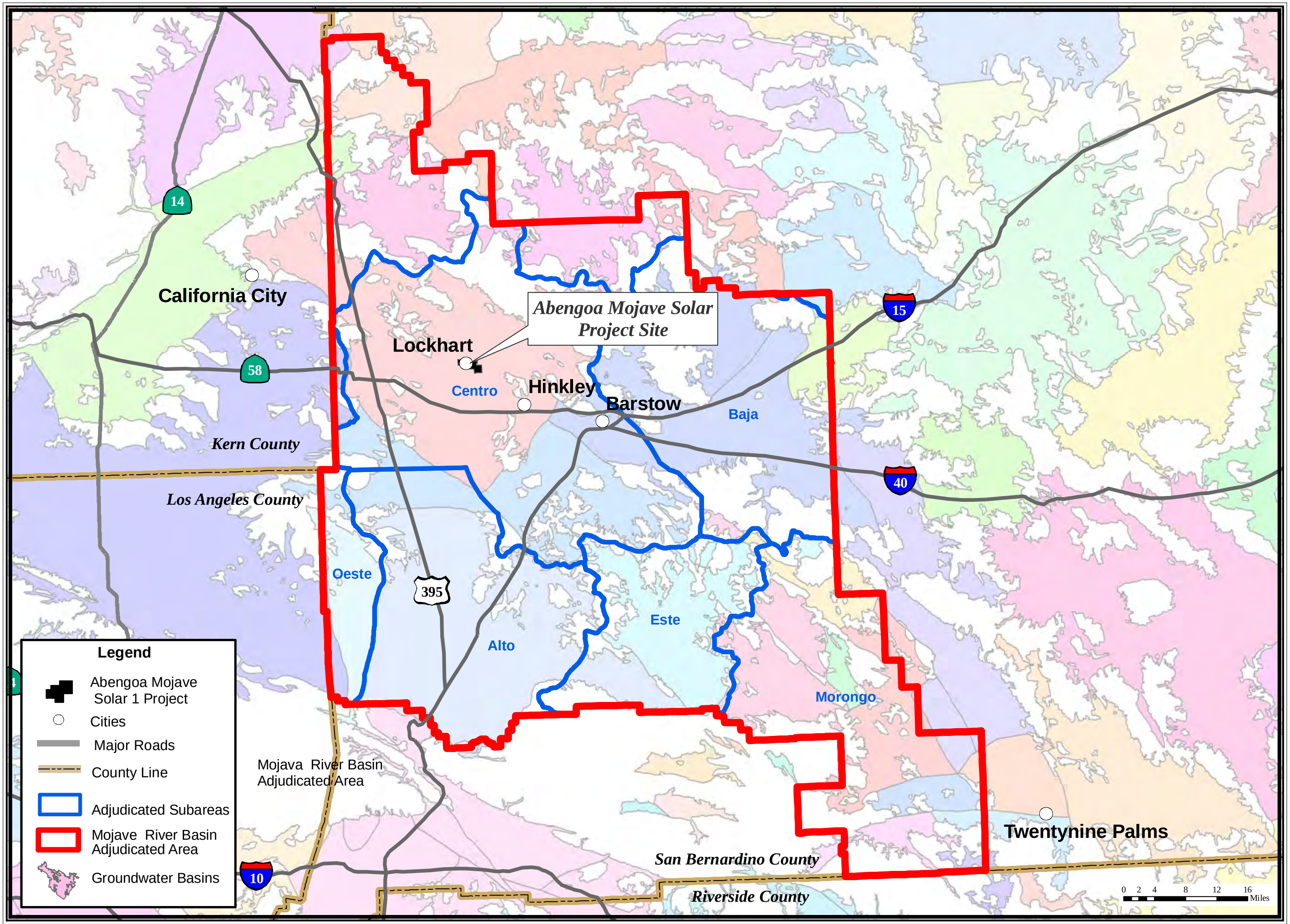
   d. Monitoring reports are to include the name and telephone number of an individual who can answer questions about the report.

MARCH 2010

SOIL AND WATER RESOURCES

SOIL AND WATER RESOURCES - FIGURE 1

Abengoa Mojave Solar Project - Site Vicinity

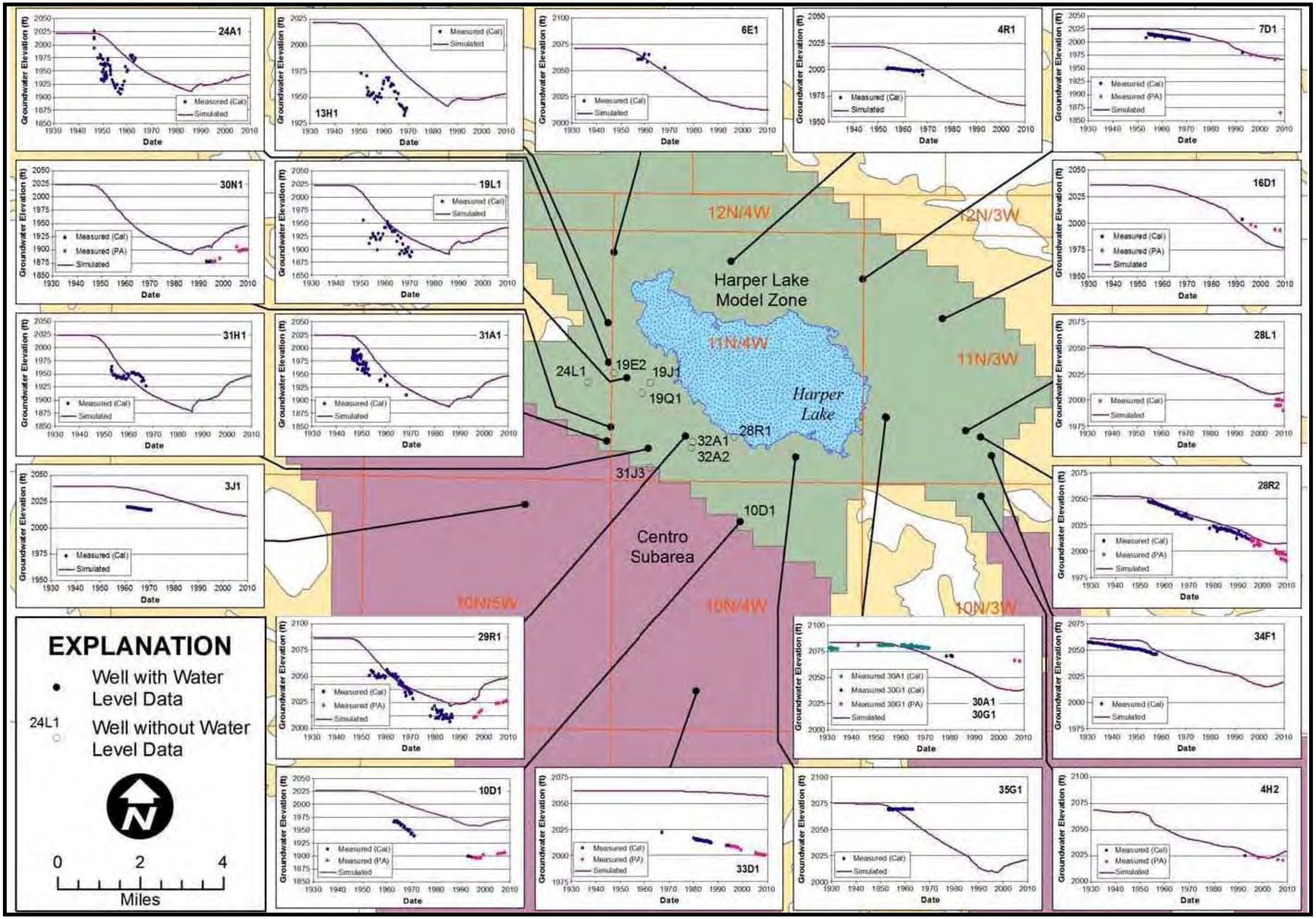


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: California Energy Commission, Bureau of Land Management

SOIL AND WATER RESOURCES - APPENDIX B - FIGURE 1

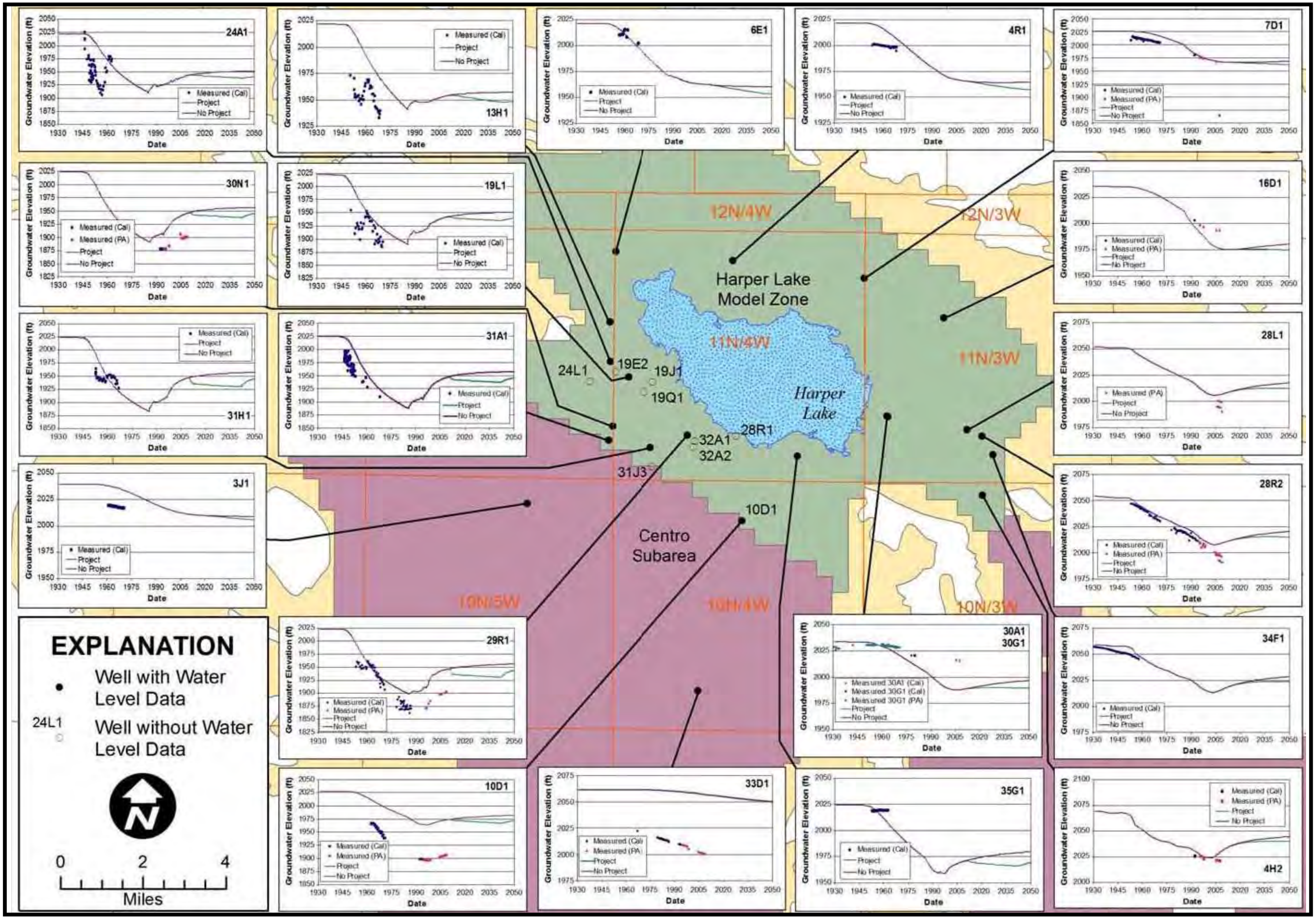
Abengoa Mojave Solar Project - Observed and Simulated Water Levels, Harper Lake Area, 1930-2008



SOURCE: California Energy Commission

SOIL AND WATER RESOURCES - APPENDIX B - FIGURE 2

Abengoa Mojave Solar Project - Simulated Water Levels Without (No Project) and With Proposed Project Pumping, Harper Lake Area, 1930-2050

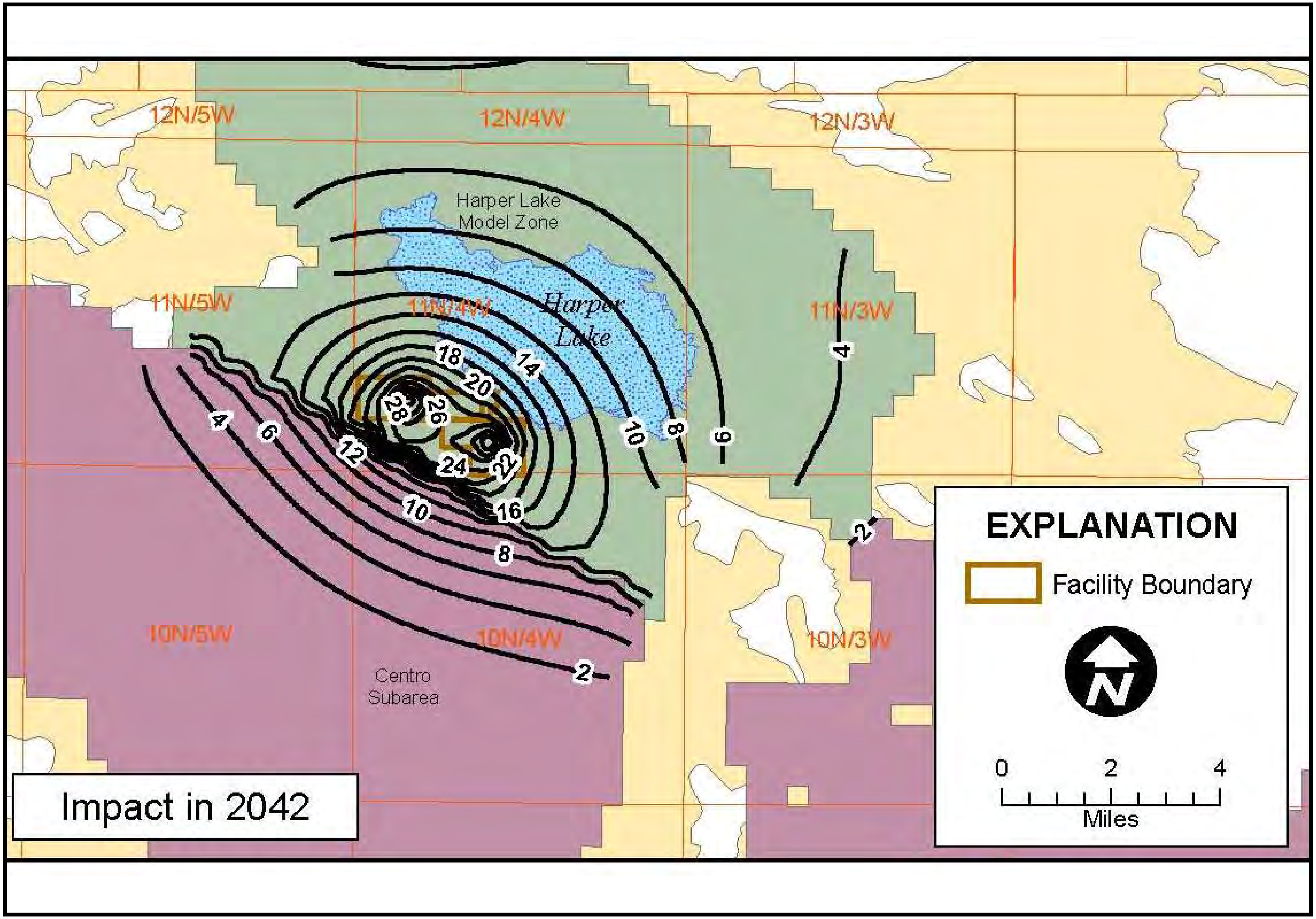


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MAY 2010

SOURCE: California Energy Commission

SOIL AND WATER RESOURCES - APPENDIX B - FIGURE 3

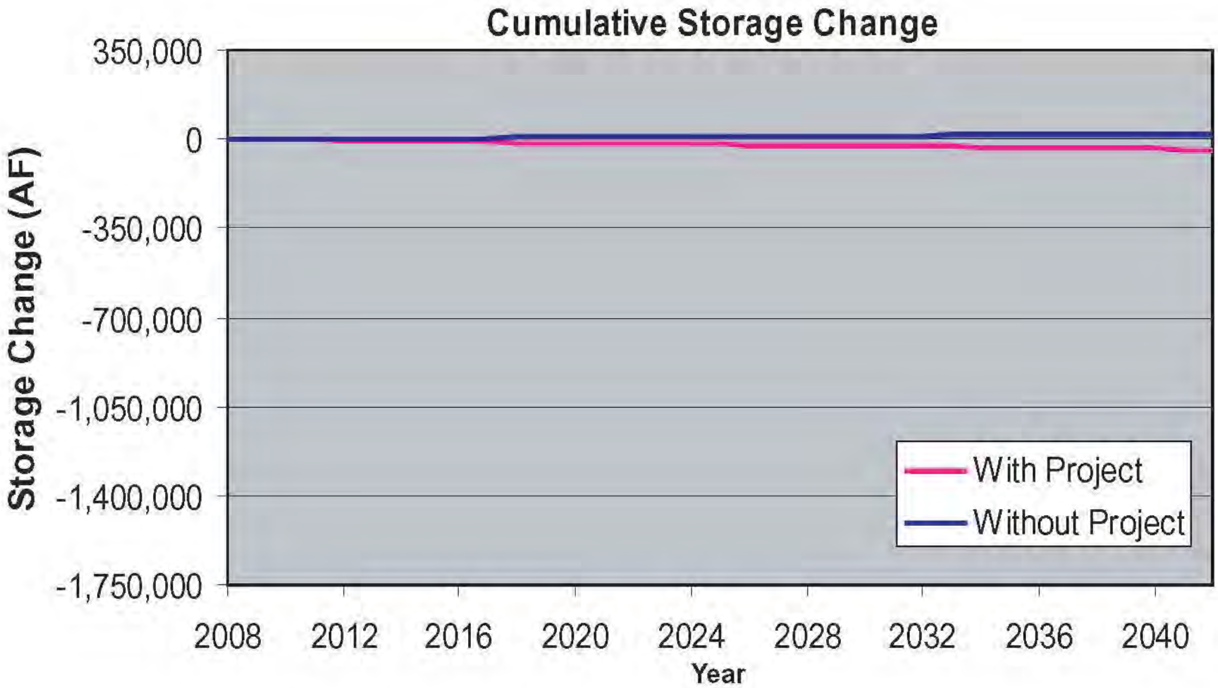
Abengoa Mojave Solar Project - Simulated Cumulative Storage Change Relative to Estimated Accessible Storage in the Harper Lake Model Zone

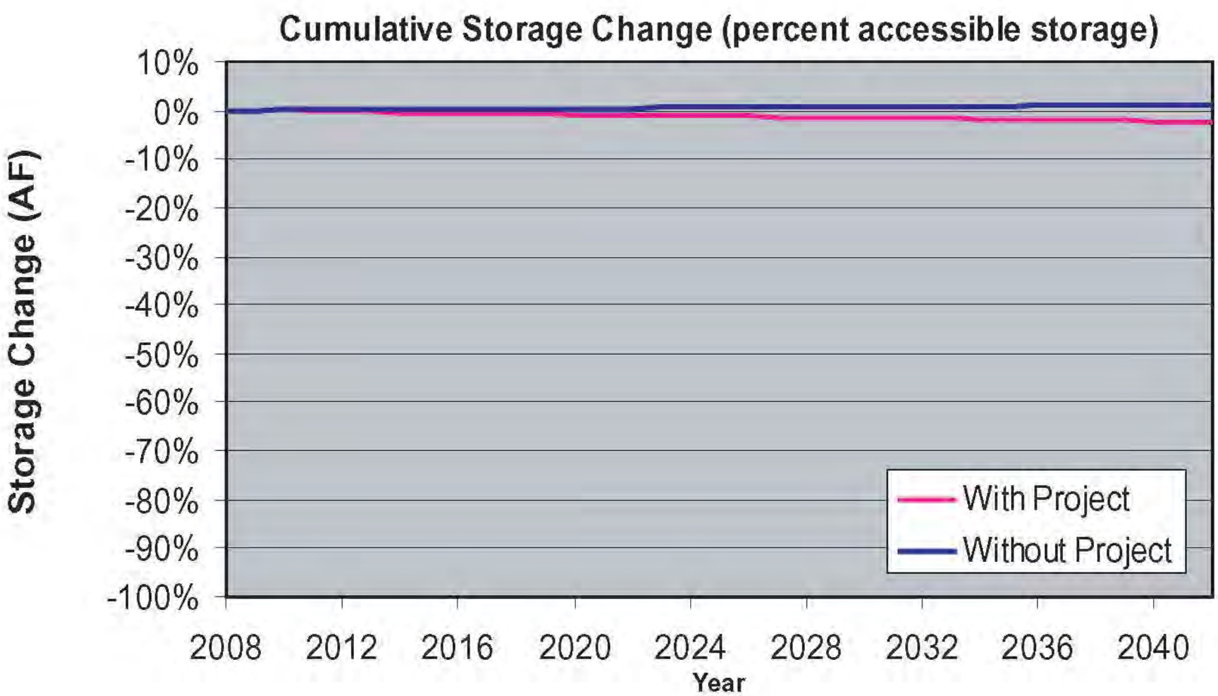


SOURCE: California Energy Commission

Abengoa Mojave Solar Project - Difference Between Simulated 2042 Water Levels With and Without (No Project) Proposed Project Pumping, Harper Lake Area

Simulated cumulative groundwater storage change in the Harper Lake model zone relative to estimated accessible groundwater in-place as of 2008 (accessible groundwater is considered as the water within the saturated zone between the water table and bottom of existing wells, which in 2008 is estimated to be 1,740,500 AF).





CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MAY 2010
SOURCE: California Energy Commission

ENGINEERING ASSESSMENT

TRANSMISSION SYSTEM ENGINEERING

Testimony of Ajoy Guha, P. E. and Mark Hesters

SUMMARY OF CONCLUSIONS

The proposed interconnection facilities for the Abengoa Mojave Solar project (AMS) including the proposed new Alpha and Beta 230 kV switchyards, the generator 230 kV tie lines to the proposed new Southern California Edison (SCE) Lockhart 230 kV substation and their terminations would be adequate in accordance with industry standards and good utility practices, and are acceptable to staff according to engineering Laws, Ordinances, Regulations and Standards (LORS).

The Interconnection Facilities Study/Technical Assessment Study demonstrate that the addition of the AMS would cause new normal (N-0) and single contingency (N-1) overloads on the Kramer-Lugo No. 1 & No. 2 230 kV lines during 2013 summer peak and light spring system conditions. The study also identified transient stability violation for loss of the Lugo-Cool Water 230 kV line. The current mitigation plan responsibility for the AMS includes two alternatives. The alternative 1 mitigation plan involves building a new 59-mile Cool Water-Lugo 230 kV line, and installation of a new Special Protection System (SPS) for curtailment of the AMS generation under certain outage and other conditions. The alternative 2 mitigation plan includes congestion management, installation of a new SPS for curtailment of the AMS generation output and participation in the existing Kramer Remedial Acton Scheme (RAS) for associated curtailments in lieu of installation of the proposed Cool Water-Lugo 230 kV line.

The applicant has chosen the alternative 2 mitigation plan as above which staff finds acceptable. The plan involves installation of a telecommunication system using multi-stranded fiber optic cables and other communication equipment, which would be installed in the following routes:

- Lockhart substation to Alpha & Beta switchyards-about 3 miles.
- Lockhart substation to Kramer substation-about 18 miles.
- Lockhart substation to Tortilla substation-about 31 miles.
- Tortilla substation to Cool Water substation-about 12 miles.
- Kramer substation to Victor substation-about 36 miles.

The new fiber optic cables for a total length of approximately 100 miles of the combined routes would be installed partly on the existing overhead transmission (115 kV) and distribution (33 kV) wood and steel poles, partly on new wood poles, and partly through new and existing underground conduits. The installation of the proposed fiber optic cables is considered a downstream project impact. A general environmental analysis of the telecommunication system upgrades with the fiber optic cables will be provided as Appendix A to this Transmission System Engineering (TSE) section on or before June 30, 2010 in the Supplemental Staff Assessment Part C.

The AMS would meet the requirements and standards of all applicable LORS upon compliance with the recommended Conditions of Certification.

The applicant has signed a power purchase agreement with Pacific Gas and Electric for renewable power supply. The AMS as a solar generation would provide clean renewable energy towards meeting state mandate and goals.

INTRODUCTION

The Transmission System Engineering (TSE) analysis examines whether or not the facilities associated with the proposed interconnection conforms 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 CEQA, the Energy Commission must conduct an environmental review of the "whole of the action," which may include facilities not licensed by the Energy Commission (California Code of Regulations, title 14, §15378). Therefore, the Energy Commission must identify the system impacts and necessary new or modified transmission facilities downstream of the proposed interconnection that are required for interconnection and represent the "whole of the action." The 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.

Energy Commission staff relies on the interconnecting authority for the analysis of impacts on the transmission grid as well as the identification and approval of required new or modified facilities downstream from the proposed interconnection that would be required as mitigation measures. The proposed AMS would interconnect to the SCE transmission network and requires analysis by SCE and approval of the California ISO.

SCE'S ROLE

SCE is responsible for ensuring electric system reliability in the SCE system for addition of the proposed generating plant. SCE will provide the analysis and reports in their System Impact and Facilities studies, and their approval for the facilities and changes required in the SCE system for addition of the proposed transmission modifications.

CALIFORNIA ISO'S ROLE

The California ISO is responsible for ensuring electric system reliability for all participating transmission owners and is also responsible for developing the standards necessary to achieve system reliability. The California ISO is responsible for completing the studies of the SCE system to ensure adequacy of the proposed transmission interconnection. The California ISO will determine the reliability impacts of the proposed transmission modifications on the SCE transmission system in accordance with all applicable reliability criteria. According to the California ISO Tariffs, the California ISO will determine the "Need" for transmission additions or upgrades downstream from the interconnection point to insure reliability of the transmission grid. The California ISO will, therefore, review the System Impact Study (SIS) performed by SCE and/or any third party, provide their analysis, conclusions and recommendations. On satisfactory completion of the SCE Interconnection Facility Study (IFS)/Technical Assessment Study (TAS) and in accordance with the LGIP as in the California ISO Tariff, the California ISO instead of issuing a final approval letter, would proceed to execute the LGIA between the California ISO and the project owner and subsequently perform an Operational study examining the impacts of the project on the grid based on the expected June, 2012 COD or current COD. The California ISO may also provide written and verbal testimony on their findings at the Energy Commission hearings, if necessary.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

- 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 (CPUC) 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, 1999 provides electrical, mechanical, civil and structural requirements for overhead electric line construction and operation.
- NERC/WECC Planning Standards: The Western Electricity Coordinating Council (WECC) Planning Standards are merged with the North American Electric Reliability Council (NERC) Planning Standards and provide the system performance standards used in assessing the reliability of the interconnected system. These standards require the continuity of service to loads as the first priority and preservation of interconnected operation as a secondary priority. Certain aspects of the NERC/WECC standards are either more stringent or more specific than the NERC standards alone. These standards provide planning for electric systems so as to withstand the more probable forced and maintenance outage system contingencies at projected customer demand and anticipated electricity transfer levels, while continuing to operate reliably within equipment and electric system thermal, voltage and stability limits. These standards include the reliability criteria for system adequacy and security, system modeling data requirements, system protection and control, and system restoration. Analysis of the WECC system is based to a large degree on Section I.A of the standards, “NERC and WECC Planning Standards with Table I and WECC Disturbance-Performance Table” and on Section I.D, “NERC and WECC Standards for Voltage Support and Reactive Power”. These standards require that the results of power flow and stability simulations verify defined performance levels. Performance levels are defined by specifying the allowable variations in thermal loading, voltage and frequency, and loss of load that may occur on systems during various disturbances. Performance levels range from no significant adverse effects inside and outside a system area during a minor disturbance (loss of load or a single transmission element out of service) to a level that seeks to prevent system cascading and the subsequent blackout of islanded areas during a major disturbance (such as loss of multiple 500 kV lines along a common right of way, and/or multiple generators). While controlled loss of generation or load or system separation is permitted in certain circumstances, their uncontrolled loss is not permitted (WECC 2006).

- North American Reliability Council (NERC) Reliability Standards for the Bulk Electric Systems of North America provide national policies, standards, principles and guidelines to assure the adequacy and security of the electric transmission system. The NERC Reliability Standards provide for system performance levels under normal and contingency conditions. With regard to power flow and stability simulations, while these Reliability Standards are similar to NERC/WECC Standards, certain aspects of the NERC/WECC Standards are either more stringent or more specific than the NERC Standards for Transmission System Contingency Performance. The NERC Reliability Standards apply not only to interconnected system operation but also to individual service areas (NERC 2006).
- California ISO Planning Standards also provide standards, and guidelines to assure the adequacy, security and reliability in the planning of the California ISO transmission grid facilities. The California ISO Grid Planning Standards incorporate the NERC/WECC and NERC Reliability Planning Standards. With regard to power flow and stability simulations, these Planning Standards are similar to the NERC/WECC or NERC Reliability Planning Standards for Transmission System Contingency Performance. However, the California ISO Standards also provide some additional requirements that are not found in the WECC/NERC or NERC Standards. The California ISO Standards apply to all participating transmission owners interconnecting to the California ISO controlled grid. They also apply 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 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 (California ISO 2007a).

PROJECT DESCRIPTION

The AMS, a solar thermal generating plant, would be located in a 1,765-acre site in the Mojave Desert in San Bernardino County immediate southwest of Harper Dry Lake and about 9 miles northwest of Lockhart. The project would have two independent solar fields, Alpha and Beta, each feeding a 125 MW power island with a solar steam generator to operate a steam turbine generator (STG). The AMS would have a total 250 MW nominal output with two 125 MW STG units. Each STG unit rated 165 MVA, 13.8 kV would be connected through an 8,000-ampere segregated bus duct to the low voltage terminal of a dedicated 148/175 MVA, 13.8/230 kV generator step-up (GSU) transformer with an impedance of 9 percent @148 MVA (AS 2009a, AFC, sections 1 & 2; AS 2009b, DA supplemental AFC).

SWITCHYARDS AND INTERCONNECTION FACILITIES

The new Alpha and Beta 230 kV switchyards would have a 1,200-ampere single bus arrangement. The 230 kV high voltage terminals of each GSU transformer at the Alpha and Beta solar fields would be connected to its switchyard 230 kV bus by short 700-ampere overhead conductors through a 1,200-ampere, 230 kV circuit breaker and two disconnect switches.

The Alpha and Beta switchyards would be interconnected to the SCE Kramer-Cool Water No. 1 230 kV line by building a new SCE Lockhart 230 kV substation located at the southern fence line of Beta solar field and looping the existing Kramer-Cool Water No. 1 230 kV line into the new substation (ESH 2010b, Page 3). The Alpha switchyard would be interconnected to Lockhart substation by building a new 2.17-mile long single circuit 230 kV overhead line with 477 kcmil steel-reinforced aluminum conductors (ACSR) on 80 to 110-foot steel poles within the plant boundary. The Beta switchyard would be interconnected to Lockhart substation by building a new 0.84-mile long single circuit 230 kV overhead line with 477 kcmil ACSR conductors on 80 to 110-foot steel poles within the plant property. The generator tie lines would be connected to their respective Alpha and Beta 230 kV switchyard bus through a 1,200-ampere disconnect switch. The applicant would build, own and operate the AMS Alpha and Beta switchyards and the generator tie lines.

The new SCE Lockhart 230 kV substation is proposed as a 2,000-ampere double bus arrangement. For two switch bays there would a double breaker configuration at this time for connecting generator tie lines from Alpha and Beta switchyards and also another switch bay would be built with a breaker and a half configuration for connecting two circuits for looping the SCE Kramer-Cool Water #1 230 kV line. Each of the generator tie lines from Alpha and Beta switchyard would be connected to a Lockhart substation switch bay through a 1,200-ampere disconnect switch. The switch bays would be built with seven 2,000-ampere circuit breakers and fourteen associated 2,000-ampere disconnect switches. SCE would build, own and operate the new Lockhart substation, the interconnection facilities within the substation fence line, and all transmission outlets (AS 2009a, AFC, sections 1 & 2; AS 2009b, DA supplemental AFC).

The configuration of the AMS Alpha and Beta 230 kV switchyards, the generator 230 kV overhead tie lines and their terminations at the proposed new Lockhart 230 kV substation would be adequate in accordance with industry standards and good utility practices, and is acceptable to staff. Proposed Conditions of Certification TSE 1 to TSE 8 insure that the proposed facilities are designed, built and operated in accordance with good utility practices and applicable LORS.

TRANSMISSION SYSTEM IMPACT ANALYSIS

For the interconnection of a proposed generating unit or transmission facility to the grid, the interconnecting utility and the control area operator are responsible for ensuring grid reliability. For the AMS, SCE and California ISO are responsible for ensuring grid reliability. In accordance with the FERC/California ISO/Utility Tariffs, System Impact and Interconnection Facilities Studies are conducted to determine the preferred and alternate interconnection methods to the grid, the downstream transmission system impacts and the mitigation measures needed to ensure system conformance with performance levels required by the utility reliability criteria, NERC planning standards, WECC reliability criteria, and California ISO reliability criteria. Staff relies on the studies and any review conducted by the responsible agencies to determine the effect of the project on the transmission grid and to identify any necessary downstream facilities or project impacts required to bring the transmission network into compliance with applicable reliability standards (NERC2006, WECC 2006, California ISO 2002a and 2007a).

The System Impact and Interconnection Facilities Studies/Technical Assessment Study analyze the grid with and without the proposed project under conditions specified in the planning standards and reliability criteria. The standards and criteria define the assumptions used in the study and establish the thresholds by which grid reliability is determined. The studies must analyze the impact of the project for the proposed first year of operation and thus are based on a forecast of loads, generation and transmission. Load forecasts are developed by the interconnected utility, which would be SCE in this case. Generation and transmission forecasts are established by an interconnection queue. The studies are focused on thermal overloads, voltage deviations, system stability (excessive oscillations in generators and transmission system, voltage collapse, loss of loads or cascading outages), and short circuit duties. SCE completed the System Impact Study in June 2008 and the Interconnection Facilities Study in October 2009.

The applicant has also provided the Harper Lake Solar Power Plant Interconnection Optional Study Report which forecasts the curtailment of the AMS if congestion management is chosen as a means to mitigate overloads identified in the Interconnection Facilities Study.

If the studies show that the interconnection of the project causes the grid to be out of compliance with reliability standards, the study will then identify mitigation alternatives or ways in which the grid could be brought into compliance with reliability standards. If the interconnecting utility determines that the only feasible mitigation includes transmission modifications or additions which require CEQA review as part of the “whole of the action,” the Energy Commission must analyze those modifications or additions according to CEQA requirements.

SCOPE OF SYSTEM IMPACT STUDY (SIS)/ INTERCONNECTION FACILITIES STUDY

The June 27, 2008 SIS was prepared by the California ISO in coordination with SCE to evaluate the impact of the proposed AMS on the SCE transmission system and was supplanted by the IFS which included the TAS completed on December 12, 2008 (ESH 2010b, page 3). The TAS updated the generation interconnection queue, removing many generators that dropped out or moved to lower queue positions. The updated generation interconnection queue used in the TAS provides a more accurate forecast of the impacts of the AMS interconnection. The SIS and IFS/TAS were prepared with and without the AMS 250 MW generation output with the following base cases based on the most expected critical loading condition for the transmission system in SCE’s service area:

- A 2013 summer peak base case derived from the current SCE’s California ISO annual transmission expansion study base cases and has 1-in -10 year extreme weather load level for SCE’s service area.
- A 2013 light spring peak base case at 65 percent of the summer peak load level.

In each of the studies southern California generation and critical seasonal power flows in WECC Paths were maintained within limits. The base cases included planned California ISO approved transmission upgrades that would be operational by 2013. The pre-project base cases also included all queue generation projects with higher positions than the AMS, for the SIS this was 5,846 MW, in the IFS/TAS only 1,460 MW were left in the interconnection queue ahead of AMS (ESH 2010b, TAS page 9).

In addition, the study evaluated conditions with dispatch of generation inside and outside SCE territory that maximized loadings in the north of Lugo area. This included adjusting the West-of-River (Path 46) flow and modeling all pertinent queue generation in the vicinity of the AMS.

The study included analyses for power flow, short circuit, substation evaluation, transient stability, and post-transient voltage. The study also provided preliminary scope of work and cost estimates for the upgrades in the proposed Lockhart substation including downstream network reliability upgrades in the SCE system, assuming SCE would engineer, construct, own and maintain the new Lockhart substation and downstream network upgrades (AS 2009a, AFC, Appendix N: SIS report).

Power Flow Study Results and Mitigation

The IFS/TAS found that the addition of the AMS would cause new normal (N-0) and single contingency (N-1) overloads on the Kramer-Lugo No. 1 & No. 2 230 kV lines during 2013 summer peak and light spring system conditions. The Power Flow study results are shown in Tables 2.1 & 2.4, and section IV.A of the SIS (AS 2009a, AFC; Appendix N, SIS, pages 23-38).

Below is a summary of the results of the California ISO's power flow analysis for the AMS with the base cases (ESH 2010b).

- Under 2013 summer peak and light spring system conditions the study identified new normal (N-0) overloads on the Kramer-Lugo No. 1 & No. 2 230 kV lines (119% of their normal ratings) due to the addition of the AMS:

  Mitigation:

  Staff considers mitigation alternative 1 or alternative 2 acceptable.

  Alternative 1:

  a. Construction of a new Cool Water-Lugo 230 kV line and installation of a new SPS designed to curtail AMS generation under certain system conditions. This line would be designed. Built and operated by SCE and the CPUC would be the lead agency for permitting. The new about 59-mile long 230 kV line would be built using 500 kV structures for 16 miles with bundled 2156 Kcmil ACSR conductors and 230 kV structures for 43 miles with 2-1590 Kcmil ACSR conductors. Additional facilities to provide fiber optic channels may be required to remedy situations for withdrawal of application by higher queue interconnections projects.

Alternative 2

a. Use congestion management and install a new SPS to mitigate overloads through curtailment of the AMS generation, and participation in the existing Kramer RAS. A telecommunication system using multi-stranded fiber optic cables and other communication equipment would be required in order to implement the SPS, as well as providing monitoring and remote operation capabilities at the Lockhart substation. The All Dielectric Self Supporting Fiber (ADSS) Optic cables would be installed in the following routes:

   i. Lockhart to Alpha and Beta Switchyards, approximately 3 miles.

   ii. Lockhart substation-Kramer substation, approximately 18 miles in an existing transmission corridor.

   iii. Lockhart Substation-Cool Water Substation via Tortilla substation, approximately 43 miles in an existing corridor.

   iv. Kramer Substation-Victor Substation, approximately 36 miles in an existing corridor.

- Under 2013 summer peak and light spring system conditions the study identified the that the AMS aggravated pro-project overloads of the Kramer-Lugo No. 1 & No. 2 230 kV lines under single (N-1) contingency conditions:

  Mitigation:

  With the additional upgrades in place for the new normal (N-0) overloads as stated above, the study determined that installation of a special protection system (SPS) for both the above lines under the single contingency conditions would be required to mitigate thermal and transient stability problems by tripping off the AMS. Staff considers the mitigation measure acceptable under the study assumptions.

- With the additional upgrades identified to mitigate new overloads caused by the addition of AMS, the study does not identify any double (N-2) contingency overloads in the local area.

The applicant has chosen alternative 2, congestion management and SPS, as the mitigation for overloads identified in the power flow studies. Based on the current studies, congestion management and SPS are acceptable mitigation for the identified overloads.

Short Circuit Study Results A and Substation Evaluation

Three line-to-ground (3 LG) and single line-to-ground (SLG) faults were simulated with and without the AMS to determine if there are any overstressed circuit breakers in SCE substations in the project vicinity caused by the addition of the project. The short circuit duty analysis included all queue projects and the related transmission upgrades.

The short circuit results shown in Tables 2-5 and 2-6 in section D of the SIS present the impact for the addition of the AMS only, while the results shown in the Tables 2-7 and 2-8 present the incremental impacts for the addition of upgrades required for the AMS (AS 2009a, Appendix N, SIS, Section IV. D, Pages 39-42). The Interconnection Facilities

Study found that the AMS does not trigger the need for circuit breaker replacement but does aggravate pre-project conditions that could require the upgrade/replacement of fifty-two circuit breakers at eight different locations in case of withdrawal of application by higher queue interconnection projects (EHS 2010b, page 4).

The replacement of circuit breakers usually occurs within the fence line of existing facilities and does not require further CEQA review. If CEQA review is required the CPUC would be the lead agency for required permits.

Transient Stability Study Results and Mitigation

Transient stability analysis is performed to determine whether the transmission system would remain stable with the addition of the AMS. The analysis was performed with the 2013 summer peak and light spring base cases with simulated faults under selected critical single and double contingencies. Transient stability plots for summer and spring load conditions are provided in Appendices A and B of the SIS report (AS 2009a, Appendix N, SIS, section IV.B, pages 38-39).

The IFS/TAS found one transient stability violation caused by the AMS. The SPS identified for the mitigation of the N-1 overload above would also mitigate the transient stability violation (EHS 2010b, page 5).

Post-transient Voltage Analysis Results

The power flow study revealed that without facility upgrades identified under the pre-project base case conditions, the AMS aggravates previous low voltage conditions, including case non-convergence, which are indicative of voltage collapse conditions. These voltage problems would be mitigated with implementation of pre-project transmission upgrades for higher queue projects (AS 2009a, Appendix N, SIS, section IV.C, page 39).

Interconnection Option Study Results

The Interconnection Optional Study analyzed the potential curtailment for the AMS if congestion management and the SPS (Alternative 2, above) were used to mitigate transmission overloads identified in the TAS. The study looked at the historical loading of the transmission lines affected by the AMS and found that the likely maximum annual curtailment for the AMS would be 5% under the congestion management and SPS mitigation alternative (AS 2010d).

CALIFORNIA ISO REVIEW

In accordance with the provisions of LGIP, the June 27, 2008 SIS was prepared by the California ISO in coordination with SCE and evaluated the impact of the proposed 250 MW generation output from the AMS to a new Lockhart 230 kV substation with the loop-in of the existing Kramer-Cool Water 230 kV line. The IFS/TAS identified mitigation plan to eliminate the adverse impacts of the AMS would be adequate. The California ISO may also provide written and verbal testimony on their findings at the Energy Commission hearings, if necessary.

Execution of the LGIA would ensure system reliability in the California ISO grid and compliance with WECC/NERC and California ISO Planning standards (WECC 2006, NERC 2006, California ISO 2002a and 2007a). Condition of Certification TSE-5 requires the submittal of the LGIA to the Energy Commission at least 30-days prior to the construction of transmission interconnection facilities.

DOWNSTREAM FACILITIES

Besides the proposed interconnection facilities for the proposed AMS including Alpha & Beta switchyards, generator tie lines and construction of a new SCE Lockhart substation, accommodating the interconnection of the AMS new generation output to the SCE system would involve the installation of several optic communications cables on new wood poles in existing transmission corridors. The installation of the new cables is considered a reasonably foreseeable consequence of the proposed AMS project and requires CEQA analysis.

CUMULATIVE IMPACTS

Since the AMS is being connected to the north of Lugo SCE area which requires several major transmission upgrades for the reliable interconnection of both the AMS and generators with higher queue positions, staff believes that the AMS would create some cumulative effects in the SCE local network under certain conditions until all the identified transmission facilities are in place.

However, the cumulative impacts due to the AMS, as identified in the SIS or IFS which includes higher queue projects, would be mitigated. Staff also believes that there would be some positive impacts because the project, as local solar generation, would provide clean renewable energy, meet the increasing load demand in the SCE network, provide additional reactive power and voltage support, and enhance reliability in the SCE local network.

ALTERNATIVE TRANSMISSION ROUTES

The AMS site has access to two major transmission lines abutting its southern boundary, the Mead-Adelanto 500 kV line in the Los Angeles Department of Water and Power (LADWP) system and the SCE Kramer-Cool Water No. 1 230 kV line. The applicant did not choose to interconnect to the LADWP line with multiple owners, as the interconnection would increase costs, uncertainty, complexity and would be harder to ensure delivery of the project to the California ISO grid. The interconnection to the SCE system would ensure earlier interconnection and power delivery to the California ISO grid.

The generator overhead tie lines from the proposed AMS Alpha and Beta switchyards to the SCE Kramer-Cool Water 230 kV line through the proposed SCE Lockhart substation would also follow the shortest, least expensive routes within the AMS site with least environmental impacts (GWF2008a, AFC, section 4.5).

CONFORMANCE WITH LORS AND CEQA REVIEW

The configuration of the AMS Alpha and Beta switchyards, the generator interconnection overhead tie lines and their terminations at the proposed new Lockhart 230 kV substation would be adequate in accordance with industry standards and good utility practices, and is acceptable to staff.

The IFS/TAS demonstrate that there would be some adverse impacts on the SCE system for the addition of the AMS. The mitigation plan would be adequate and would eliminate the adverse impacts of the AMS.

SCE would be responsible for designing, building and operating the new 230 kV Cool Water – Lugo line. Sixteen miles of the new line would replace the existing Lugo – Pisgay 230 kV line as it heads east from the Lugo substation. SCE has not identified a route for the new 37-miles of the line as it heads north to the Cool Water substation.. The final routing and permitting of the 230 kV line would not occur until the LGIA is signed and CPUC permitting for the line could take twelve-months or more. Until a route for the line is chosen by SCE or through the permitting process any environmental analysis would require speculation on that final route. Without a specific route staff and the applicant are unable to provide an environmental analysis of these project impacts.

The AMS would meet the requirements and standards of all applicable LORS with the applicant's submission of all required information as stated above and upon satisfactory compliance of the Conditions of Certifications.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Staff received comments from SCE in a letter dated April 15, 2010 indicating that the Staff Assessment did not include a complete environmental analysis of the interconnection facilities at the Lockhart substation and that staff's description of the Lockhart substation facilities was not accurate. Staff has reviewed SCE's general environmental analysis report in the Draft, "Lockhart Substation Project Description for Abengoa Solar Inc." of March 15, 2010. The SCE report includes environmental impacts and mitigation measures for design and construction of the proposed Lockhart 230 kV substation, Kramer-Cool Water #1 230 kV transmission line loops into the new Lockhart substation , generator tie line connections, 12 kV distribution lines for station power and light and fiber optic telecommunication cables. The report does not discuss the relocation of 50 kV lines in or around the Lockhart Substation. Staff at this stage has no further information about any other new or existing facilities near the project site which would need to meet CEQA requirements (SCE 201b). The project description has been updated in this Staff Assessment and now indicates that the proposed Lockhart 230 kV substation would have 3 switch bays and seven circuit breakers along with associated disconnect switches.

CONCLUSIONS AND RECOMMENDATIONS

1. The configuration of the AMS Alpha and Beta switchyards, the generator interconnection overhead tie lines and their terminations at the proposed new

Lockhart 230 kV substation would be adequate in accordance with industry standards and good utility practices, and is acceptable to staff according to engineering LORS.

2. The IFS/TAS demonstrates that the addition of the AMS would cause new normal (N-0) and single contingency (N-1) overloads on the Kramer-Lugo No. 1 & No. 2 230 kV lines during 2013 summer peak and light spring system conditions. The study also identified transient stability violation for loss of the Lugo-Cool Water 230 kV line. The current mitigation plan responsibility for the AMS includes building a new 59-mile Cool Water-Lugo 230 kV line, and installation of a new SPS to curtail the AMS generation under certain contingency and other conditions OR congestion management and installation of a new SPS and participation in the existing Kramer RAS.

3. The applicant has chosen the congestion management and the SPS mitigation alternative which staff finds acceptable. A telecommunication system using multi-stranded fiber optic cables and other communication equipment would be required in order to provide transmission line protection, SPS, monitoring and remote operation capabilities at the Lockhart substation. The fiber optic cables would be installed in the following routes:

   - Lockhart substation to Alpha & Beta switchyards-about 3 miles.
   - Lockhart substation to Kramer substation-about 18 miles.
   - Lockhart substation to Tortilla substation-about 31 miles.
   - Tortilla substation to Cool Water substation-about 12 miles.
   - Kramer substation to Victor substation-about 36 miles.

   The new fiber optic cables for a total length of approximately 100 miles of the combined routes would be installed partly on the existing overhead transmission (115 kV) and distribution (33 kV) wood and steel poles, partly on new wood poles, and partly through new and existing underground conduits. The installation of the proposed fiber optic cables is a reasonably foreseeable consequence of the MEP.

4. A general environmental analysis of the telecommunication system upgrades with the fiber optic cables will included in the Appendix A to this Transmission System Engineering (TSE) section by June 30, 2010 as in the Supplemental Staff Assessment Part C.

5. The AMS would meet the requirements and standards of all applicable LORS upon compliance with the recommended Conditions of Certification.

6. The applicant has signed a power purchase agreement with Pacific Gas and Electric for renewable power supply. The AMS as a solar generation would provide clean renewable energy towards meeting state mandate and goals.

RECOMMENDATIONS

If the Energy Commission approves the project, staff recommends the following Conditions of Certification to ensure system reliability and conformance with 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: At least 60 days (or a lesser number of days mutually agreed to by the project owner and the CBO) prior to the start of 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 Prior to the start of construction the project owner shall assign an electrical engineer and at least one of each of the following to the project:

A. A civil engineer;

B. A geotechnical engineer or a civil engineer experienced and knowledgeable in the practice of soils engineering;

C. A design engineer, who is either a structural engineer or a civil engineer fully competent and proficient in the design of power plant structures and equipment supports; or

D. A mechanical engineer.

(Business and Professions Code Sections 6704 et seq., require state registration to practice as a civil engineer or structural engineer in California.)

The tasks performed by the civil, mechanical, electrical or design engineers may be divided between two or more engineers, as long as each engineer is responsible for a particular segment of the project (e.g., proposed earthwork, civil structures, power plant structures, equipment support). No segment of the project shall have more than one responsible engineer. The transmission line may be the responsibility of a separate California registered electrical engineer. The civil, geotechnical or civil and design engineer assigned in conformance with Facility Design condition **GEN-5**, may be responsible for design and review of the TSE facilities.

The project owner shall submit to the CBO for review and approval, the names, qualifications and registration numbers of all engineers assigned to the project. If any one of the designated engineers is subsequently reassigned or replaced, the project owner shall submit the name, qualifications and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer. This engineer shall be authorized to halt earthwork and to require changes if site conditions are unsafe or do not conform with predicted conditions used as a basis for design of earthwork or foundations.

The electrical engineer shall:

1. Be responsible for the electrical design of the power plant switchyard, outlet and termination facilities; and

2. Sign and stamp electrical design drawings, plans, specifications, and calculations.

<u>Verification:</u> At least 30 days (or a lesser number of days mutually agreed to by the project owner and the CBO) prior to the start of rough grading, the project owner shall submit to the CBO for review and approval, the names, qualifications and registration numbers of all the responsible engineers assigned to the project. The project owner shall notify the CPM of the CBO's approvals of the engineers within five days of the approval.

If the designated responsible engineer is subsequently reassigned or replaced, the project owner has five days in which to submit the name, qualifications, and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer within five days of the approval.

TSE-3 If any discrepancy in design and/or construction is discovered in any engineering work that has undergone CBO design review and approval, the project owner shall document the discrepancy and recommend corrective action (1998 CBC, Chapter 1, Section 108.4, Approval Required; Chapter 17, Section 1701.3, Duties and Responsibilities of the Special Inspector; Appendix Chapter 33, Section 3317.7, Notification of Noncompliance). The discrepancy documentation shall become a controlled document and shall be submitted to the CBO for review and approval and shall reference this condition of certification.

Verification: The project owner shall submit a copy of the CBO's approval or disapproval of any corrective action taken to resolve a discrepancy to the CPM within 15 days of receipt. If disapproved, the project owner shall advise the CPM, within five days, the reason for disapproval, and the revised corrective action required to obtain the CBO's approval.

TSE-4 For the power plant switchyard, outlet line and termination, the project owner shall not begin any increment of construction until plans for that increment have been approved by the CBO. These plans, together with design changes and design change notices, shall remain on the site for one year after completion of construction. The project owner shall request that the CBO inspect the installation to ensure compliance with the requirements of applicable LORS. The following activities shall be reported in the Monthly Compliance Report:

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: At least 30 days (or a lesser number of days mutually agreed to by the project owner and the CBO) 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-5 The project owner shall ensure that the design, construction and operation of the proposed transmission facilities will conform to all applicable LORS, including the requirements listed below. The project owner shall submit the required number of copies of the design drawings and calculations to the CBO as determined by the CBO.

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. Breakers and busses in the power plant switchyard and other switchyards, where applicable, shall be sized to accommodate full output from the project and 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 shall be sized to accommodate the full output from the project.

E. Termination facilities shall comply with applicable SCE interconnection standards.

F. The project owner shall provide to the CPM:

   i. The Special Protection System (SPS) sequencing and timing if applicable,

   ii. A letter stating the mitigation measures or projects selected by the transmission owners for each reliability criteria violation are acceptable,

   iii. An Operational study report based on the expected or current COD from the California ISO and/or SCE, and

   iv. A copy of the executed LGIA signed by the California ISO and the project owner.

Verification: At least 60 days prior to the start of construction of transmission facilities (or a lesser number of days mutually agree to by the project owner and CBO), the project owner shall submit to the CBO for approval:

A. Design drawings, specifications and calculations conforming with CPUC General Order 95 or NESC, Title 8, Articles 35, 36 and 37 of the "High Voltage Electric Safety Orders", NEC, applicable interconnection standards and related industry standards, for the poles/towers, foundations, anchor bolts, conductors, grounding systems and major switchyard equipment.

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 NESC, Title 8, California Code of Regulations, Articles 35, 36 and 37 of the, "High Voltage Electric Safety Orders", NEC, applicable interconnection standards, and related industry standards.

[1] Worst case conditions for the foundations would include for instance, a dead-end or angle pole.

C. Electrical one-line diagrams signed and sealed by the registered professional electrical engineer in responsible charge, a route map, and an engineering description of equipment and the configurations covered by requirements **TSE-5** a) through f) above.

D. The Special Protection System (SPS) sequencing and timing if applicable shall be provided concurrently to the CPM.

E. A letter stating the mitigation measures or projects selected by the transmission owners for each reliability criteria violation are acceptable,

F. An Operational study report based on the expected or current COD from the California ISO and/or SCE, and

G. A copy of the executed LGIA signed by the California ISO and the project owner.

TSE-6 The project owner shall inform the CPM and CBO of any impending changes that may not conform to requirements **TSE-5** a) through f), and have not received CPM and CBO approval, and request approval to implement such changes. A detailed description of the proposed change and complete engineering, environmental, and economic rationale for the change shall accompany the request. Construction involving changed equipment or substation configurations shall not begin without prior written approval of the changes by the CBO and the CPM.

<u>Verification:</u> At least 60 days prior to the construction of transmission facilities, the project owner shall inform the CBO and the CPM of any impending changes that` may not conform to requirements of **TSE-5** and request approval to implement such changes.

TSE-7 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.

<u>Verification:</u> 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-8 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.

<u>Verification:</u> 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 April 1998, Amendments 1,4,5,6, and 7 incorporated.

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, February 7, 2002.

California ISO (California Independent System Operator) 2007a. California ISO, FERC Electric Tariff, First Replacement Vol. No. 1, March, 2007.

California ISO (California Independent System Operator) 2009a, Large Generator Interconnection Procedures, dated.

AS 2009a: Abengoa Solar Inc. Application for Certification (AFC) for the AMS, dated 7-2-09. Appendix N: Interconnection System Impact Study report. Submitted on 8-10-2009.

AS 2009b: Abengoa Solar Inc. Data Adequacy Supplement dated 9-4-09. Submitted on 9-24-2009.

AS 2009c: Abengoa Solar Inc. Power Purchase Agreement dated 10-8-2009. Submitted on 9-24-2009.

AS 2010b: Abengoa Solar Inc. / E. Garcia (TN 55215). Abengoa Mojave - Facility Transmission System Upgrade, dated 2/5/2010. Submitted to CEC on 2/8/2010.

ESH 2009c. Ellison. C. Response to Data Request set no 1. Submitted on 11-24-09.

ESH 2010b: Ellison, Schneider and Harris / C. Ellison (TN 54796). Application for Confidential Designation: System Impact Study dated 1/4/10. Submitted to CEC on 1/4/2010.

AS 2010d-Abengoa Solar Inc. / K. Sullivan (TN 55679). Interconnection Optional Study by California ISO, January 2010, dated 2/24/2010. Submitted to CEC on 2/25/2010.

CEC 2009m: CEC Data Request set 1A (1-93) dated 10-22-09. Submitted on 10-22-09.

NERC (North American Electric Reliability Council) 2006. Reliability Standards for the Bulk Electric Systems of North America, May 2 2006.

SCE 2010b: SCE letter of April 15, 2010, comments on staff assessments. Submitted to CEC on 4-19-10.

WECC (Western Electricity Coordinating Council) 2006. NERC/WECC Planning Standards, August 2006.

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 Megavars	Megavolt Ampere-Reactive. One million Volt-Ampere-Reactive. Reactive power is generally associated with the reactive nature of motor loads that must be fed by generation units in the system.
Megavolt Ampere (MVA)	A unit of apparent power, 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	A power flow analysis is a forward looking computer simulation

Analysis	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: An 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.

PREPARATION TEAM

DECLARATION OF
Craig Hoffman

I, Craig Hoffman, declare as follows:

1. I am presently employed by the California Energy Commission in the Siting, Transmission and Environmental Protection Division, as a Project Manager (Planner III).

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on the **Executive Summary** and **Transmission System Engineering Appendix A** for the **Abengoa Mojave Solar** project (09-AFC-5) based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 5/5/10 Signed: Original signed by C. Hoffman

At: Sacramento, California

CRAIG D. HOFFMAN

EDUCATION

Master of Rural and Town Planning May 1997
California State University, Chico

Bachelor of Arts in History; Minor in Planning and Development May 1995
California State University, Chico

PROFESSIONAL EXPERIENCE

California Energy Commission June 2009 to Present
Siting, Transmission and Environmental Protection Division

Project Manager
Responsible for the day-to-day management of the certification process for thermal power plants of 50 megawatts or greater along with transmission lines, fuel supply lines, and related facilities to serve them. Works as a team leader on the coordination of activities and work product of technical specialists in 20 environmental and engineering disciplines. Coordinates project calendaring, public notices, workshops and public hearing meetings, the preparation of a preliminary staff assessment (draft EIR) and final staff assessment (final EIR). Responsible for identifying key technical and process issues and notifying management team of issues and process concerns. Recommends actions, policies and procedures affecting projects and program direction in order to ensure that needed energy facilities were authorized in an expeditious, safe and environmentally acceptable manner, consistent with the requirements of the Warren-Alquist Act and the California Environmental Quality Act (CEQA).

Trinity Investment Partners December 2008 to June 2009

Senior Associate
Was involved in project site investigation, due diligence, feasibility reports, budgets, funding source books and presentations to financial investors and institutions. Projects ranged in complexity and were typically impaired brownfield developments. Interacted with local jurisdiction community development staff to determine appropriate project land use mix and determine design feature limitations. The selection of project sites and land use assumptions were important to gain funding and financial backing to move

forward with the entitlement and development of projects. Prepared CEQA screening studies in order to determine potential impacts and provide the jurisdictions base line information for preparation of CEQA environmental reviews.

RCH Group / The Hodgson Company November 2007 to December 2008

Project Manager

Provided a full-range of real estate consulting and advisory services in mixed-use land development, entitlement processing, urban design and project management. These services included a range of legal, strategic, management and political advisory services - from advocating a project property before government agencies to resolving conflicts among project participants. Was the project manager for several large specific plans in the Sacramento region. This included coordination with owners groups, consultants, city and county jurisdictions, preparation of budgets, time lines and process charts and interaction with public and jurisdictional groups. Coordinated the preparation of EIRs and EIS's for projects along with securing proposals from various consultants to prepare technical studies for the environmental document. Also prepared numerous property evaluation and feasibility reports for lending institutions on foreclosed properties including large development entitlements.

Dunmore Communities / Dunmore Capital April 2005 to September 2007

Project Manager

As a project manager, was involved in project development from the acquisition of undeveloped property to the ultimate development of a successful project. These projects included the entitlement of large land parcels for master planned communities, commercial developments and residential subdivisions. Prepared due diligence, feasibility reports, and budgets; interacted with local jurisdiction staff; was involved in the layout and development of land plans; worked on design charettes; presented projects at public hearings; processed construction documents and helped facilitate building contracts and activities. Coordinated the preparation of EIRs and EIS's for projects along with securing proposals from various consultants to prepare technical studies for the environmental document. Prepared CEQA screening studies in order to determine potential impacts and provide the jurisdictions base line information for preparation of CEQA environmental reviews.

Pacific Municipal Consultants January 2000 to April 2005

Associate and Senior Planner

As a public agency contract planner, provided current, long range and environmental planning services to numerous city and county jurisdictions. Work efforts included the processing of General Plan Amendments, Specific Plans, Rezones, Williamson Act Contracts, Annexations, Vesting Tentative Subdivision Maps, Tentative Subdivision

Maps, Use Permits, Design Review for large scale residential master plans, commercial centers, multi-family projects, and mixed-use sites, policy document preparation, and appropriate environmental documentation for projects consistent with the requirements of CEQA. Presentations to community groups, Planning Commissions, City Councils and Board of Supervisors were routine activities and an integral part of public hearing process.

Was a senior planner from 2001 to 2003 and was the lead current planner for the City of Elk Grove from 2003 to 2005. Was responsible for the management of projects that were complicated, had the potential for public scrutiny and the city needed the projects to move forward. Was the lead planner on the Laguna Ridge Specific Plan and coordinated the planning process, the EIR and all approval documents.

Sierra County Planning Department October 1997 to January 2000

Planner II

Responsible for current planning functions including review, recommendation, and presentation to Planning Commission and Board of Supervisors. Evaluation of land-use and development applications, including general plan amendments, zone amendments, zone variances, special use permits, site plan review, reclamation plans, and tentative parcel map review, for consistency with County and State regulations. Prepared environmental documents as required by CEQA for development projects. A typical environmental document was the preparation of a mitigated negative declaration with attached technical studies. Review of building applications for consistency with General Plan, Zoning Ordinance and other County policies. Answer public inquiries regarding county planning and building issues, demographics and statistics.

DECLARATION OF
Tao Jiang

I, Tao Jiang, declare as follows:

1. I am presently employed by the California Energy Commission in the Siting, Transmission and Environmental Protection Division, as an Air Resources Engineer.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on the **Air Quality** for the **Abengoa Mojave Solar** project (09-AFC-5) based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: May 6, 2010 Signed: Original signed by T. Jiang

At: Sacramento, California

Tao Jiang, Ph.D.

Professional Experience

Air Resources Engineer ***(Jan. 2009 – Present)***

California Energy Commission, Siting Transmission and Environmental Protection Division

Currently acting as air quality technical staff on Siting projects filed with the Energy Commission including Abengoa Mojave Solar, Ridgecrest Solar Millennium and Almond 2 Power Plant, and compliance projects including 42 power plants in construction and operation. Specific responsibilities include the following:

- Analyze the impacts of the construction and operation of large power generation projects on air quality, Green House Gas and climate change
- Determine the conformance to applicable U.S. EPA, CARB and local air district regulations and standards
- Investigate and recommend appropriate emission mitigation measures
- Prepare air quality staff assessments and technical testimony
- Develop and monitor air quality compliance plans
- Review and evaluate U.S. EPA, CARB, and local air district air quality rules and regulations
- Collect, analyze and evaluate data for the effects of air pollutants and power plant emissions on human health, vegetation, wildlife, water resources and the environment
- Develop, recommend, and implement statewide planning and policy initiatives for the Energy Commission and Governor

Research assistant ***(Sep. 2004 – Dec. 2008)***

University of California, Riverside, Chemical & Environmental Engineering

- Investigated phase behavior of air colloidal particles
- Study mediated colloidal interactions in the air particle dispersions
- Construct and evaluate models for gas molecules and air particulate matters
- Perform computer simulation and modeling for gas molecules and air particulate matters

Education

PhD Chemical & Environmental Engineering, University of California, Riverside (August, 2008)
ME Materials Science and Engineering, Beijing University of Chemical Technology (June, 2003)
BE Materials Science and Engineering, Beijing University of Chemical Technology (June, 2000)

DECLARATION OF
Testimony of William Walters, P.E.

I**, William Walters,** declare as follows:

1. I am presently employed by Aspen Environmental Group, a contractor to the California Energy Commission's Siting,Transmission and Environmental Protection Division, as a senior associate in engineering and physical sciences.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Air Quality/Greenhouse Gases**, and prepared the **Visual Resources VR-2 Appendix** for the **Abengoa Mojave Solar** project (09-AFC-5) based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: May 6, 2010 Signed: Original signed by W. Walters

At: Agoura Hills, California

WILLIAM WALTERS, P.E.
Air Quality Specialist

ACADEMIC BACKGROUND
B.S., Chemical Engineering, 1985, Cornell University

PROFESSIONAL EXPERIENCE

Mr. Walters has over 20 years of technical and project management experience in environmental compliance work, including environmental impact reports, emissions inventories, source permitting, energy and pollution control research RCRA/CERCLA site assessment and closure, site inspection, and source monitoring,.

Aspen Environmental Group **2000 to present**

Responsible as lead technical and/or project manager of environmental projects. Specific responsibilities and projects include the following:

- **Engineering and Environmental Technical Assistance to Conduct Application for Certification Review for the California Energy Commission:**
  - Preparation and project management of the air quality section of the Staff Assessment and/or Initial Study and the visual plume assessment for the following California Energy Commission (CEC) licensing projects: Hanford Energy Park; United Golden Gate, Phase I; Huntington Beach Modernization Project (including Expert Witness Testimony); Woodland Generating Station 2; Ocotillo Energy Project, Phase I; Magnolia Power Project; Colusa Power Project; Inland Empire Energy Center; Rio Linda/Elverta Power Plant Project; Roseville Energy Center; Henrietta Peaker Project; Tracy Peaking Power Plant Project (including Expert Witness Testimony); Avenal Energy Project; San Joaquin Valley Energy Center (including expert witness testimony); Salton Sea Unit 6 Project (including expert witness testimony); Modesto Irrigation District Electric Generation Station (including expert witness testimony); Walnut Energy Center (including expert witness testimony); Riverside Energy Resource Center (including expert witness testimony); Pastoria Energy Facility Expansion; Panoche Energy Center; Starwood Power Plant; and Riverside Energy Resource Center Units 3 and 4 Project (in progress).
  - Preparation and project management of the visual plume assessment for the following California Energy Commission (Energy Commission) licensing projects: Metcalf Energy Center Power Project (including Expert Witness Testimony); Contra Costa Power Plant Project (including Expert Witness Testimony); Mountainview Power Project; Potrero Power Plant Project; El Segundo Modernization Project; Morro Bay Power Plant Project; Valero Cogeneration Project; East Altamont Energy Center (including expert witness testimony); Russell City Energy Center; SMUD Cosumnes Power Plant Project (including expert witness testimony); Pico Power Project; Blythe Energy Project Phase II; City of Vernon Malburg Generating Station; San Francisco Electric Reliability Project; Los Esteros Critical Energy Facility Phase II; Roseville Energy Park; City of Vernon Power Plant; South Bay Replacement Project; Walnut Creek Energy Park; Sun Valley Energy Project; Highgrove Power Plant; Colusa Generating Station; Russell City Energy Center; Avenal Energy Project; Carlsbad Energy Center; Community Power Project; Panoche Energy Center; San Gabriel Generating Station; Sentinel Energy Project; and Victorville 2 Hybrid Power Project.
  - Assistance in the aircraft safety review of thermal plume turbulence for the Riverside Energy Resources Center; Russell City Energy Center Amendment (including expert witness testimony); Eastshore Energy Power Plant (including expert witness testimony); Carlsbad Energy Center (in progress), Riverside Energy Resource Center Units 3 and 4 Project; Victorville 2 Hybrid Power Project; and the Blythe Energy Power

Plant and Blythe Energy Project Phase II (including expert witness testimony) siting cases. Assistance in the aircraft safety review of thermal and visual plumes of the operating Blythe Energy Power Plant. Preparation of a white paper on methods for the determination of vertical plume velocity determination for aircraft safety analyses.

- Preparation and instruction of a visual water vapor plume modeling methodology class for the CEC.
- Preparation and project management of the public health section of the Initial Study for the Woodland Generating Station 2 Energy Commission licensing project.
- Preparation of project amendment or project compliance assessments, for air quality or visual plume impacts, for several licensed power plants, including: Metcalf Energy Center; Pastoria Power Plant; Elk Hills Power Plant; Henrietta Peaker Project; Tracy Peaker Project; Magnolia Power Project; Delta Energy Center; SMUD Cosumnes Power Plant; Walnut Energy Center; San Joaquin Valley Energy Center; City of Vernon Malburg Generating Station; Otay Mesa Power Plant; Los Esteros Critical Energy Facility; Pico Power Project; Riverside Energy Resource Center; Blythe Energy Project Phase II; Inland Empire Energy Center; Salton Sea Unit 6 Project; and Starwood Power-Midway Peaking Power Plant.
- Preparation of the air quality section of the staff paper "A Preliminary Environmental Profile of California's Imported Electricity" for the Energy Commission and presentation of the findings before the Commission.
- Preparation of the draft staff paper "Natural Gas Quality: Power Turbine Performance During Heat Content Surge", and presentation of the preliminary findings at the California Air Resources Board Compressed Natural Gas Workshop and a SoCalGas Technical Advisory Committee meeting.
- Preparation of the staff paper "Emission Offsets Availability Issues" and preparation and presentation of the Emission Offsets Constraints Workshop Summary paper for the Energy Commission.
- Preparation of information request and data analysis to update the Energy Commission's Cost of Generation Model capital and operating cost factors for combined and simple cycle gas turbine projects. Additionally, performed a review of the presentation for the revised model as part of the CEC's 2007 Integrated Energy Policy Report workshops, and attended the workshop and answering Commissioner questions on the data collection and data analysis.

- For the **Los Angeles Department of Water and Power (LADWP)**:
  - Preparation of the Air Quality Inventory for the LADWP River Supply Pipeline Project EIR.
  - Project management and preparation of the Air Quality Section for the LADWP Valley Generating Station Stack Removal IS/MND support project.
- For the **U.S. Army Corps of Engineers (Corps)**:
  - Preparation of the Air Quality Section and General Conformity Analysis for the Matilija Dam Ecosystem Restoration Project EIS/R for the Corps.
  - Preparation of emission inventory and General Conformity Analysis of the Murrieta Creek Flood Control Project and the Joint Red Flag exercise to be conducted in the Nevada Test and Training Range.
  - Emission inventory for the construction activities forecast for the San Jose/Old San Jose Creeks Ecosystem Restoration project for the Corps.
- Other Projects:
  - Preparation of the Air Quality Section of the LAUSD New School Construction Program EIR and provided traffic trip and VMT calculation support for the Traffic and Transportation Section.

- Preparation of the draft staff paper "Natural Gas Quality: Power Turbine Performance During Heat Content Surge", and presentation of the preliminary findings at the California Air Resources Board Compressed Natural Gas Workshop and a SoCalGas Technical Advisory Committee meeting.
- Preparation of the Air Quality Section of the Environmental Information Document in support of the Coastal Consistency Determinations for the suspension of operation requests for undeveloped units and leases off the Central California Coast.
- Preparation of comments on the Air Quality, Alternatives, Marine Traffic, Public Safety, and Noise section of the Cabrillo Port Liquefied Natural Gas Deepwater Port Draft EIS/EIR for the City of Oxnard.
- Preparation of the emission estimates used in the Air Quality Sections for the DWR Tehachapi Second Afterbay Project Initial Study and EIR.

Camp Dresser & McKee, Inc. 1998 to 2000

Mr. Walters was responsible as lead technical and/or project manager of environmental projects. Specific responsibilities and projects include the following:

- Preparation of emission inventories and dispersion modeling for criteria and air toxic pollutants for the Los Angeles International Airport Master Plan (LAXMP) EIS/EIR.
- Project Manager/Technical lead for the completion of air permit applications and air compliance audits for two Desa International fireplace accessory manufacturing facilities located in Santa Ana, California.
- Project manager/technical lead for the completion of Risk Management Plans (RMPs) for four J.R. Simplot food processing facilities in Oregon, Idaho, and Washington and the Consolidated Reprographics facility located in Irvine, California.

Planning Consultants Research 1997 to 1998

Mr. Walters was responsible as lead technical and/or project manager of environmental projects. Specific responsibilities and projects include the following:

- Project Manager for a stationary source emission audit of the entire Los Angeles International Airport complex for Los Angeles World Airports (LAWA) in support of the LAXMP.
- Review of the Emission Dispersion Modeling System (EDMS) and preparation of a report with findings to the Federal Aviation Administration for LAWA in support of the LAXMP.
- Project manager for the ambient air monitoring and deposition monitoring studies performed for LAWA in support of the LAXMP, including the selection of the monitoring sites and specialty sub-contractor, and review of all monitoring data.

Aspen Environmental Group/Clean Air Solutions 1995 to 1996

Mr. Walters was responsible as lead technical and/or project manager of environmental projects. Specific responsibilities and projects include the following:

- Manager of the Portland, Oregon, office of Clean Air Solutions from March 1995 to December 1995, with responsibilities including Project Management, Business Development, and Administration.
- Control technology assessment, engineering support and Notice of Intent to construct preparation for J.R. Simplot's Hermiston, Oregon, food processing facility. Review and revision of an Air Contaminant Discharge Permit application, Title V permit application, and PSD modeling analysis for J.R. Simplot's Hermiston facility.

- Air quality compliance report including an air emission inventory, regulation and permit compliance determination, and recommendations for compliance for Lumber Tech, Inc.'s Lebanon, Oregon, wood products facility.

Fluor Daniel, Inc. 1990 to 1995 and 1996 to 1997

Mr. Walters was responsible as lead technical or project manager for major environmental projects for both government and private clients. His projects included:

- Prepared several air permit applications for the ARCO Los Angeles Refinery Polypropylene Plant Project; Phase I environmental assessments for properties located in Southern California; and a site investigation and RCRA closure plan for a hazardous waste storage site in Vernon, California.
- Project manager of the Anaconda Smelter site for the U.S. Environmental Protection Agency's (EPA) Alternative Remedial Contract System (ARCS) project during the conclusion of technical activities and project closeout. Prepared a cost recovery report for the project.
- Performed environmental analysis for the Bonneville Power Authority, including air pollution BACT analysis, wastewater analysis, and evaluation of secondary environmental effects of electric power producing technologies.

Jacobs Engineering Group 1988 to 1990

Mr. Walters was responsible for a wide range of air pollution regulatory and testing projects, including the following:

- Project manager of air toxic emission inventory reports prepared for U.S. Borax's boron mining and refining facility and the Naval Aviation Depot (N. Island Naval Base, San Diego, California).
- Prepared air permit applications and regulatory correspondence for several facilities including the U.S. Department of Energy's Feed Material Production Center uranium processing facility in Fernald, Ohio; Evaluation of a sludge dewatering process at Unocal's Wilmington, California, Refinery; and United Airlines blade repair facility at the San Francisco Airport.
- Characterized and quantified air emissions for offshore oil and gas development activities associated with Federal oil and gas Lease Sale 95, offshore southern California, for the U.S. Minerals Management Service.

CERTIFICATIONS

- Chemical Engineer, California License 5973
- CARB, Fundamentals of Enforcement Seminar
- EPA Methods 1-8, 17; Training Seminar

AWARDS

- California Energy Commission Outstanding Performance Award 2001

DECLARATION OF
Heather Blair

I, Heather Blair, declare as follows:

1. I am presently employed as a consultant to the California Energy Commission in the Siting, Transmission and Environmental Protection Division.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on the **Biological Resources** for the **Abengoa Mojave Solar** project (09-AFC-5) based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 5/5/10 Signed: Original signed by H. Blair

At: Sacramento, California

Aspen Environmental Group

HEATHER BLAIR
Environmental Scientist

ACADEMIC BACKGROUND

M.S., Conservation Biology, Sacramento State University, In Progress
B.S., Ecology, San Diego State University, 2004

PROFESSIONAL EXPERIENCE

Heather Blair is an Environmental Scientist experienced in a range of natural resource investigations and environmental impact analysis including botanical and wildlife research, inventory, and survey techniques; technical writing; and data analysis. She has experience preparing environmental documents pursuant to applicable federal, state and local environmental regulations, including the California Environmental Quality Act, National Environmental Policy Act, and the California and federal Endangered Species Acts.

Aspen Environmental Group — 2004 to present

Selected project experience at Aspen includes the following:

Power Generation and Transmission Interconnection Projects

- **California Energy Commission.** Aspen has a multi-year contract to provide support to the Energy Facility Planning and Licensing Programs. Under this contract Ms. Blair has participated in the following projects:
  - **Biological Resources Assessment for the Abengoa Mojave Solar Project.** Ms. Blair is currently serving as the lead technical staff for the analysis of impacts to biological resources from the 250 MW power plant in the Mojave Desert. Important biological issues include impacts to Harper Dry Lake from potentially decreased water availability, desert tortoise, and Mojave ground squirrel.
  - **Biological Resources Assessment for the San Joaquin Solar 1&2 Hybrid Project.** Ms. Blair is currently serving as the lead technical staff for the analysis of impacts to biological resources from the 107 MW solar thermal/biomass hybrid power plant. Important biological issues include potential impacts to San Joaquin kit fox habitat and movement corridor connectivity.
  - **Biological Resources Assessment for the Genesis Solar Energy Project.** Ms. Blair is currently serving as the assistant technical staff for the analysis of impacts to biological resources from the 250 MW power plant in an undeveloped area of the Sonoran Desert. Important biological issues include direct and indirect (downstream) impacts to ephemeral drainages from site development and indirect impacts to sand dune dependent vegetation and wildlife communities from disruption of Aeolian processes.
  - **Biological Resources Assessment for the Carlsbad Energy Center.** Ms. Blair is currently serving as the lead technical staff for the analysis of impacts to biological resources from the 540 MW CECP. Important biological issues include potential impacts to Agua Hedionda Lagoon and consistency with the Carlsbad Habitat Management Plan. Ms. Blair recently testified as an expert witness in biological resources during Evidentiary Hearings before the Commission.
  - **Biological Resources Assessment for the CPV Sentinel Project.** Ms. Blair served as the lead technical staff for the analysis of impacts to biological resources from the 850 MW CPV Sentinel project. Important biological issues include potential impacts from groundwater drawdown to the mesquite hummock plant community and the special-status species it supports.
  - **Biological Resources Assessment for the CPV Vaca Station Project.** Ms. Blair is currently serving as the lead technical staff for the analysis of impacts to biological resources from the 660 MW CPVVS.

Important biological issues include potential impacts to giant garter snake from reduced flows in Old Almao Creek and loss of Swainson's hawk foraging habitat.

- **Biological Resources Assessments for the Marsh Landing and Willow Pass Generating Stations.** Ms. Blair is currently serving as the lead technical staff for the analysis of impacts to biological resources from the 930 MW MLGS and 550 MW WPGS. Important biological issues include potential indirect impacts to listed plant species in the Antioch Dunes National Wildlife Refuge from nitrogen deposition.
- **Biological Resources Assessments for the Panoche and Starwood Energy Centers.** Ms. Blair served as the lead technical staff for the analysis of impacts to biological resources from the 400 MW Panoche Energy Center and 120 MW Starwood Project. These projects required coordination with USFWS and CDFG regarding impacts to the State and federally listed San Joaquin kit fox.

- **Northern California CO2 Storage Pilot, Confidential Client, CEQA and NEPA compliance, (2008).** Contributed to the preparation of Department of Energy NEPA environmental questionnaire to comply with Category Exclusion requirements and preparation of the Initial Statement under CEQA for the proposed CO_2 sequestration pilot test site in Montezuma Hills, California. Ms. Blair conducted focused nesting surveys of the State-threatened Swainson's hawk (*Buteo swansonii*).
- **Arizona Utilities CO_2 Storage Pilot, CEC and University of California, NEPA compliance, (2007).** Contributed to the preparation of Department of Energy NEPA environmental questionnaire to comply with Category Exclusion requirements for the proposed CO_2 sequestration pilot test site near Joseph City, Arizona. Ms. Blair conducted focused surveys of the federally endangered Peebles Navajo cactus (*Pediocactus peeblesianus* var. *peeblesianus*).
- **Environmental Screening Tool for Out-of-State Renewables, KEMA and CEC, Staff (2009).** Assessed the potential for California laws, ordinance, regulations and standards to be impacted by out-of-state renewable facilities seeking RPS certification. Ms. Blair prepared the assessment of impacts associated with geothermal projects.
- **Nuclear Power Plant Assessment (Assembly Bill 1632).** Ms. Blair managed the preparation of and was a contributing author for a major Appendix to the Nuclear Power Plan Assessment Report for the Energy Commission. This report evaluated nuclear power issues in the state in response to recent legislation (AB 1632), including environmental issues associated with alternatives (including renewable) to the state's two nuclear facilities.
- **Diablo Canyon Power Plant Steam Generator Replacement Project.** Ms. Blair supported the management team in preparing the project description, alternatives and supporting sections of the Draft and Final EIR.

<u>Transmission Line and Substation Projects</u>

- **Sunrise Powerlink Transmission Line Project.** Under contract to the California Public Utilities Commission (CPUC), Aspen prepared an EIR/EIS for a 150-mile proposed transmission line from Imperial Valley Substation, near El Centro, California, to Peñasquitos Substation in northwestern San Diego County. The Proposed Project would potentially deliver renewable resources from the Imperial Valley via a 500 kV transmission line to a new 500/230 kV substation, and from the new substation to western San Diego via 230 kV overhead and underground transmission lines. Ms. Blair analyzed the impacts to wilderness and recreation. Additionally, she wrote the project description and assisted with overall project support.
- **TANC Transmission Project.** Aspen was awarded a contract with the Transmission Agency of Northern California (TANC) for CEQA/NEPA and environmental permitting support for 600-miles of proposed 500 and 230 kV transmission lines between Lassen County and Santa Clara County, California. The project included evaluation of over 600 additional miles of alternative routes, six new substations, and modifications to six existing substations. Ms. Blair was the Deputy Project Manager, responsible for coordinating the biological and cultural resource field surveys. The project was cancelled in July 2009.

- **Sacramento Area Voltage Support Project.** Under contract to Western Area Power Administration (Western) and in cooperation with SMUD, Aspen prepared an SEIS and EIR for a double-circuit 230 kV circuit between Western's O'Banion/Sutter Power Plant and Elverta Substation/Natomas Substation. Ms. Blair was part of the project management team and managed the wetland delineation, Biological Survey Report, and Biological Evaluation.

- **North Area ROW Maintenance Project**. Under contract to Western, Ms. Blair is currently providing project support to prepare an Environmental Assessment and Operation and Maintenance Program associated with the operation and maintenance procedures along Western's transmission line ROWs between Sacramento (Sutter/Yuba County line) and the Oregon border. This project also includes a detailed survey of the biological and cultural resources along 434 miles of North Area ROW, 342 miles of COTP ROW, and several hundred miles of access and maintenance roads. Ms. Blair is working closely with project management and resource specialists to coordinate and execute over 800 miles of surveys. She conducted wildlife inventory and surveyed portions of ROW for sensitive species and recorded habitat types, jurisdictional waters and infrastructure using a Trimble GeoXT GPS unit. Additionally, Ms. Blair was integrally involved in the management and development of the North Area O&M GIS database.

- **Categorical Exclusions for Routine Operation and Maintenance.** Under contract to Western, Ms. Blair has prepared multiple CXs for routine maintenance activities along Western's CVP, PACI, and COTP transmission line ROWs and access roads. She has developed a streamlined and highly efficient system to use the results and analysis for the North Area ROW Maintenance Project to complete these documents.

- **GIS Data Verification and Resource Database Development for the Trinity County PUD Direct Interconnection Project.** Under contract to Western, Ms. Blair was the Deputy Project Manager for this project and also be coordinated and conducted biological resources in support of the development of an O&M GIS database, which included identification of sensitive resources and associated project conservation measures for this new segment of Western's CVP transmission system.

- **Seventh Standard Substation Project.** Under contract to the CPUC, Ms. Blair prepared the biological resource section of an Initial Study/Mitigated Negative Declaration for a proposed 4.9 acre 115/21 kV substation and transmission interconnection in northwest Bakersfield, Kern County, California. Important biological issues included impacts to the State and federally listed San Joaquin kit fox and western burrowing owl (a California species of special concern), as well as compliance with the Metropolitan Bakersfield Habitat Conservation Plan.

- **Atlantic–Del Mar Reinforcement Project Mitigated Negative Declaration**. Under contract to the CPUC, Ms. Blair served as an assistant environmental monitor during the construction of four miles of overhead transmission towers and lines and approximately 1.3 miles of underground lines. The project involved trenching, horizontal drilling and blasting and requires avoidance of several wetlands, seasonal pools and threatened and endangered species.

- **Miguel-Mission 230 kV #2 Project EIR Addendum**. Under contract to the CPUC, Ms. Blair helped to prepare a detailed addendum associated with engineering design changes for the Miguel-Mission 230 kV #2 Project.

<u>Other Infrastructure, Resource Management, and Monitoring Projects</u>

- **Hazardous Fuels and Vegetation Management for Angeles National Forest.** Under contract to the U.S. Forest Service, Ms. Blair conducted botanical and wildlife surveys at approximately 100 sites ranging from one to 2500 acres throughout the Angeles National Forest. Modifications to current fuel management practices were proposed in response to increased frequency and intensity of wildfire resulting from climate change. She prepared 75 Biological Evaluations/Biological Assessments that assessed the biological impacts of proposed fuel management practices throughout the forest.

- **Rare Plant Surveys for the East Branch Extension Pipeline Project.** Under contract to the Department of Water Resources, Ms. Blair conducted rare plant surveys of the endangered Santa Ana River wooly star (*Eriastrum densifolium* ssp. *sanctorum*) and the state and federally endangered slender horned spine flower (*Dodecahema leptoceras*) in response to the proposed construction of a water pipeline through San Bernardino and Riverside Counties.
- **Upper San Antonio Creek Watershed Giant Reed Removal Project.** Ms. Blair prepared the biological resource analysis of an Initial Study to remove invasive plant species from the Upper San Antonio Creek Watershed. Required field survey and development of impact avoidance measures for several special-status species, including California red-legged frog, southern steelhead, and riparian nesting birds.
- **Least Tern Monitoring for the Montezuma Slough Tidal Wetlands Restoration Project**. Under contract to EcoBridges Environmental, Ms. Blair monitored the nesting success of three nesting colonies of the federally and State endangered least tern. This effort involved counting and mapping the nest sites and tern chicks once a week for two years.
- **Endangered Species Monitoring for the Lomita Canal Vegetation Clearing Project**. Monitored the federally threatened California Red-legged frog and the state- and federally endangered San Francisco Giant Garter Snake during vegetation clearing activities along the Lomita Canal at the San Francisco International Airport. Involved identification of these species, relocation of California red-legged frogs, and re-direction of work in the event a SF Garter Snake was spotted.

PREVIOUS EXPERIENCE

Soil Ecology and Restoration Group ***January to May 2004***

Research Assistant. Ms. Blair assisted in managing the greenhouse where native seeds were germinated and propagated. In this role, she collected seeds from native plants and analyzed the composition of the soil present in their native habitat to ensure seedling viability. The plants were subsequently used in the restoration of degraded habitat as contracted by the U.S. Army Corps of Engineers and others.

DECLARATION OF
Kathleen A. Forrest

I, Kathleen A. Forrest, declare as follows:

1. I am presently employed by the California Energy Commission in the Siting, Transmission and Environmental Protection Division, as a Planner II.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on the **Cultural Resources Section** and **Transmission System Engineering Appendix A** for the **Abengoa Mojave Solar** project (09-AFC-5) based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 4/28/10 Signed: Original signed by K. Forrest

At: Sacramento, California

Kathleen A. Forrest

PROFESSIONAL EXPERIENCE

Planner II, Siting, Transmission and Environmental Protection Division, California Energy Commission, Sacramento, CA, December 2009-Present
Cultural resource specialist performing technical analyses assessing cultural resources implications of energy resource utilization and electric power generation.

Environmental Review

- Review and analyze applications for adequacy, including identification of cultural resources, project-related impacts, and mitigations
- Negotiate with applicants, consultants and other staff to develop solutions that achieve project objectives
- Prepare and present complex and comprehensive reports and recommendations orally and in writing, including analysis of complex data and working knowledge of the legal requirements protecting cultural resources
- Formulate mitigation techniques to prevent significant impacts to cultural resources
- Testify as subject expert at Energy Commission project certification hearings
- Participate in site visits, public workshops and hearings

Associate Planner, Preservation Office, City of Sacramento, Development Services Department
Sacramento, CA, July 2006-July 2009
Cultural resource specialist in City's Preservation Office responsible for a wide range of complex cultural resources programs, policies and project reviews.

Development Project Application Review & Management

- Interpret the Secretary of the Interior's Standards and negotiate with developers, property owners, design professionals, contractors and other city staff to reach design solutions that achieved development project objectives
- Analyzed 36 development proposals for consistency with the Secretary of the Interior's Standards
- Managed Certified Local Government Program grant-funded survey project, including RFQ and consultant selection process, contract negotiations, schedule, review of consultant work, and reporting requirements to State Office of Historic Preservation
- Led multi-disciplinary Matrix review teams to facilitate a timely, seamless and predictable development review for the applicant through planning and building permit processes
- Worked with City Council members and staff on politically sensitive issues

Environmental Review

- Reviewed and provided comments on adequacy of Cultural Resources sections of CEQA and NEPA documents, including identification of cultural resources, project-related impacts, and mitigations
- Prepared 430 recommendations to the Preservation Director and Planning staff regarding potential cultural resources eligibility for ministerial and discretionary projects

Historic Resource Nomination & Management

- Presentations to the City Council, Preservation Commission, Preservation Director, community groups and staff regarding Landmark and Historic District nominations and preservation programs, including preparation of staff reports, informational handouts and visual presentations
- Managed Preservation Commission's Historic Resources Survey Committee
- Updated and maintained the Sacramento Register of Historic and Cultural Resources

Kathleen A. Forrest

Historic Compliance Coordinator, Presidio Trust, San Francisco, CA, January 2004-July 2006
Monitored and assisted in discharging the agency's responsibilities for historic structures within the Presidio of San Francisco

NEPA and Section 106 Review

- Communicated with Presidio Trust personnel regarding NEPA and Section 106 compliance responsibilities and internal procedures to ensure that the required review & consultation occurred
- Collected, analyzed and interpreted information for all Section 106 documentation (determinations of no effect and no adverse effect by the Federal Preservation Officer) for weekly NHPA/NEPA compliance meeting, including preparation of annual report
- Carried out mitigation monitoring of commercial and residential real estate development projects
- Led organization-wide training and compliance on NHPA the Secretary of the Interior's Standards for the Treatment of Historic Properties
- Represented the Presidio Trust at public and partner agency meetings
- Managed preservation compliance files and database
- Assisted FPO in formal consultation for undertakings outside the Programmatic Agreement

Project Management

- Facilitated a successful relationship with trades crews and technical personnel to affect positive historic preservation projects. Began in non-communicative situation and built trust and open communication with those Operations and Maintenance employees that are essential to preservation projects
- Managed building preservation studies and residential rehabilitation projects
- Visited project sites to advise project managers and trades people during project planning and implementation regarding compliance requirements and mitigations

Special Project: Volunteer Coordinator, California Preservation Foundation Conference Steering Committee, 2004.

- Recruited 80 volunteers to staff the 29th annual California Preservation Foundation Conference (2004) at the Presidio of San Francisco from local and state-wide historical associations, local neighborhood associations, regional parks, and interested individuals. Joined Steering Committee halfway through the planning process with no volunteers in place; recruited most volunteers in history of conference to that date
- Coordinated and trained volunteers based on availability, interest and need

Architectural Conservator, Carey & Co., San Francisco, CA. April 2002-December 2003
Staff architectural conservator conducting laboratory analysis and historic research and documentation.

- Performed conditions assessments of historic structures, including identification of character-defining features, finishes analysis of historic paint samples, and treatment recommendations
- Supervised on-site product testing for effectiveness and consistency with the Secretary of the Interior's Standards
- Conducted historical assessments of prospective development project areas to identify potential historic resources
- Prepared historic structures reports, including historic research, surveys, identification of significant features and characteristics, and treatment recommendations

Bandelier National Monument, Los Alamos, NM. June 2000 and June-September 2001
Architectural conservation intern and seasonal employee. Conducted historical research and documentation of cliff dwellings.

Mesa Verde National Park, Mesa Verde, CO. July 2000
Architectural conservation intern. Carried out documentation and on-site treatment at Cliff Palace site.

RELEVANT EDUCATION AND TRAINING

Graduate Program in Historic Preservation, University of Pennsylvania, Philadelphia, PA
Master of Science, May 2001
Emphasis on conservation of architectural materials, conditions assessment methodology and technological applications in documentation, architectural history and archival and site documentation.

University of Massachusetts, Amherst, MA
Bachelor of Arts, cum laude, May 1999.
Major, History. Minor, Anthropology.
Junior semester abroad, University College London, London, England

Environmental Impact Analysis: CEQA and NEPA, Spring 2007, CSU Sacramento
Review of legislative and judicial requirements for environmental impact analysis.

NEPA Workshop. March 28, 2004. UC Santa Cruz Extension
One-day workshop in NEPA policy.

DECLARATION OF
Testimony of Negar Vahidi

I**, Negar Vahidi,** declare as follows:

1. I am presently employed by Aspen Environmental Group, a contractor to the California Energy Commission, Systems Assessment and Facilities Siting Division, as a **Senior Project Manager/Senior Land Use Technical Specialist**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on **Land Use** and **Transmission Engineering Systems – Appendix A** for the **Abengoa Mojave Solar** project based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: May 6, 2010 Signed: Original signed by N. Vahidi

At: Agoura Hills, California

Aspen
Environmental Group

NEGAR VAHIDI

Senior Associate
Land Use, Policy Analysis, and Socioeconomics

ACADEMIC BACKGROUND

Master of Public Administration, University of Southern California, 1993
B.A. (with Highest Honors), Political Science, University of California, Irvine, 1991

PROFESSIONAL EXPERIENCE

Ms. Vahidi is an environmental planner with over 15 years of experience managing and preparing a variety of federal and State of California environmental, planning, and analytical documents for large-scale infrastructure and development projects. Ms. Vahidi brings the experience of being both a public and private sector planner, specializing in the integration and completion of NEPA and CEQA documentation, joint documentation, land use, socioeconomic, and public policy analysis, environmental justice analysis, and public and community involvement programs. Her diversity and experience in preparing NEPA, CEQA, and NEPA/CEQA joint documentation can be shown through a sample of her projects.

Aspen Environmental Group **1992 to 1998 and 2001 to present**

Ms. Vahidi has participated in CEQA and NEPA analyses of major utility development projects, providing public policy and land use expertise as well as managing Public Participation Programs. She has conducted land use analyses for major environmental assessments, including identification of ownership and land use types and identification of sensitive land uses and sensitive receptors. She has also gathered and analyzed information on State, federal and local laws, policies and regulations relevant to land uses and public policy. Her specific projects are described below.

- **TANC Transmission Project (TTP), several Northern California Counties.** Ms. Vahidi is currently serving as the Deputy Project Manager in charge of preparation of the EIR/EIS and guiding the CEQA/NEPA analysis. The Transmission Agency of Northern California (TANC) and Western Area Power Administration (Western), an agency of the U.S. Department of Energy (DOE), are the CEQA lead agency and NEPA lead agency, respectively. The TTP generally would consist of approximately 600 miles of new and upgraded 500 kilovolt (kV) and 230 kV transmission lines, substations, and related facilities generally extending from northeastern California near Ravendale in Lassen County to the California Central Valley through Sacramento and Contra Costa Counties and westward into the San Francisco Bay Area. Ms. Vahidi worked with TANC and Western to initiate the scoping process, including preparation of the NOP, preparing for scoping meetings, frameworking the EIR/EIS document, etc. She also led the preparation of the project scoping report.
- **Littlerock Reservoir Sediment Removal Project EIS/EIR, Palmdale, CA.** Ms. Vahidi is the Project Manager for this joint EIS/EIR evaluating the impacts of sediment removal alternatives for the Littlerock Reservoir and Dam on USFS Angeles National Forest (NEPA Lead Agency) lands in Los Angeles County. The Palmdale Water District (District) [CEQA Lead Agency] proposes to remove approximately 540,000 cubic yards of sediment from the reservoir (behind the dam) and haul it to off-site commercial gravel pits located 6 miles north of the dam site in the community of Littlerock. The project involves impacts to the arroyo toad, extensive coordination with USFWS for a Section 7 consultation, incorporation of new Forest Service Plan updates and requirements into the

analysis, preparation of the Forest Service required BE/BA, and analysis of compliance with federal air quality conformity requirements. Under Ms. Vahidi's direction, Aspen developed six different project alternatives for sediment removal, involving detailed hydraulics analysis and preparation of a hydraulics technical report. The most feasible of these alternatives (grade control structure) was chosen by the PWD as their proposed project to be evaluated in the EIS/EIR. In addition, the PWD is currently considering an additional alternative (use of a slurry line for sediment removal) presented by Aspen. Aspen is currently working on the Administrative Draft EIR/EIS and assisting the PWD with portions of their Proposition 50 grant application to the DWR.

- **El Casco System Project, Riverside, CA.** Ms. Vahidi is serving as the Project Manager for this EIR being prepared for the CPUC to evaluate SCE's application for a Permit to Construct (PTC) the El Casco System Project. The Proposed Project would be located in a rapidly growing area of northern Riverside County, which includes the Cities of Beaumont, Banning, and Calimesa. A 115 kV subtransmission line begins at Banning Substation and extends westward toward the proposed El Casco Substation site within the existing Banning to Maraschino 115 kV subtransmission line and Maraschino–El Casco 115 kV subtransmission line ROWs. Major issues of concern include impacts to existing and residential land uses, which have led to the development of a partial underground alternative and a route alternative different than the project route proposed by SCE (the Applicant). The 1,200-page Draft EIR was released for a 45-day public review and comment on December 12, 2007, and evaluates project alternatives at the same level of detail as the Proposed Project analysis.
- **Sacramento Area Voltage Support Supplemental Environmental Impact Statement (SEIS), Western Area Power Administration.** Ms. Vahidi served as the task leader for several social science sections for the SEIS for a double-circuit 230 kV circuit between Western's O'Banion/Sutter Power Plant and Elverta Substation/Natomas Substation. New transmission lines and transmission upgrades are needed to mitigate transmission line overload, reduce the frequency of automatic generation and load curtailment during the summer peak load periods, and help maintain reliability of the interconnected system operation. Ms. Vahidi directed the preparation of the land use, aesthetics, socioeconomics, and environmental justice sections of the SEIS.
- **Sunset Substation and Transmission and Distribution Project CEQA Documentation, Banning, CA.** The City of Banning proposes to construct the Sunset Substation and supporting 33-kilovolt (kV) transmission line that would interconnect with the City's existing distribution system. The purpose of this new substation and transmission is to relieve the existing overloads that are occurring within the City's electric system and to accommodate projected growth in the City. Ms. Vahidi served as the Environmental Project Manager for the initial stages of CEQA documentation prepared for the City's Utility Department.
- **San Onofre Nuclear Generating Station (SONGS) Steam Generator Replacement Project, San Clemente, CA.** Ms. Vahidi served as the Technical Senior in charge of developing the methodology and guiding the analysis for the Land Use and Recreation Section of this EIR. This project EIR addressed the environmental effects of SCE's proposed replacement of Steam Generator Units 2 & 3 at the SONGS Nuclear Power Plant located entirely within the boundaries of the U.S. Marine Corps Base Camp (MCBCP) Pendleton. Issues of concern included potential conflicts resulting from the transport of the large units through sensitive recreation areas such as beaches, and the San Onofre State Park.
- **Diablo Canyon Power Plant (DCPP) Steam Generator Replacement Project, San Luis Obispo County, CA.** Ms. Vahidi served as the Technical Senior in charge of developing the methodology and guiding the analysis for the Land Use and Recreation Section of this EIR. The EIR addressed impacts associated with the replacement of the eight original steam generators (OSGs) at DCPP Units 1 and 2 due to degradation from stress and corrosion cracking, and other maintenance difficulties. The Proposed Project would be located at the DCPP facility, which occupies 760 acres within PG&E's 12,000-acre owner-controlled land on the California coast in central San Luis Obispo County. Land

use issues of concern include impacts to agricultural lands, recreational resources, and potential Coastal Act inconsistencies.

- **Cabrillo Port Liquefied Natural Gas (LNG) Deepwater Port, Ventura County, CA.** Under contract to the City of Oxnard, Aspen was tasked to review the Draft EIS/EIR for this the proposed construction and operation of an offshore floating storage and regasification unit (FSRU) that would be moored in Federal waters offshore of Ventura County. As proposed, liquefied natural gas (LNG) from the Pacific basin would be delivered by an LNG Carrier to and offloaded onto, the FSRU; re-gasified; and delivered onshore via two new 21.1-mile (33.8-kilometer), 24-inch (0.6-meter) diameter natural gas pipelines laid on the ocean floor. These pipelines would come onshore at Ormond Beach near Oxnard, California to connect through proposed new onshore pipelines to the existing Southern California Gas Company intrastate pipeline system to distribute natural gas throughout the Southern California region. Ms. Vahidi reviewed the document for technical adequacy and assisted the City in preparing written comments for the following sections of the EIS/EIR: Aesthetics, Land Use, Recreation, Socioeconomics, and Environmental Justice.
- **Long Beach LNG Import Project, Long Beach, CA.** Under contract to the City of Long Beach, Aspen was tasked to review the Draft EIS/EIR for the proposed construction and operation of this onshore LNG facility to be located at the Port of Long Beach. Ms. Vahidi reviewed the document for technical adequacy and assisted the City in preparing written comments for the following sections of the EIS/EIR: Aesthetics, Land Use, Recreation, Socioeconomics, Environmental Justice, and Port Master Plan Amendment.
- **Post-Suspension Activities of the Nine Federal Undeveloped Units and Lease OCS-P 0409, Offshore Southern California**. Aspen assisted the U.S. Department of the Interior, Minerals Management Service (MMS) to prepare an Environmental Information Document (EID) evaluating the potential environmental effects associated with six separate suspensions for undeveloped oil and gas leases Pacific Outer Continental Shelf (OCS) located offshore Southern California. These undeveloped leases lie between 3 and 12 miles offshore Santa Barbara, Ventura and southern San Luis Obispo Counties and are grouped into nine units, with one individual lease that is not unitized. As the Senior Aspen social scientist, Ms. Vahidi guided the analysis of community characteristics and tourism resources, recreation, visual resources, social and economic environment, and military operations.
- **Otay River Watershed Management Plan (ORWMP) and Special Area Management Plan (SAMP) in San Diego County, CA.** Ms. Vahidi served as a Technical Senior for social science and land use issues. The ORWMP focused on developing strategies to protect and enhance beneficial uses within this watershed and thereby comply with the San Diego Region's NPDES permit, and the SAMP intended to achieve a balance between reasonable economic development and aquatic resource preservation, enhancement, and restoration in this 145-square-mile (93,000 acres) area through the issuance of Corps and CDFG programmatic permits.

California Energy Commission (CEC)

In response to California's power shortage, Aspen has assisted the CEC in evaluating the environmental and engineering aspects of new power plant applications throughout the State under three separate contracts. Ms. Vahidi has served as Technical Senior for land use (since 2001), and a specialist for socio-economics and environmental justice, and alternatives analyses and special studies. Her specific projects are listed below.

- Technical Assistance in Application for Certification Review (Contract # 700-99-014; 3/6/2000 through 12/31/2003)
  - **Woodland Generation Station No. 2, Modesto, CA**. As the land use Technical Specialist, prepared the Land Use and Recreation, and Agricultural Resources Staff Assessments of this 80-megawatt nominal, natural gas-fired power generating facility and associated linear facilities (i.e., gas and water pipeline and

transmission line. The Staff Assessment evaluated potential impacts on nearby residential, recreational, and agricultural land uses, including important farmlands being traversed by linear faculties.

- **Valero Cogeneration Project, Benicia, CA**. Prepared the Socioeconomics Staff Assessment for a proposed cogeneration facility at the Valero Refinery in Benicia. Issues addressed included impacts on public services and other project-related population impacts such as school impact fees.
- **Rio Linda/Elverta Power Project, Sacramento, CA**. Prepared the Socioeconomics Staff Assessment for a 560-megawatt natural gas power plant in the northern Sacramento County. Issues of importance included environmental justice and impacts on property values.
- **Magnolia Power Project, Burbank, CA**. As the Socioeconomics technical specialist, prepared the Staff Assessment for this nominal 250-megawatt natural gas combined-cycle fired electrical generating facility to be located at the site of the existing City of Burbank power plant. Environmental justice issues and potential impacts on local economy and employment were evaluated
- **Potrero Power Plant Project, San Francisco, CA**. Prepared the land use portion of the Alternatives Staff Assessment for this proposed nominal 540 MW natural gas-fired, combined cycle power generating facility. Analysis included review of several alternative sites for development of the power plant and the comparative merits of those alternatives with the proposed site located on the San Francisco Bay.
- **Los Esteros Critical Energy Facility, San Jose, CA.** Technical Senior for the Land Use Staff Assessment of this 180-megawatt natural-gas-fired simple cycle peaking facility. Issues included potential impacts resulting from loss of agricultural land, and impacts associated with the project's non-compliance with local General Plan land use and zoning designations.
- **East Altamont Energy Center, Alameda County, CA.** Technical Specialist for the Land Use Assessment for a 1,100-megawatt nominal, natural gas-fired power plant and associated linear facilities. Provided expert witness testimony on Land Use Staff Assessment. Major issues addressed in the Staff Assessment included loss of Prime Farmlands, recommendation of land preservation mitigation, and the project's non-compliance with local General Plan land use and zoning designations.
- **Tracy Peaker Project, Tracy, CA.** Technical Senior for the Land Use Staff Assessment of this 169-megawatt simple-cycle peaking facility in an unincorporated area of San Joaquin County. Provided expert witness testimony on Land Use Staff Assessment. Issues included potential impacts resulting from loss of agricultural land under Williamson Act Contract, and evaluation of cumulative development in the fast-growing surrounding area.
- **Avenal Energy Project, Kings County, CA.** Socioeconomics Technical Specialist for this 600-megawatt combined cycle electrical generating facility, and associated linear facilities.
- **Tesla Power Project, Alameda County, CA.** Land Use Technical Senior and Alternatives Technical Specialist in charge of preparation of two Staff Assessments for this project. The project will be a nominal 1,120-MW electrical generating power plant with commercial operation planned for third quarter of 2004. The Tesla Power Project will consist of a natural gas-fired combined cycle power generator, with 0.8 miles of double-circuit 230-kilovolt transmission line connected to the Tesla PG&E substation, 24-inch 2.8-mile natural gas pipeline, and 1.7-mile water line constructed along Midway Road.
- **Sacramento Municipal Utility District Consumes Power Plant Project, Sacramento, CA.** Socioeconomics and Alternatives Technical Specialist in charge of preparation of two Staff Assessments for this nominal 1,000-megawatt (MW) combined-cycle natural gas facility. Provided expert witness testimony on Socioeconomics Staff Assessment. The project would include the construction and operation of a natural gas power plant at the Rancho Seco Nuclear Plant, 25 miles southeast of the City of Sacramento, in Sacramento County. The project would be located on a 30-acre portion of an overall 2,480-acre site owned by SMUD.
- **Inland Empire Energy Center, Riverside County, CA.** Technical Specialist for the Land Use Assessment for a 670-megawatt natural gas-fired, combined-cycle electric generating facility and associated linear facilities including, a new 18-inch, 4.7-mile pipeline for the disposal of non-reclaimable wastewater, and a new 20-inch natural gas pipeline. Provided expert witness testimony on Land Use Staff Assessment. The project would be located on approximately 46-acres near Romoland, within Riverside County. Major issues addressed in the Staff Assessment included potential loss of agricultural lands, impacts to planned school uses, and the project's potential non-compliance with local General Plan land use and zoning designations.

  - **Senior Technical Lead, Land Use Resources.** The California Energy Commission (CEC) requested that the Aspen Team provide Technical Seniors for the Land Use Resources area in order to help coordinate and review Land Use Resource Assessments. As a Technical Senior, Negar Vahidi was responsible for the technical review of Land Use sections for various power plants assigned to them.
  - **Legislative Bill Review.** As a Land Use Technical Senior for the CEC, Ms. Vahidi conducted legislative bill review related to energy facilities siting. She conducted portions of the CEC Systems Assessment & Facilities Siting Division analysis of Senate Bill 1550 which was intended to give the Superintendent of Public Instruction/CDE approval authority over siting of power plants within one mile of existing or proposed K-12 school sites by requiring the CDE (in coordination with the State Architect, and the commission) to develop appropriate siting guidelines.

- Engineering & Environmental Technical Assistance to Support the Energy Facility Planning and Licensing Program Contract (Contract # 700-02-004; 6/30/03 through 3/30/06)
  - **Environmental Performance Report (EPR).** Ms. Vahidi managed the preparation of the Socioeconomics chapter of the EPR for the California Energy Commission, which eventually became part of the State of California's Integrated Energy Policy Report (IEPR). The Socioeconomics chapter addressed: the importance of reliable and affordable electricity supply power plant construction and operation impacts, including labor force, taxation, etc.; and trends in the energy section, including renewable power sources such as wind and solar. She also conducted the analysis of a new portion of the Land Resources Chapter, which addressed the siting and land use issues associated with renewable power. This new portion of the land use analysis compared the land use and siting constraints associated with renewable power infrastructure such as wind and solar versus other forms of power infrastructure, such as gas pipelines, transmission lines, LNG facilities, and power plants.
  - **Coastal Plant Study.** Ms. Vahidi served as the Social Sciences Task Manager for this special study being conducted as part of Aspen's contract with the California Energy Commission. The study included identification and evaluation of potential issues associated with the possible modernization, re-tooling, or expansion of California's 25 coastal power plants including: northern California power plants such as Humboldt, Potrero, Hunter's Point, Pittsburg, and Oakland; central coast power plants such as Contra Costa, Diablo Canyon Nuclear, Morro Bay, Moss Landing, Elwood, Mandalay, and Ormond Power Plants; and southern California power plants such as the Alamitos, Long Beach, Los Angeles Harbor, Haynes, Redondo Beach, Scattergood, El Segundo, Huntington Beach, Encina, Silver Gate, South Bay, and San Onofre Nuclear. As Task Manager her responsibilities included, identification of potential political, social, community, and physical land use impacts that may arise from the potential increased output of energy from plants in highly sensitive coastal communities. The intent of the study is to identify red flag items for the Energy Commission in order to streamline future licensing processes. Her task as the Social Science Task Manager also included a thorough review of applicable Local Coastal Plans, and Coastal Commission regulations associated with Coastal Development Permits and Consistency Determinations.
  - **Natural Gas Market Outlook Report (NGMOR**). Ms. Vahidi assisted the CEC's Natural Gas Unit as a technical editor in their preparation and publication of the NGMOR. She managed Aspen's efforts, including format and graphics, to edit technical sections prepared by Natural Gas Unit Staff under a condensed time frame. The Preliminary NGMOR was released for public review in June 2003.

- Peak Workload Support for the Energy Facility Siting Program and the Energy Planning Program (Contract #700-05-002; 4/11/06 through 3/30/09)
  - **Chula Vista Energy Upgrade Project, Chula Vista, CA.** Senior Technical Specialist for the Land Use Staff Assessment for MMC Energy, Inc.'s Application for Certification (AFC) to construct and operate replacements and upgrades of equipment at the Chula Vista Power Plant, located on a 3.8-acre parcel in the City of Chula Vista's Main Street Industrial Corridor and within the City's Light Industrial zoning district. Issues of concern include the impacts of the power plant on adjacent residential and open space land uses, and compliance with applicable local LORS. Provided expert witness testimony on Land Use Staff Assessment.
  - **Ivanpah Solar Electric Generating System Project, San Bernardino County, CA.** Senior Technical Specialist for the Socioeconomics Staff Assessment/BLM EIS for a 400-megawatt solar thermal electric power generating system. The project's technology would include heliostat mirror fields focusing solar energy on power tower receivers producing steam for running turbine generators. Related facilities would

include administrative buildings, transmission lines, a substation, gas lines, water lines, steam lines, and well water pumps. The proposed project would be developed entirely in the Mojave Desert region of San Bernardino County, California. The document was prepared in compliance with both NEPA and CEQA requirements.

- **Sentinel Energy Project, Riverside County, CA.** Senior Technical Specialist for the Land Use Staff Assessment for CPV Sentinel's Application for Certification (AFC) to construct and operate an 850-megawatt (MW) peaking electrical generating facility near SCE's Devers Substation. The proposed project site consists of 37 acres of land situated approximately eight miles northwest of the center of the City of Palm Springs with portions of the construction laydown area and natural gas pipeline within the Palm Springs city limits. Land use issues of concern include the project's compliance with local LORS.
- **Carrizo Energy Solar Farm, San Luis Obispo County, CA.** Senior Technical Specialist for the Land Use Staff Assessment for Carrizo Energy, LLC's Application for Certification (AFC) to build the Carrizo Energy Solar Farm (CESF), which will consist of approximately 195 Compact Linear Fresnel Reflector (CLFR) solar concentrating lines, and associated steam drums, steam turbine generators (STGs), air-cooled condensers (ACCs), and infrastructure, producing up to a nominal 177 megawatts (MW) net. The CESF is located in an unincorporated area of eastern San Luis Obispo County, west of Simmler and northwest of California Valley, California. The CESF includes the solar farm site, a minimal offsite transmission system connection, and construction laydown area. The CESF site will encompass approximately 640 acres of fenced area in an area zoned for agricultural uses as specified in the San Luis Obispo County General Land Use Plan. Issues of concern include the impacts of the power plant on adjacent land uses and compliance with applicable local LORS.
- **Carlsbad Energy Center Project, Carlsbad, CA.** Senior Technical Specialist for the Land Use and Alternatives Staff Assessments for Carlsbad Energy Center, LLC's Application for Certification (AFC) to build the Carlsbad Energy Center Project (CECP), which will consist of a 558 MW gross combined-cycle generating facility configured using two units with one natural-gas-fired combustion turbine and one steam turbine per or unit. Issues of concern include major incompatibilities with local LORS, and cumulative impacts from widening of I-5.
- **Marsh Landing Generating Station, Contra Costa County, CA.** Senior Technical Specialist for the Land Use Staff Assessment for the Mirant Marsh Landing, LLC AFC for a 930 MW natural gas-fired power plant, which would be would be sited adjacent to the existing Contra Costa Power Plant in unincorporated Contra Costa County, near the City of Antioch.
- **Canyon Power Plant, Anaheim, CA.** Senior Technical Specialist for the Socioeconomics Staff Assessments for a nominal 200 megawatt (MW) simple-cycle plant, using four natural gas-fired combustion turbines and associated infrastructure proposed by Southern California Public Power Authority (SCPPA). This project is a peaking power plant project located within the City of Anaheim, California.
- **Willow Pass Generating Station, Pittsburg, CA.** Senior Technical Specialist for the Land Use Staff Assessment for a new, approximately 550-megawatt (MW) dry-cooled, natural gas-fired electric power facility proposed by Mirant. Development of Willow Pass would entail the construction of two generating units and ancillary systems including, adjacent electric and gas transmission lines, and water and wastewater pipelines.
- **Marsh Landing Generating Station, Contra Costa County, CA.** Senior Technical Specialist for the Land Use Staff Assessment for a new, 930-megawatt (MW) gas-fired electric generating facility proposed by Mirant. Delta. The proposed 27-acre Project site would be located at the existing Contra Costa Power Plant.
- **Stirling Energy Systems Solar One, San Bernardino County, CA.** Senior Technical Specialist for the Land Use Staff Assessment/BLM EIS for a nominal 850-megawatt (MW) Stirling engine project, with construction planned to begin late 2010. The primary equipment for the generating facility would include the approximately 30,000, 25-kilowatt solar dish Stirling systems (referred to as SunCatchers), their associated equipment and systems, and their support infrastructure. Major issues of concern include the conversion of approximately 8,230 acres of open space to industrial uses, compliance with BLM's CDCA Plan, etc.
- **Stirling Energy Systems Solar Two, Imperial County, CA.** Senior Technical Specialist for the Land Use Staff Assessment/BLM EIS for a nominal 750-megawatt (MW) Stirling engine project, with construction

planned to begin either late 2009 or early 2010. The primary equipment for the generating facility would include the approximately 30,000, 25-kilowatt solar dish Stirling systems (referred to as SunCatchers), their associated equipment and systems, and their support infrastructure. Major issues of concern include conversion of 6,500 acres of public recreation land used for OHV use and camping, and compliance with the BLM's CDCA plan..

- **GWF Tracy Combined Cycle Power Plant, San Joaquin County, CA.** Senior Technical Specialist for the Land Use Staff Assessment for GWF's proposal to modify the existing TPP (see description above), a nominal 169-megawatt (MW) simple-cycle power plant, by converting the facility into a combined-cycle power plant with a nominal 145 MW, net, of additional generating capacity.
- **City of Palmdale Hybrid Power Plant Project, Palmdale, CA.** Senior Technical Specialist for the Land Use Staff Assessment for the Palmdale Hybrid Power Project (PHPP) proposed by the City of Palmdale. The PHPP consists of a hybrid of natural gas-fired combined-cycle generating equipment integrated with solar thermal generating equipment to be developed on an approximately 377-acre site in the northern portions of the City of Palmdale (City).
- **Lodi Energy Center, Lodi, CA.** Senior Technical Specialist for the Socioeconomics Staff Assessment for a combined-cycle nominal 225-megawatt (MW) power generating facility.
- **Abengoa Mojave Solar One Project, San Bernardino County, CA.** Senior Technical Specialist for the Land Use Staff Assessment of a nominal 250 megawatt (MW) solar electric generating facility to be located near Harper Dry Lake in an unincorporated area of San Bernardino County. Issues of concern include the impacts associated with the conversión of 1,765 acres of open space lands.
- **Genesis Solar Energy Project, Riverside County, CA.** Senior Technical Specialist for the Land Use Staff Assessment/BLM EIS for two independent solar electric generating facilities with a nominal net electrical output of 125 megawatts (MW) each, for a total net electrical output of 250 MW. Electrical power would be produced using steam turbine generators fed from solar steam generators. The project is located approximately 25 miles west of the city of Blythe. Major issues of conern include conversión of 4,460 acres of BLM lands to an industrial use.
- **Contra Costa Generating Station, Contra Costa County, CA.** Senior Technical Specialist for the Land Use Staff Assessment for a natural gas-fired, combined-cycle electrical generating facility rated at a nominal generating capacity of 624 megawatts (MW). The project would be located in the City of Oakley.

- **Topaz Solar Project EIR, San Luis Obispo County, CA.** (Applicant: First Solar). Aspen is managing preparation of an EIR for this 500 MW solar photovoltaic project in the Carrizo Plain area. A major issue of concern is the conversion of approximately 6,000 acres of open space (60 percent of which are under land preservation contracts) to an industrial use. Ms. Vahidi is the Senior in charge of developing the methodology, approach, and thresholds of significance for analysis of impacts related to agricultural land conversion using the CA Department of Conservation LESA Model. One major issue of concern related to agricultural resources is impacts to lands under Williamson Act contracts. She will be guiding the analysis.
- **California Valley Solar Ranch EIR, San Luis Obispo County, CA.** (Applicant: SunPower). Aspen is managing preparation of an EIR for this 250 MW solar photovoltaic project in the Carrizo Plain area. A major issue of concern is the conversion of approximately 4,000 acres of open space to an industrial use. Ms. Vahidi is the Senior in charge of developing the methodology, approach, and thresholds of significance for analysis of impacts related to agricultural land conversion using the CA Department of Conservation LESA Model. She will be guiding the analysis.
- **Santa Ana Valley Pipeline Repairs Project, San Bernardino and Riverside Counties, CA.** Under Aspen's on-going environmental services contract with the DWR, Ms. Vahidi served as the project manager for CEQA documentation and permitting efforts related to the repair of 12 sites along the pipeline portion of the East Branch of the California Aqueduct. The repair of the 12 sites was crucial because, eight of the Priority 1 sites included areas of the pipeline that were under high stress and subject to rupture. Issues of concern included, potential impacts to special status species, sensitive receptors, and traffic. As the DWR's CEQA consultant, Ms. Vahidi determined that the proposed SAPL Repairs Project would qualify for a CEQA Categorical Exemption, and recommended the preparation

of a Technical Memorandum to justify this exemption. The Technical Memorandum and supporting documentation, including a Biological Constraints Report, and analyses of proposed project potential construction-related air quality, noise, and traffic impacts, were prepared and presented to DWR as one packet to support both a Class 1 and Class 2 CEQA Exemption. Subsequent to preparation of this packet, DWR filed a Notice of Exemption on June 13, 2003 for their repair activities.

- **Piru Creek Erosion Repairs and Bridge Seismic Retrofit Project, Northern Los Angeles County, CA.** Under Aspen's on-going environmental services contract with the DWR, Ms. Vahidi served as the project manager for CEQA documentation for this project. An IS/MND was prepared to evaluate the impacts of the project, which proposed to maintain four access routes to DWR's facilities along the West Branch of the California Aqueduct downstream of the Pyramid Dam. Repair and improvement activities would occur on Osito Canyon (an intermittent tributary to Piru Creek) at Osito Adit, adjacent to Old Highway 99 at North Adit (or access tunnel), alongside an eroded section of Old Highway 99 along Piru Creek, and at Pyramid Dam Bridge. Repair activities would serve to improve conditions of access routes, as well as strengthening and reinforcing them against seismic or flood events. Project-related construction could result in potentially significant impacts to biological resources, cultural resources, geology and soils, hazards and hazardous materials, hydrology and water quality, noise, and transportation and traffic.

- **Pyramid Lake Repairs and Improvements Project, northern Los Angeles County.** Under Aspen's on-going environmental services contract with the DWR, Ms. Vahidi served as the project manager for CEQA documentation, ADA (Americans with Disabilities Act) compliance, and permitting efforts for this project. DWR and the Department of Boating and Waterways (DBW) are planning repairs and improvements at various recreational sites at Pyramid Lake, which is located on the border between Los Padres National Forest and Angeles National Forest; recreation is managed by Angeles National Forest. The lake is also part of Federal Energy Regulatory Commission Project 2426. Aspen worked with DWR and DBW to determine ADA compliance components at each site. CEQA documentation in support of a Class 1 and 2 Categorical Exemption was prepared to evaluate the potential impacts of the repairs and improvements, and provide CEQA clearance for filing of required permit applications, including but not necessarily limited to 404, 401, and 1602 permits. In addition to the CEQA documentation and preparation of permit applications, Aspen coordinated DWR and DBW's efforts with the USFS, and the permitting agencies (i.e., CDFG, RWQCB, and USACE). Through coordination with the USAC, Aspen prepared the NEPA EA for Corps 404 permit process, and reviewed and coordinated revisions to the 1602 with CDFG.

- **Mulholland Pumping Station and Lower Hollywood Reservoir Outlet Chlorination Station Project, Los Angeles, CA.** Under Aspen's on-going environmental services contract with the City of Los Angeles Department of Water and Power (LADWP), Ms. Vahidi served as the Project Manager for preparation of CEQA documentation for this project. LADWP proposed to replace the existing historic pumping/chlorination station building as well as the existing lavatory and unoccupied Water Quality Laboratory buildings with a new single structure pumping/chlorination station within the LADWP's Hollywood Reservoir Complex located in the Hollywood Hills section of the City Los Angeles. These improvements were required due to the age and deterioration of the facility and the potential risk of seismic damage to existing structures. An Initial Study was prepared in support of a City of Los Angeles General Exemption.

- **River Supply Conduit (RSC) Upper Reach Project EIR, Los Angeles and Burbank, CA.** Under Aspen's on-going environmental services contract with the City of Los Angeles Department of Water and Power (LADWP), Ms. Vahidi served as the Task Leader for land use issues and is in charge of development and analysis of project alternatives for the CEQA document for this project. The RSC is a major transmission pipeline in the LADWP water distribution system. The existing RSC pipeline's purpose is to transport large amounts of water from the Los Angeles Reservoir Complex and local ground water wells to reservoirs and distribution facilities located in the central areas within of the City of Los Angeles. The LADWP proposed a new larger RSC pipeline to replace and realign the

Upper and Lower Reaches of the existing RSC pipeline, which would involve the construction of approximately 69,600 linear feet (about 13.2 miles) of 42-, 48-, 60-, 66-, 72-, 84-, and 96-inch diameter welded steel underground pipeline.

- **Valley Generating Station Site Survey & Documentation Report, Los Angeles, CA.** Ms. Vahidi managed the preparation of a comprehensive report (over 150 pages) documenting all of the structures and facilities located at the Valley Generating Station (VGS). The report includes exhibits that illustrate locations of each structure at the VGS, a detailed appendix of color photos of each structure, and a written description of each structure. The report also provides a general discussion of the history and background of the VGS and its development to provide a context for the structures on site.
- **Taylor Yard Water Recycling Project (TYWRP), Los Angeles and Glendale, CA.** Under Aspen's on-going environmental services contract with the City of Los Angeles Department of Water and Power (LADWP), Ms. Vahidi served as the Project Manager for preparation of CEQA documentation for this project. LADWP proposed to construct the TYWRP in order to provide recycled water produced by the Los Angeles–Glendale Water Reclamation Plant (LAGWRP) to the Taylor Yard. An important part of the City of Los Angeles' expanding emphasis on water conservation is the concept that water is a resource that can be used more than once. Because all uses of water do not require the same quality of supply, the City has been developing programs to use recycled water for suitable landscaping and industrial uses. The project is located in the southernmost part of the City of Glendale and northeastern part of the City of Los Angeles. The IS/MND was adopted in the Summer of 2007.
- **Devers–Palo Verde 500 kV Transmission Line Project EIS/EIR, southern California/western Arizona.** For this EIR/EIS prepared by U.S. Bureau of Land Management and CPUC, Ms. Vahidi served as the Deputy Project Manager and Social Sciences Issue Area Coordinator for SCE's proposed 250-mile transmission line project from the Palo Verde Nuclear power plant in Arizona to the northern Palm Springs area in California. Major issues of concern include EMF and visual impacts on property values, impacts on the area's vast recreational resources and tribal lands, and the development and evaluation of several route alternatives, including the Devers-Valley No. 2 Route Alternative, which eventually was approved by the CPUC.
- **Antelope-Pardee 500 kV Transmission Line Project EIR/EIS, Los Angeles County, CA.** For this EIR/EIS prepared by USFS, Angeles National Forest and CPUC, Ms. Vahidi is served as the Deputy Project Manager and Social Sciences Issue Area Coordinator for SCE's proposed 25-mile transmission line project from the Antelope Substation in the City of Lancaster, through the ANF, and terminating at SCE's Pardee Substation in Santa Clarita. Major issues of concern included impacts to biological, recreational, and cultural resources within Forest lands, EMF and visual impacts on property values, impacts on residences in the urbanized southern regions of the route, and the development and evaluation of several route alternatives.
- **Antelope Transmission Project, Segments 2 & 3 EIR, Los Angeles and Kern Counties, CA.** For this EIR being prepared by the CPUC, Ms. Vahidi served as the Deputy Project Manager and Social Sciences Issue Area Coordinator. The proposed Project includes both Segment 2 and Segment 3 of the Antelope Transmission Project, and involves construction of new transmission line infrastructure from the Tehachapi Wind Resource Area in southern Kern County, California, to SCE's existing Vincent Substation in Los Angeles County, California. The Tehachapi Wind Resource Area is one of the State's greatest potential sources for the generation of wind energy. A variety of wind energy projects are currently in development for this region. Major issues of concern include EMF and visual impacts on property values, impacts on residences and agricultural resources, and the development and evaluation of several substation and route alternatives.
- **Tehachapi Renewable Transmission Project (TRTP) EIR/EIS, Kern, Los Angeles, and San Bernardino Counties, CA.** For this EIR/EIS prepared by USFS, Angeles National Forest and CPUC,

Ms. Vahidi is served as the Deputy Project Manager in the early stages (i.e., during Scoping) of the project for SCE's proposal to construct, use, and maintain a series of new and upgraded high-voltage electric transmission lines and substations to deliver electricity generated from new wind energy projects in eastern Kern County. Approximately 46 miles of the project would be located in a 200- to 400-foot right-of-way on National Forest System land (managed by the Angeles National Forest) and approximately three miles would require expanded right-of-way within the Angeles National Forest. The proposed transmission system upgrades of TRTP are separated into eight distinct segments: Segments 4 through 11. Segments 1 (Antelope-Pardee) and Segments 2 and 3 (Antelope Transmission Project) were evaluated in separate CEQA and NEPA documents as described above.

- **Jefferson-Martin 230 kV Transmission Line Project EIR, San Francisco Bay Area, CA.** Ms. Vahidi served as the Issue Area Coordinator for the Social Science issues of the EIR, and was responsible for preparation of the socioeconomics, recreation, and public utilities sections of the EIR prepared on behalf of the California Public Utilities Commission (CPUC) to evaluate a proposed 27-mile transmission line in San Mateo County. Major issues of concern included EMF and visual impacts on property values, impacts on the area's vas recreational resources, and evaluation of several route alternatives.
- **Miguel-Mission 230 kV #2 Project EIR, San Diego, CA.** Ms. Vahidi conducted the land use, recreation, socioeconomics, and environmental justice analyses for this EIR for a proposed 230 kV circuit within an existing transmission line ROW between Miguel and Mission substations in San Diego County. The proposed project included installing a new 230 kV circuit on existing towers along the 35-mile ROW, as well as relocate 69 kV and 138 kV circuits on approximately 80 steel pole structures. In addition, the Miguel Substation and Mission Substation would be modified to accommodate the new 230 kV transmission circuit.
- **Viejo System Project, Orange County, CA.** Ms. Vahidi served as the Deputy Project Manager for the project's CEQA documentation, including and Initial Study, prepared on behalf of the CPUC to evaluate Southern California Edison's (SCE) Application for a Permit to Construct the Viejo System Project, which was in SCE's forecasted demand of electricity and goal of providing reliable electric service in southern Orange County. The Viejo System Project would serve Lake Forest, Mission Viejo, and the surrounding areas. Components of the project included, construction of the new 220/66/12 kilovolt (kV) Viejo Substation, installation of a new 66 kV subtransmission line within an existing SCE right-of-way, replacement of 19 double-circuit tubular steel poles with 13 H-frames structures, and minor modification to other transmission lines. Major issues of concern include visual impacts of transmission towers, EMF effects, and project impacts on property values.
- **MARS EIR/EIS, Monterey, CA.** Ms. Vahidi served as the technical specialist in charge of preparing the Environmental Justice analysis for this EIR/EIS, which would evaluate the effects associated with the installation and operation of the proposed Monterey Accelerated Research System (MARS) Cabled Observatory Project (Project) proposed by Monterey Bay Aquarium Research Institute (MBARI)[NEPA Lead Agency]. The goal of the Project was to install and operate, in State and Federal waters, an advanced cabled observatory in Monterey Bay that would provide a continuous monitoring presence in the Monterey Bay National Marine Sanctuary (MBNMS) as well as serve as the test bed for a state-of-the-art regional ocean observatory, currently one component of the National Science Foundation (NSF) Ocean Observatories Initiative (OOI). The Project would provide real-time communication and continuous power to suites of scientific instruments enabling monitoring of biologically sensitive benthic sites and allowing scientific experiments to be performed. The environmental justice analysis evaluated the potential for any disproportionate project impacts to both land-based populations and fisheries workers. The CEQA Lead Agency was CSLC.
- **Kinder Morgan Concord-Sacramento Pipeline EIR**. Ms. Vahidi prepared the environmental justice and utilities and service systems sections of an EIR evaluating a proposed 70-mile petroleum products pipeline for the California State Lands Commission. Analysis included consideration of potential impacts of pipeline accidents in Contra Costa, Solano, and Yolo Counties.

- **Shore Marine Terminal Lease Consideration Project EIR, Contra Costa County, CA.** Served as Aspen's Project Manager (under contract to Chambers Group, Inc.) in charge of conducting the preparation of the Land Use, Recreation, Air Quality, and Noise sections of this EIR evaluating Shore Terminal, LLC's application to the California State Lands Commission (CLSC) to exercise the first of two 10-year lease renewal options, with no change in current operations. Shore Terminals operations comprise the marine terminal and on-land storage facilities in an industrial part of the city of Martinez. The marine terminal is on public land leased from the CSLC with the upland storage facilities located on private land.
- **Looking Glass Networks Fiber Optic Cable Project IS/MND, northern and southern California.** As part of Aspen's ongoing contract with the CPUC for review of Telecommunications projects, this document encompassed the evaluation of project impacts and network upgrades in the San Francisco Bay Area and the Los Angeles Basin Area. Ms. Vahidi served as the Deputy Project Manager and Study Area Manager for the Los Angeles Basin for this comprehensive CEQA document reviewing the potential impacts of hundreds of miles of newly proposed fiber optic lines throughout northern and southern California, including Los Angeles and Orange Counties. Issues of concern focused on potential construction impacts of linear alignments in highly urbanized rights-of-way, and resultant land use, traffic and utilities conflicts.
- **U.S. Army Corps of Engineers, Los Angeles District.** Ms. Vahidi is responsible for managing Delivery Orders and conducting the analyses of the social science issue areas for 16 projects throughout southern California and Arizona as part of two environmental services contracts. Delivery orders have included:
  - **Northeast Phoenix Drainage Area Alternatives Analysis Report, Phoenix and Scottsdale, AZ.** As the project manager guided the preparation of an alternatives analysis report that evaluated the potential environmental impacts associated with channel and detention basin alternatives to control flooding problems resulting from fast rate of development in the northeast Phoenix area.
  - **Imperial Beach Shore Protection EIS/EIR, Imperial Beach, CA.** Responsible for preparing the affected environment and environmental consequences sections for the land use, recreation, aesthetics, and socioeconomics issue areas. This EIS will analyze the impacts of shore protection measures along a 4.7-mile stretch of beach in southwest San Diego County.
  - **U.S. Food and Drug Administration Laboratory EIS/EIR, Irvine, CA.** Prepared the land use and recreation; socioeconomics, public services, and utilities; and visual resources/aesthetics analyses for this proposed "mega-laboratory" on the University of California Irvine Campus. Also developed the cumulative projects scenario for analyses of cumulative impacts. As the Public Participation Coordinator for the EIS/EIR review process, prepared the NOP, set up the scoping meeting and public hearing, prepared meeting handouts, and developed the project mailing list.
  - **San Antonio Dam EIS, Los Angeles and San Bernardino Counties, CA.** Responsible for preparing the cultural resources, land use and recreation, and aesthetics sections for the analysis of impacts resulting from the re-operation of San Antonio Dam to increase flood protection.
  - **Rio Salado Environmental Restoration EIS, Phoenix and Tempe, AZ.** Conducted the land use and recreation, and aesthetics analyses for this environmental restoration project in the Salt River and Indian Bend Wash located in the Cities of Phoenix and Tempe. Incidental to the primary objective of the Proposed Action (environmental restoration) is the creation of passive recreational opportunities associated with the restored habitat areas, such as trails for walking and biking, and areas for observing wildlife and learning about the natural history of the river.
  - **Airspace Restrictions EA, Ft. Irwin, CA.** Conducted the land use, recreation, aesthetics, and socioeconomics analyses of impacts for the conversion of unrestricted airspace to restricted airspace above Ft. Irwin in the Mojave Desert.
  - **National Guard Armory Building EA, Los Angeles, CA.** Conducted the land use, aesthetics, and socioeconomics analyses and prepared the cumulative impacts and policy consistency sections.

- **Supplemental EA for the Seven Oaks Dam Woolly Star Land Exchange, San Bernardino County, CA.** Prepared the land use and recreation analyses and policy consistency section.
- **Lower Santa Ana River Operations and Maintenance EA, Orange County, CA.** Responsible for conducting the land use, recreation, aesthetics, socioeconomics, and cultural resources analyses.
- **EA for Area Lighting, Fencing, and Roadways at the International Border, San Diego, CA.** Conducted the land use, aesthetics, and socioeconomics analyses and prepared the policy consistency section.
- **Border Patrol Checkpoint Station EA, San Clemente, CA.** Analyzed the aesthetic impacts of the installation of a concrete center divider and a Pre-inspected Automated Lane adjacent to and parallel to Interstate 5.
- **Upper Newport Bay Environmental Restoration Project, Newport Beach, CA.** Prepared physical setting, socioeconomics, land and water uses, and cultural resources sections for the Baseline Conditions Report and the Environmental Planning Report.
- **Whitewater/Thousand Palms Flood Control Project, Thousand Palms, CA.** Prepared the land use and recreation, aesthetics, and socioeconomics affected environment sections for the project's Baseline Conditions Report that was incorporated into the project EIS.
- **San Antonio Creek Bridges Project, Vandenberg Air Force Base, CA.** Prepared the physical setting, land use, socioeconomics, utilities, and aesthetics sections for analyses of bridge alternative impacts for missile transport on Vandenberg Air Force Base.
- **Ft. Irwin Expansion Mitigation Plan, Mojave Desert, CA.** Responsible for developing Ft. Irwin's Public Access Policy based on mitigation measures from the Army's Land Acquisition EIS for the National Training Center. Policy includes provisions for access by research and scientific uses.

- **Los Angeles Unified School District (LAUSD), Los Angeles County, CA.** Ms. Vahidi is Program Manager for Aspen's Environmental Master Services Agreement with the LAUSD (nation's second largest school district) to prepare CEQA documents (EIRs, IS/MNDs, Categorical Exemptions) in review of the LAUSD's four-phased new school construction program intended to meet existing and projected overcrowded conditions (200,000 seat shortfall) within the LAUSD (i.e., City of Los Angeles and all or parts of 28 surrounding jurisdictions cover 700 square miles of land). As the Program Manager, she is responsible for client interface and providing CEQA expertise to the LAUSD on day-to-day basis, QA/QC activities for all Aspen documents submitted, budget tracking and allocation, staff assignments, and the general day-to-day management of this contract. Thus far, Aspen has been awarded 48 CEQA document assignments for new school projects, school expansions and additions. In addition to her duties as the contract manager, Ms. Vahidi has managed the preparation of several CEQA documents under this contract, including:
  - **East Valley Middle School No. 2 EIR.** This middle school was proposed to be located at the previous Van Nuys Drive-In site. The EIR focused on impacts associated with air quality, hazards and hazardous materials, noise, land use and planning, and traffic and transportation. Major issues of concern included traffic and noise generated by school operation activities. The EIR included LAUSD design standards and measures employed to minimize environmental impacts.
  - **Canoga Park New Elementary School IS/MND.** This elementary school would be developed on a parcel of land owned by the non-profit organization, New Economics For Women (NEW). This "Turn-Key" project consisted of a Charter Elementary School to be developed by NEW and sold to the LAUSD for operation. It was later decided that NEW would lease the school back and run it as a charter school. Issues of concern included, pedestrian safety, traffic, air quality, noise, and land use.
  - **Mt. Washington Elementary School Multi-Purpose Room Addition Project IS/MND.** This project proposed the development of a multi-purpose room facility, including a library, auditorium, and theater, to the existing Mt. Washington Elementary School campus located in Los Angeles. The surrounding residential community had concerns regarding the proposed project's impacts on aesthetics, traffic, air quality, and noise. Of particular concern, were impacts generated due to the after-hours use of the multi-purpose room facility by civic and community groups.

- **New School Construction Program EIR.** Serves as a Study Area Manager (Valley Districts), and Issue Area Coordinator (IAC) (i.e., technical lead and reviewer) for social science issues, including land use, socioeconomics, public services, population and housing, and utilities and service systems. As the IAC, she has formulated the scope of work and methodology for analysis of issues and mitigation options. In addition to her managerial duties, Ms. Vahidi is preparing the Land Use section of the EIR, and directing the preparation of the Project's Scoping Report.
- **Belmont Senior High School 20-Classroom Modular Building Addition Project.** Under Aspen's on-going master services agreement with the LAUSD, served as the project manager for CEQA documentation and permitting efforts related to the addition of modular classrooms to the existing Belmont Senior High School campus. Issues of concern included, potential impacts to sensitive receptors adjacent to the school from construction-related air quality, noise, and traffic, and operation-related noise generated by the new classrooms. As the LAUSD's CEQA consultant, Ms. Vahidi directed the preparation of technical documentation in support of a Class 32 In-Fill CEQA Categorical Exemption. This technical documentation included analyses of potential project-related air quality, noise, and traffic impacts, which were then submitted to LAUSD as one packet. Subsequent to preparation of this packet, LAUSD filed a CEQA Notice of Exemption for the classroom addition project.
- **Narbonne High School Stadium Lighting Project MND Addendum.** Served as the project manager for this project proposed to add a new stadium, lighting, and associated sport facilities needed to address existing needs at Narbonne High School. Issues of concern include lighting impacts to the surrounding neighborhood, and available parking stock.

- **SCE Calnev Power Line and Substation Project IS/MND.** Aspen was contracted to thoroughly review and analyze Southern California Edison Company's Application for a Permit to Construct and Proponent's Environmental Assessment (PEA) for the Calnev Power Line and Substation Project in the City of Colton. Ms. Vahidi served as the Deputy Project Manager for preparation of the IS/MND. Tasks include: a site visit, and evaluation of the project's compliance with the Commission's General Order 131D, Rule 17.1, and associated information submittal requirements; and preparation of a letter report identifying data deficiencies of the Application and PEA. Upon formal CPUC acceptance of the Application and PEA, Aspen prepared a CEQA Initial Study Checklist by identifying baseline data, project characteristics, and determining impact significance for each issue area. Each issue area's impact determination was supported by a paragraph or more of analysis describing the rationale for the impact identified, or for the lack of a significant impact. Upon completion of the Initial Study, the Mandatory Findings of Significance were prepared and Aspen determine that a Mitigated Negative Declaration should be prepared per CEQA Guidelines.
- **SCE Six Flags Substation and Power Line Project IS/MND.** Ms. Vahidi served as Deputy Project Manager for preparation of the IS/MND. Reviewed and provided comments on the permit application by SCE to construct a substation and power line to provide electrical service to Six Flags Amusement Park in Valencia, CA. Subsequent to the application completeness review, she prepared the project's Initial Study Checklist and Mitigated Negative Declaration for the California Public Utilities Commission (CPUC). Identified possible deficiencies and provided recommendations.
- **Industrywide Survey for the South Coast Air Quality Management District.** Ms. Vahidi coordinated Aspen's work for an Air Toxics Survey of harmful emissions by auto body and paint shops, performed in compliance with AB2588. She was responsible for development of an industrywide emission inventory for these facilities; she also performed information management, facility verifications, survey mail-outs, emissions calculations, analysis of calculated results, and preparation of the final report.
- **Technical Support to NEPA Lawsuit, Angeles National Forest, CA.** Ms. Vahidi prepared a detailed project chronology and a list of all applicable federal, State, and local laws and regulations in support of the USDA Office of General Counsel and National Forest's response to the City of Los Angeles' 1996 lawsuit on the adequacy of the Pacific Pipeline EIS.
- **Yellowstone Pipeline EIS, Lolo National Forest, Montana.** Environmental Justice and Public Services Issue Area Specialist. Responsible for conducting the analysis of project impacts on minority and

low-income populations to comply with Presidential Executive Order 12898 on Environmental Justice using Census data to determine population density, minority population percentages and unemployment rates to determine the potential for disproportionate project impacts on affected communities. Also responsible for conducting analysis of project impacts such as population inmigration and pipeline accidents on public services in western Montana. During the EIS scoping process, she served as the project public participation coordinator and was responsible for preparation of the project newsletter, setup of the first round of scoping meetings, and determination of project information centers.

- **Santa Fe Pacific Pipeline Project EIR.** Ms. Vahidi was responsible for development and screening of alternatives for a 13-mile petroleum products pipeline from Carson to Norwalk, CA. Prepared analyses of project impacts on socioeconomics, public services, utilities, and aesthetics.
- **Pacific Pipeline Project Mitigation Monitoring, Compliance, and Reporting Program (MMCRP).** Ms. Vahidi served as the expert technical reviewer for the socioeconomics and environmental justice issues. As the MMCRP Agency Liaison, was responsible for developing protocol for efficient interagency communication procedures in coordination of mitigation activities with the CPUC, USFS, Responsible Agencies, and the project proponent. Also responsible for the development and management of the MMCRP Community Outreach and Public Access Program.
- **Pacific Pipeline Project EIR.** For the California Public Utilities Commission's (CPUC) EIR on the originally proposed route of this proposed pipeline (from Santa Barbara County to Los Angeles), Ms. Vahidi developed and coordinated a public participation program to comply with CEQA's mandate for information disclosure and public involvement in decision-making. The Final EIR was certified in September 1993.
- **Pacific Pipeline Project EIS and Subsequent EIR.** Ms. Vahidi prepared the socioeconomics and public services analysis, the Environmental Justice analysis in compliance with Presidential Executive Order 12898, as well as portions of the Land Use and Public Recreation analyses, including a comprehensive comparative analysis of project alternatives on this EIS/Subsequent EIR for the U.S. Forest Service (Angeles National Forest) and the CPUC. Ms. Vahidi managed the subsequent GIS mapping of socioeconomic data relative to pipeline corridor alternatives and other industrial facilities. She also prepared the cumulative projects list (covering a five county area for the Proposed Project and its alternatives) used for the cumulative scenario analyses of the various issue areas in the EIS/SEIR. As the Public Participation Program Coordinator for the project, she developed, implemented, and managed the public involvement efforts for the NEPA and CEQA environmental review processes. This included: setup and logistics for 20 separate scoping meetings, informational workshops, and public hearings along the project route; preparation of all meeting handouts; preparation of project newsletters and public notices; placement of project documents on Internet; and maintenance of the a project telephone information hotline. She also reviewed over 2,000 public comments (written and verbal) received on the Draft EIS/SEIR, for subsequent distribution to the project team.
- **Alturas Transmission Line Project EIR/EIS.** Ms. Vahidi conducted the analysis of potential impacts on minority populations and low-income populations in compliance with Presidential Executive Order 12898 on Environmental Justice using Census data to determine population density, minority population percentages and unemployment rates, and the potential impacts of the transmission line on affected communities. She also prepared the cumulative projects list and map used for analyses of cumulative impacts. She managed development of meeting handouts; scheduling and logistics for four scoping meetings; developed and maintained project mailing list; reviewed public scoping comments and prepared the Scoping Report; coordinated four sets of informational workshops and public hearings for the Draft EIR/EIS; supervised the distribution of comments on the Draft EIR/EIS to the project team; and coordinated the distribution of the Draft and Final EIR/EIS to affected public agencies, organizations, and citizens.

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- **Program EIR for the Divestiture of PG&E's Hydroelectric Generation Assets.** For the CPUC's EIR evaluating the Pacific Gas & Electric Company's (PG&E) proposal to divest their hydroelectric facilities in California, served as the land use technical analyst for two watershed areas, and the Task Manager for the Socioeconomics and Transportation sections of the EIR covering five watershed areas. PG&E owns and operates the largest private hydroelectric power system in the nation. Situated in the Sierra Nevada, Southern Cascade, and Coastal mountain ranges of California, this system is strung along 16 different river basins and annually generates approximately five percent of the power consumed each year in California. The proposed sale of assets also includes approximately 140,000 acres of land proposed for sale with the hydroelectric system. The EIR analyzes the range of operational changes that could occur under new ownership, including complex integrated models that analyze power generation and water management. The land use section of the EIR examines the implications of the change in ownership of lands and the potential for impacts due to development or potential changes in use. Contributed significantly to the extensive GIS analysis, which was conducted to determine the development suitability and potential intensity of development that might occur on the lands if sold. These results served as one of the primary bases for analysis of impacts associated with the sale of the hydroelectric assets.
- **Section 108 Loan Guarantee EA/FONSI for the Waterfront Development Project.** Served as the Manager and Principal Preparer for this EA/FONSI for the City of Huntington Beach Economic Development Department. Prepared NEPA documentation evaluating the impacts resulting from the use of HUD Section 108 Loan guarantee funds for the Waterfront Resort Expansion Project in accordance with The HUD NEPA Guidelines and Format 1 (Environmental Assessments at the Community Level). Tasks included: (1) Evaluation of activities that would be categorically excluded from NEPA based on an assessment of the NEPA Implementing Guidelines for HUD Projects; (2) Evaluation of proposed actions compliance with all applicable federal statutes, regulations, and policies; and (3) Preparation of an Environmental Assessment/Mitigated Finding of No Significant Impact (EA/FONSI) for proposed actions that are not categorically excluded. Proposed actions to be evaluated consisted mainly of infrastructure improvement projects, rehabilitation and/or development of affordable housing, provision of relocation assistance, facilitation of development and/or redevelopment plans, property acquisition, provision of open space, etc.
- **MTA Mid Cities/Westside Transit Corridor Study EIS/EIR.** Served as the EIS/EIR Deputy Project Manager (DPM) for this 3-phase (including prepared the Major Investment Study (MIS), the Environmental Impact Statement (EIS), and an evaluation of the urban design implications of transit interventions on selected routes) study intended to address current and long range traffic congestion in the central and westside areas of the Los Angeles, Basin. Three east/west corridors and a range of transit alternatives ranging including Rapid Bus, light rail, and heavy rail are being evaluated. In addition to her duties as DPM for this comprehensive joint EIS/EIR, Ms. Vahidi prepared the Environmental Justice Analysis (per Executive Order 12898), the Section 4(f) Parklands discussion, and the land use and socioeconomics sections of the EIS/EIR.
- **Wes Thompson Ranch Development Project EIR.** Served as the EIR Project Manager for this hillside residential development in the City of Santa Clarita. Issues of concern included seismic and air quality impacts associated with the excavation of 2 million cubic yards of soil, the project's non-compliance with the City's hillside ordinance for innovative design, and traffic generated by project-related population growth in the area. Four different site configuration alternatives were developed as part of the EIR analysis. Other issues of concern included sensitive biological resources, the potential for hydrological impacts due to disturbance of the hillside, and cultural resources.
- **City of Santa Monica Environmental Assessments.** As one of the City's qualified CEQA consultants managed several environmental assessment documents for housing, commercial, institutional, and mixed-use developments in compliance with CEQA, including:

- **Berkeley Manor Condominium EIR and Technical Reports**. This one-issue EIR originally was a CEQA Categorical Exemption per direction of the City. During preparation of the Categorical Exemption documentation, it was determined that project-generated traffic would have potentially significant impacts. As a result, a traffic technical report was prepared as the background document for and EIR. In addition, shade and shadow impacts were evaluated in a technical report to ensure that shading impacts from the proposed structure on surrounding uses would not be significant. A simple Excel model was developed for calculation of shade and shadow angles.
- **Seaview Court Condominiums IS/MND.** This comprehensive Initial Study/Mitigated Negative Declaration included six technical reports including traffic, cultural resources, parking survey, shade and shadow analysis, and a geotechnical assessment to evaluate the level of severity of this development in the waterfront area of Santa Monica. Major issues of concern were; parking and project-generated traffic on adjacent narrow residential streets; visual obstruction and shading impacts of the proposed structure; liquefaction and seismic impacts to adjacent properties as result of the project's excavation for a subterranean parking garage; and the potential impacts of the project to impact the integrity of a historic district and the historic Seaview Walkway to the beachfront.
- **Four-Story Hotel IS/MND.** A comprehensive Initial Study/Mitigated Negative Declaration was prepared for this four-story hotel adjacent to St. John's Hospital in Santa Monica. Major issues of concern included project-generated traffic on surrounding multi-family residential uses and emergency access to the hospital.
- **Santa Monica College Parking Structure B Replacement EIR.** This focused EIR addressed issues related to traffic and neighborhood land use impacts associated with the addition of a 3-story parking structure in the center of the SMC campus. Major issues of concern included the potential for project-generated traffic to cause congestion at the school's main entrance on Pico Boulevard, and the potential for overflow traffic to impact the Sunset Community of single-family homes adjacent to the school.
- **North Main Street Mixed-Use Development Project EIR.** This EIR included evaluation of impacts resulting from the development of a mixed-use development in Santa Monica's "Commercial Corridor" on Main Street, with ground-floor residences and boutique commercial uses. Major issues of concern included traffic and parking impacts to Main Street and surrounding residential land uses, shade and shadow impacts, and neighborhood impacts.

- **Specific Plans and Redevelopment Projects.** As the senior technical lead for land use, prepared the project description, alternatives screening and development, cumulative scenario, and land use analysis for:
  - **Cabrillo Plaza Specific Plan EIR in Santa Barbara.** This project consisted of a mixed-use commercial development on Santa Barbara's waterfront on Cabrillo Boulevard. On-site uses included an aquarium, specialty retail, restaurants, and office space.
  - **Culver City Redevelopment Plan and Merger EIR.** This programmatic EIR evaluated the impacts of the City's redevelopment of its redevelopment zones. A major land use survey and calculation of acreage of redevelopment lands was conducted as part of the EIR.
  - **Dana Point Headlands Specific Plan EIR.** This EIR evaluated the development of coastal bluff in the City with hotel, single- and multi-family residential, and commercial uses. Major issues of concern included ground disturbance as a result of excavation, impacts to terrestrial and wildlife biology, recreation impacts to beachgoers, and project-generated population inducement.
  - **Blocks 104/105 Redevelopment Project EIR in Huntington Beach (Project Manager).** This EIR evaluated the development of a supermarket, retail shops, and office space in the City's Waterfront Redevelopment Zone. Issues of concern evaluated included traffic, land use, and impacts to on-site historic structures.

HONORS AND AWARDS

- 2006 American Planning Association, Los Angeles Section Environmental Award for the Los Angeles Unified School District New School Construction Program, Program EIR
- 2004 Association of Environmental Professionals Statewide Best EIR Award for the Jefferson-Martin 230 kV Transmission Project EIR.
- 2001 Outstanding Performance Award from the State of California Energy Commission.

- 1992-93 recipient of the USC Merit ("Ides of March") Scholarship from the Southern California Association of Public Administrators (SCAPA).
- University of California, Irvine, School of Social Sciences. Graduated with Highest Honors in Political Science.

PROFESSIONAL ASSOCIATIONS

- American Planning Association (APA), Los Angeles Section Executive Board Member
- Association of Environmental Professionals (AEP)

DECLARATION OF
Testimony of Susanne Huerta

I**, Susanne Huerta,** declare as follows:

1. I am presently employed by Aspen Environmental Group, a contractor to the California Energy Commission, Siting, Transmission and Environmental Protection Division, as a **Environmental Planner/Land Use Technical Specialist**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on **Land Use** and **Transmission Engineering Systems – Appendix A** for the **Abengoa Mojave Solar** project based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: May 6, 2010 Signed: Original signed by S. Huerta

At: Agoura Hills, California

SUSANNE R. HUERTA
Environmental Planner

ACADEMIC BACKGROUND

Master of Urban Planning, New York University, 2007
B.A., Geography, University of California, Los Angeles, 2004

PROFESSIONAL EXPERIENCE

Ms. Huerta is an Environmental Planner with five years of experience in environmental consulting, city planning, economic development and GIS analysis. She is currently conducting the technical analysis for agricultural and land use analyses for numerous solar and wind energy generating facilities. While attending graduate school, Ms. Huerta interned for a city planning consultant firm in New Jersey. Her city planning background includes experience in the preparation of master plans, the evaluation of site plans and subdivisions, and conducting land use surveys. At Aspen Environmental Group, Ms. Huerta conducts research and prepares environmental analyses in accordance with CEQA, NEPA, and various other environmental laws and regulations. Ms. Huerta's project-specific efforts are provided below.

Aspen Environmental Group — 2007 to present

- **Topaz Solar Farm Project Environmental Impact Report (EIR), San Luis Obispo County, CA, Project Assistant/Technical Specialist (2009-Present).**Ms. Huerta is currently preparing the Project Description and the technical analysis for the agriculture section for this 550 MW solar photovoltaic power plant on the Carrizo Plain of eastern San Luis Obispo County. The project includes solar arrays that would cover approximately 4,200 acres, as well as an electric substation and switching station.
- **California Valley Solar Ranch Project EIR, San Luis Obispo County, CA, Technical Specialist (2009-Present).** Ms. Huerta is currently preparing the technical analysis for the agricultural resources for this 250 MW solar photovoltaic power plant on the Carrizo Plain of eastern San Luis Obispo County. The project includes solar arrays that would cover nearly 2,000 acres, as well as an electric substation, a 2.5-mile transmission line, and expansion of a surface aggregate mine.
- **Pacific Wind Project EIR, Kern County, CA, Technical Specialist (2009-Present).** Ms. Huerta is currently preparing the technical analysis for land use and public services. The project is proposed to be located on approximately 8,300 acres of land with up to 250 wind turbines to produce up to 250 MW of wind energy.
- **Alcoa Dike Project Supplemental Environmental Assessment EA/EIR, US Army Corps of Engineers, Technical Specialist (2009-Present).** Ms. Huerta is a preparing the land use and visual analysis for the Supplemental EA/EIR Addendum under the NEPA/CEQA for the United States Army Corps of Engineers. A Supplemental EA/EIR Addendum is being performed to address design changes to the approved Alcoa Dike located in the Prado Basin, Riverside County.
- **Auxiliary Dike Project Supplemental Environmental Assessment (EA)/EIR, US Army Corps of Engineers, Technical Specialist (2009).** Ms. Huerta prepared the land use and visual analysis for the Supplemental EA/EIR Addendum under the NEPA/CEQA for the United States Army Corps of Engineers. A Supplemental EA/EIR Addendum is being performed to address design changes to the approved Auxiliary Dike located in the Prado Basin, Riverside County.

- **Baldwin Hills Community Standards District (CSD), City of Culver City, Technical Specialist (2009).** Technical Specialist for the review of a County of Los Angeles environmental document and preparation of an oil and gas drilling ordinance for the City of Culver City in Los Angeles County. Ms. Huerta reviewed the technical comments on the Baldwin Hills Community Standards District EIR prepared by the County of Los Angeles for the Inglewood Oil Field. The technical review included the evaluation of the County's proposed CSD (drilling ordinance), which the County revised based on public comments. The City used the review comments as part of their formal comments submitted on the County's EIR and CSD.
- **California River Parkways Trailhead Project Initial Study/Mitigated Negative Declaration (IS/MND), Ventura County Watershed Protection District, Technical Specialist, (2009).** The project would provide a new point of entry to the Ventura County-maintained Ojai Valley Trail and the Ventura River Trail, building on an existing trails network, and would include a new parking lot and crosswalk. Ms. Huerta performed the analyses for land use, agricultural and mineral resources, public services, and recreation resources.
- **TANC Transmission Project, Transmission Agency of Northern California, Staff Professional (2009).** Public scoping for 600 miles of proposed 230-kV and 500-kV transmission lines and associated infrastructure extending from eastern Lassen County south through the Sacramento Valley, and branching west to the Bay Area and east to Tuolumne County: Ms. Huerta assisted in the acquisition and processing of 6,600 scoping comments and information requests; responded via phone, email, and postal mail to public and agency inquiries throughout the twice extended, five-month scoping period; quantitatively evaluated scoping data; and authored sections of the scoping report.
- **Alta-Oak Creek Mojave Project EIR, Kern County, CA, Technical Specialist (2008-2009).** Ms. Huerta is prepared the technical analysis for land use, public services, population, and housing resources. The project is proposed to be located on approximately 11,000 acres of land with up to 350 wind turbines to produce up to 800 MW of wind energy. This would be the first project of the Alta Wind Energy Center which is designed to produce 1,500 MW of wind power in the Tehachapi Wind Resource Area of Kern County**.**
- **Santa Maria River Levee Repair Project, US Army Corps of Engineers, Technical Specialist (2008).** An Environmental Assessment (EA) is being performed for the corrective action to repair the design deficiency of the Santa Maria River Levee in order to avoid the potentially catastrophic consequences of a levee breach that would affect the population of the city of Santa Maria. Ms. Huerta has prepared technical analysis of potential land use and socioeconomic impacts for the EA under NEPA.
- **River Supply Conduit (RSC) Upper Reach Project EIR, Los Angeles and Burbank, CA, Technical Reviewer (2008).** Under Aspen's environmental services contract with the City of Los Angeles Department of Water and Power (LADWP), Ms. Huerta assisted in preparation of the potential impacts to recreational resources for this EIR. The RSC is a major transmission pipeline in the LADWP water distribution system. The existing RSC pipeline's purpose is to transport large amounts of water from the Los Angeles Reservoir Complex and local ground water wells to reservoirs and distribution facilities located in the central areas within of the City of Los Angeles. The LADWP proposed a new larger RSC pipeline to replace and realign the Upper and Lower Reaches of the existing RSC pipeline.
- **Tehachapi Renewable Transmission Project (TRTP) EIR/EIS, Kern, Los Angeles, and San Bernardino Counties, CA, Technical Specialist (2007-Present).** In preparation of a joint EIR/EIS for the CPUC and USDA Forest Service (Angeles National Forest), Ms. Huerta conducted research and analysis for impacts related to public services and utilities, and prepared the Cumulative Impact Scenario. In addition, she prepared the EIR/EIS Summary; and assisted in preparation of the Project

Description, Alternative Screening Report, Scoping Report, and the public comment period of the Draft EIR/EIS.

California Energy Commission (CEC)

In response to California's power shortage, Aspen has assisted the CEC in evaluating the environmental and engineering aspects of new power plant applications throughout the State under three separate contracts. Ms. Huerta has served as a Staff Professional for Land Use Staff Assessments since 2008. Her specific projects are listed below.

- Peak Workload Support for the Energy Facility Siting Program and the Energy Planning Program (Contract #700-05-002; 4/11/06 through 3/30/09)
  - **Carrizo Energy Solar Farm, San Luis Obispo County, CA.** Staff Professional for the Land Use Staff Assessment for Carrizo Energy, LLC's Application for Certification (AFC) to build the Carrizo Energy Solar Farm (CESF), which will consist of approximately 195 Compact Linear Fresnel Reflector (CLFR) solar concentrating lines, and associated steam drums, steam turbine generators (STGs), air-cooled condensers (ACCs), and infrastructure, producing up to a nominal 177 megawatts (MW) net. The CESF is located in an unincorporated area of eastern San Luis Obispo County, west of Simmler and northwest of California Valley, California. The CESF includes the solar farm site, a minimal offsite transmission system connection, and construction laydown area. The CESF site will encompass approximately 640 acres of fenced area in an area zoned for agricultural uses as specified in the San Luis Obispo County General Land Use Plan. Issues of concern include the impacts of the power plant on adjacent land uses and compliance with applicable local LORS.
  - **Willow Pass Generating Station, Pittsburg, CA.** Staff Professional for the Land Use Staff Assessment for a new, approximately 550-megawatt (MW) dry-cooled, natural gas-fired electric power facility proposed by Mirant. Development of Willow Pass would entail the construction of two generating units and ancillary systems including, adjacent electric and gas transmission lines, and water and wastewater pipelines.
  - **Stirling Energy Systems Solar One, San Bernardino County, CA.** Staff Professional for the Land Use Staff Assessment/BLM EIS for a nominal 850-megawatt (MW) Stirling engine project, with construction planned to begin late 2010. The primary equipment for the generating facility would include the approximately 30,000, 25-kilowatt solar dish Stirling systems (referred to as SunCatchers), their associated equipment and systems, and their support infrastructure. Major issues of concern include the conversion of approximately 8,230 acres of open space to industrial uses, compliance with BLM's CDCA Plan, etc.
  - **Stirling Energy Systems Solar Two, Imperial County, CA.** Staff Professional for the Land Use Staff Assessment/BLM EIS for a nominal 750-megawatt (MW) Stirling engine project, with construction planned to begin either late 2009 or early 2010. The primary equipment for the generating facility would include the approximately 30,000, 25-kilowatt solar dish Stirling systems (referred to as SunCatchers), their associated equipment and systems, and their support infrastructure. Major issues of concern include conversion of 6,500 acres of public recreation land used for OHV use and camping, and compliance with the BLM's CDCA plan.
  - **City of Palmdale Hybrid Power Plant Project, Palmdale, CA.** Staff Professional for the Land Use Staff Assessment for the Palmdale Hybrid Power Project (PHPP) proposed by the City of Palmdale. The PHPP consists of a hybrid of natural gas-fired combined-cycle generating equipment integrated with solar thermal generating equipment to be developed on an approximately 377-acre site in the northern portions of the City of Palmdale (City).
  - **Abengoa Mojave Solar One Project, San Bernardino County, CA.** Staff Professional for the Land Use Staff Assessment of a nominal 250 megawatt (MW) solar electric generating facility to be located near Harper Dry Lake in an unincorporated area of San Bernardino County. Issues of concern include the impacts associated with the conversión of 1,765 acres of open space lands.

PREVIOUS EXPERIENCE

Burgis Associates, Inc. — May 2006 to May 2007

Ms. Huerta worked as a consultant for city planning departments and private developers throughout northern New Jersey. Her primary projects were to draft a master plan reexamination report and an open space and recreation element of a master plan. Within these projects she evaluated existing socioeconomic conditions and land uses, and conducted an inventory of recreational facilities and open space. She also used ArcGIS to illustrate zoning recommendations and update land use and zoning maps. Other routine projects included the evaluation of site plan, subdivision and variance applications for compliance with local, State and federal regulations.

Brooklyn Economic Development Corporation — September to December 2005

Ms. Huerta conducted research and field surveys for community revitalization projects. She also participated in collaborative meetings with other community organizations.

ADDITIONAL TRAINING AND COURSES

- Successful CEQA Compliance (February 2009)
- CEQA Basics Workshop Series (November 2008)
- Advanced courses in ArcGIS
- Graduate courses in Environmental Impact Assessment and Environmental Policy

PROFESSIONAL AFFILIATIONS

- American Planning Association

DECLARATION OF
Christopher B. Dennis, P.G.

I, **Christopher B. Dennis**, declare as follows:

1. I am presently employed by the California Energy Commission for the in the Environmental Office of the Siting, Transmission and Environmental Protection Division as an Engineering Geologist**.**

2. My professional qualifications and experience are attached hereto and incorporated by reference herein.

3. I helped prepare the Staff Testimony on **Soil and Water Resources** and **Transmission System Engineering Appendix A** for the Abengoa Mojave Solar project based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: April 27, 2010 Signed: Original signed by C. Dennis

At: Sacramento, California

CHRISTOPHER B. DENNIS, P.G., J.D.

EXPERIENCE SUMMARY

Mr. Dennis is a licensed Professional Geologist with the State of California. His professional experience includes over 17 years of innovative technical and management experience. He has worked with a wide variety of CEQA and environmental management issues including soil, water, and waste compliance, investigation, and remediation. He has recently worked with siting and compliance of natural gas-fired and solar power plants. He has been a portfolio manager for several major oil companies and the East Bay Municipal Utility District's trench spoils program. He actively managed Unocal CERT, ExxonMobil, and ChevronTexaco pipeline, service station, bulk fueling, and terminal sites. He is knowledgeable of California's regulatory structure and laws, and is proficient in CEQA analysis, risk assessment, site assessment, remediation, environmental due diligence, and database/GIS development and management.

EDUCATION/REGISTRATION/CERTIFICATIONS

Pepperdine Law School, Certificate in Dispute Resolution, 1997
Whittier College of Law, J.D., 1996
California State University, Fullerton, B.S. Geology, 1989
Licensed Professional Geologist, State of California #7184
OSHA-SARA 40-Hour Hazardous Waste Activity Training 29 CFR 1910.120

PROFESSIONAL HISTORY

2007 to Current California Energy Commission, Engineering Geologist
2004 to 2007 Science Applications International Corporation, Senior Geologist
2004 to 2004 Bay Consulting Services, LLC, Principal
2001 to 2004 Cambria Environmental Technology, Inc., Senior Geologist
2000 to 2001 Alisto Engineering, Inc, Senior Geologist
1998 to 2000 TRC, Inc., Senior Geologist
1993 to 1995 GeoResearch, Inc., Project Manager
1990 to 1993 AeroVironment, Inc., Staff Geologist
1989 to 1990 Applied Geosciences, Inc., Technician

2007 to Current California Energy Commission, Sacramento, CA

Siting, Transmission, and Environmental Protection Division. Focusing on siting and compliance for simple-cycle, combined cycle, solar, and hybrid power plants. Developed a broad knowledge of CEQA impact analysis and mitigation involving water resources, water quality, soil resources, and waste management. Developed preliminary and final staff assessments involving issues of basin water management, overdraft, water quality, water conservation, water transfers, flood potential, and wind and water soil erosion. Deeply involved in issues surrounding the recently proposed large-scale solar power projects including project grading designs, flood management, water use, biological resource impacts, interagency cooperation, and laws, ordinances, regulations, and standards compliance. Also participating in the Quarterly Fuels and Energy Reporting (QFER) program and Environmental Policy Report. Oversaw the development of a QFER database for the collection and management of water use and wastewater discharge by all power plants 20 MW and greater in California.

2004 to 2007 Science Applications International Corporation, Sacramento, CA

Chevron, Northern California (various sites). Managed several former pipeline right-of-way and pump stations sites within the Central California region. Developed and implemented new written field quality assurance/quality control procedures for the entire portfolio of sites. Developed and implemented an analytical laboratory evaluation plan. Managed the groundwater monitoring and sampling program for the portfolio. Initiated low-flow sampling and the use of pre-packed filter screens in boreholes to reduce turbidity in groundwater samples and attain low risk-assessment level detection limits. Initiated a crude oil remediation study for the portfolio that is proving to be a pivotal tool for closure of the pipeline sites. Submitted the first soil vapor survey workplan to the RWQCB for the portfolio and was given approval of that workplan without comment. Worked with a GIS team to incorporate all pertinent site data into a web-based GIS and geo-reference the GIS as appropriate. This portfolio required a significant amount of for-end planning and coordination. Developed and managed all sites budgets and billing.

2004 to 2004 Bay Consulting Services, LLC, Rocklin, CA

Chevron, Northern California (various sites). Completed several closure requests with Tier I/II risk analysis. Started and operated this experimental company for two months.

2001 to 2004 Cambria Environmental Technology, San Ramon and Rocklin, CA

Chevron, Northern California (various sites). Responsible for a large portfolio (40 - 60+ active sites) of ChevronTexaco service station, bulk fueling, and terminal sites in Northern California, some of which were located in the sensitive Lake Tahoe area. Started Cambria's Rocklin office and grew that office to a staff of over 12 in less than a year through initiative and hard work. Helped develop and received State Underground Storage Tank (UST) Fund pre-approved for ~100 low-risk ChevronTexaco sites as part of a management transfer initiative. Through good regulatory communication, solid analysis, and hard work, closed over 30 sites in two years (half of one portfolio). Site closures were risk-based using both natural attenuation and active remediation approaches. Worked with Caltrans on a freeway (CA I-80) expansion project that required excavation and dewatering beneath a former Chevron site. Through a series of constructive meetings, built into the Caltrans request for bid, specifications for handling petroleum impacted excavated soils and water. The expansion project has proceeded as expected and planned. Liaison for the client and regulators. Developed and managed all sites budgets and billing.

East Bay Municipal Utility District, Northern California (various sites). Brought to Cambria a three-year, $275K/yr maximum EBMUD contract. The contract focused on pre-trenching activity soil sampling/analysis for potential contaminant identification and on trench spoils sampling/analyses for soil disposal. Developed a small group of professionals to manage this portfolio. As part of this project, managed several EPA SW-846 statistical soil analysis projects at District landfill sites with volumes up to ~180,000 cubic yards of landfilled soil. Created and surveyed statistical grids on the landfills and characterized the soil for removal to Class III or Class II landfills. Conducted site investigations and quarterly groundwater monitoring projects. Liaison for the client and regulators. Developed and managed all sites budgets and billing.

2000 - 2001 Alisto Engineering, Lafayette, CA

Caltrans, Northern California (various sites). Conducted statistical analyses of the soil from the shoulders of several Caltrans highways in Southern California. Performed the statistical analyses to determine lead hazard levels for use soil management planning in proposed construction corridors. The statistical analyses were performed on sample populations ranging from approximately 80 to 300. Liaison for the client and regulators. Developed and managed all sites budgets and billing.

Industrial Facilities, Northern California (various sites). Conducted site investigations at several industrial sites in Northern California. Developed storm water pollution prevention plans (SWPPPs) for development projects in downtown San Jose and a Caltrans project along CA I-680. Liaison for the client and regulators. Developed and managed all sites budgets and billing.

1998 - 2000 TRC, Concord, CA

ExxonMobil, Northern California (various sites). Responsible for a mid-size portfolio (15 - 20+ active sites) of ExxonMobil service station and bulk fueling sites in Northern California. Through good regulatory communication, solid analysis, and hard work, closed over 30 sites. Site closures were risk-based using both natural attenuation and active remediation approaches. For one bulk plant on the sensitive Napa River, secured a public recession of a RWQCB cleanup and abatement order and site closure for Mobil after two years of negotiations, technical presentations, and meetings. Conducted high vacuum, dual-phase extraction at several ExxonMobil sites. Liaison for the client and regulators. Developed and managed all sites budgets and billing.

Quick Stop Markets, Northern California (various sites). Developed and managed a small portfolio of Quick Stop Market sites in Northern California. Saved the client thousands of dollars in lease fees by closing a site through solid regulatory negotiation and communication, and aggressive site assessment and remediation. The site was located a few blocks upgradient from Lake Merritt in Oakland. Conducted high vacuum, dual-phase extraction at several Quick Stop sites. Liaison for the client and regulators. Developed and managed all sites budgets and billing.

Miscellaneous Sites, Northern California. Team member of the Level 3 Communications environmental impact report (EIR) submittals, preparing geologic hazard evaluations. Conducted site investigations at several industrial sites in Northern California. Liaison for the client and regulators. Developed and managed all sites budgets and billing.

1993 - 1995 Project Manager, GeoResearch, Long Beach, CA

Unocal CERT, Southern California (various sites). Project manager of a portfolio of active Unocal CERT sites. Frequently utilized mobile laboratories to assist in the placement of soil borings, vapor extraction, and groundwater wells. Conducted risk assessments, site assessments, tanks pulls, station demolitions, aquifer and vapor extraction tests, and remediation system designs and installations.

1990 - 1993 Staff Geologist, AeroVironment, Monrovia, CA

Project manager and project geologist for industrial sites and government projects. Team leader for documenting homestead well locations and archaeological and biological concerns at over 400 former homestead sites at Edwards AFB using GPS technology. Conducted groundwater sampling according to AFCEE protocols, and soil-vapor and geophysical surveys at Vandenberg AFB. Member of the design team of a mobile soil-vapor laboratory. Lead designer of an insitu soil-vapor sample collection system. Managed two teams for monitoring landfill vapor emissions and subsurface migration at active county operated landfills, and wrote the standard operating procedures, conducted field training, and prepared quarterly AQMD reports.

DECLARATION OF
John L. Fio

I, John L. Fio, declare as follows:

1. I am presently a consultant to the California Energy Commission for the Siting Office of the Energy Facilities Siting Division as a Hydrogeologic Consultant through Aspen Environmental Group.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Soil and Water Resources** for the Abengoa Mojave Solar project based on my independent analysis of the Application for Certification and the supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: May 7, 2010 Signed: ______________

At: Davis, California

JOHN L. FIO

QUALIFICATIONS

John L. Fio has almost 25 years of problem-solving experience. Mr. Fio analyzes groundwater systems, quantifies chemical transport in the subsurface, and evaluates groundwater surface-water interactions. He is a recognized expert on hydrologic and water quality issues. Mr. Fio develops and employs numerical models for site, water district, and basin-wide investigations; calculates extraction effects on groundwater levels, stream flow, and lake levels; establishes water quality monitoring programs; designs water management plans; evaluates groundwater quality effects of wastewater and recycled water disposal to land; develops and implements Geographic Information System (GIS) databases; and determines water sources using chemical and age-dating techniques.

PROFESSIONAL EXPERIENCE

January, 1998 – present

Principal Hydrologist, HydroFocus, Inc. *Davis, CA*

California Energy Commission (2008-2009): As part of several proposed power plant permitting reviews (CPV Sentinel, Beacon, and Carizzo), project applicants developed groundwater-flow models to simulate groundwater level changes in response to pumping from power plant extraction wells. Mr. Fio reviewed model construction, assumptions, parameters, calibration, sensitivities, results, and validity. When appropriate, he also employed the models to complete analyses to identify model uncertainty and help develop mitigation and project Conditions of Certification. His written reports are integrated as part of Staff's Preliminary and Final Assessments. Additionally, John provided hydrogeologic assessments to interpret model results and describe basin conditions.

Grasslands Bypass EIR/EIS (1999 and 2008): The Grasslands Drainage Area includes 97,400 acres of farmland approximately located between the California Aqueduct on the west and San Joaquin River on the east. In 1999 and again in 2008, Mr. Fio utilized groundwater-flow and geochemical models to simulate changes in salt and selenium distributions in soil under different water- and land-management alternatives as part of NEPA/CEQA compliance documentation.

San Luis Drainage Feature Evaluation (2005-2007): John Fio completed groundwater hydraulic and soil and water quality assessments for drainage-water management alternatives. As a principal of HydroFocus, Inc., he was part of the URS team that received a commendation from the U.S. Bureau of Reclamation for outstanding performance in the successful completion and certification of the NEPA/CEQA Environmental Impact Report and Environmental Impact Statement.

Alexander Valley Resort AB-610 Water Supply Assessment (2008): The proposed Alexander Valley Resort is located in Cloverdale, California. John Fio completed the SB-610 water supply assessment as required by CEQA for the City of Cloverdale, who is both the public water supplier and the lead agency for the project. Because the City of Cloverdale did not have an adopted Urban Water Management Plan, other data sources, reports, and soil moisture budget modeling were required to determine the total available water supplies during normal, single dry, and multiple dry years for a 20-year projection. The analysis determined whether supplies met the estimated water demand associated with the proposed project and future residential and non-residential water uses.

Additional relevant data and modeling analyses include:

- Groundwater-flow, solute-transport, and water-quality impacts from wastewater disposal to land: sanitary districts and municipalities located in San Joaquin and Contra Costa Counties, California.
- Quantitative hydrogeochemical assessment of contaminant transport near Menlo Park, California. Development of groundwater-flow and solute-transport models to quantify hydrocarbon transport beneath industrial facility near San Francisco Bay.
- Groundwater recharge and subsurface storage, Merced County, California. Developed and implemented regional groundwater-flow model to assess groundwater recharge and pumping projects.
- Depletion of subsurface flow to the North Platte River, Wyoming and Nebraska. Data analysis and modeling of stream aquifer interactions in support of interstate water rights conflict.

1995 to 1997

Senior Project Hydrologist, Hydrologic Consultants, Inc. *Sacramento, CA*

Project experience in the evaluation of groundwater flow, water quality, and solute transport. Consulting assignments included the following:

- Developed relationships to describe geologic controls and load-flow relationships for Santa Ynez River drainage system. The relationships were part of a network of interacting reservoir operations, surface-water, and groundwater-flow and transport models.
- Evaluation of groundwater-flow paths beneath South San Francisco Bay. The groundwater-flow system was quantified using a groundwater-flow model to assess system response to pumping centers located east and west of the Bay.
- Coordination with the California Regional Water Quality Control Board on the remediation of a VOC plume in Mountain View, California.
- Assess the response of groundwater levels, streamflow, and spring discharge to groundwater pumpage in the Mammoth Basin, California.
- Quantifying stream flow depletions owing to increased consumption and groundwater pumping.

1990 to 1995

Research Grade Hydraulic Engineer, U.S. Geological Survey Sacramento, CA

- Geohydrologic and groundwater quality investigations in the western San Joaquin Valley, California.
- Directed the development of a regional Geographic Information System database for the South San Francisco and Peninsula Area, California.
- Supervised data collection and development of databases, data analyses, and report writing.

- Constructed groundwater flow models for parts of the western San Joaquin Valley and South San Francisco Bay areas, California.
- Interacted with private and public cooperators and funding agencies.

1987 to 1990

Civil Engineer, U.S. Geological Survey *Sacramento, CA*

- Conducted field-scale investigations of on-farm drainage systems.
- Developed groundwater-flow model of tile drainage system. Assessed flow paths and salt transport in shallow flow-system. Quantified regional groundwater-flow paths intercepted by on-farm drainage systems.
- Integrated particle-tracking models with groundwater-flow model results to assess advective transport of salts and selenium.

1985 to 1987

Hydrologist, U.S. Geological Survey *Sacramento, CA*

- Designed and conducted sorption experiments and incorporated results into a solute transport model.
- Assessed the distribution of salts and selenium in unsaturated and saturated soil profiles.
- Developed analytical method to estimate organic selenium concentrations in soil extracts.

1983 to 1984

Research Assistant, University of California *Davis, CA*

- Conducted an assessment of methods used to analyze for selenium in soil extracts, aqueous samples, and animal tissues.
- Implemented experiments to assess arsenic volatilization from soils.
- Conducted laboratory analyses to estimate the buffering capacity of soils in response to acidic deposition.

ACADEMIC BACKGROUND

Master of Science, 1987, Civil Engineering, University of California at Davis
Bachelor of Science, 1984, Soil and Water Science, University of California at Davis

PROFESSIONAL AFFILIATIONS

American Society of Civil Engineers
Association of Groundwater Scientists and Engineers
California Groundwater Resources Association
Citation for Outstanding Performance, University of California, Davis (1981).

DECLARATION OF
Eugene B. (Gus) Yates

I, Gus Yates, declare as follows:

1. I am presently a consultant to the California Energy Commission for the Siting Office of the Energy Facilities Siting Division as a Hydrogeologic Consultant through Aspen Environmental Group**.**

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Soil and Water Resources** for the Abengoa Mojave Solar project based on my independent analysis of the Application for Certification and the supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: May 9, 2010 Signed: Original signed by E. Yates

At: Davis, California

EUGENE B. (GUS) YATES

QUALIFICATIONS

Gus Yates has been a professional hydrologist in California for over 25 years. His role in water resources management projects commonly bridges the technical and policy realms. He specializes in rapidly identifying the key water-related issues for a project and addressing them with appropriate quantitative tools that make the best use of available data. He ties his technical work back into management plans and regulatory compliance documents. He has extensive experience in analysis and management of groundwater basins and related surface water and habitat systems throughout central and northern California. Mr. Yates is registered with the State of California as a professional geologist and certified hydrogeologist.

PROFESSIONAL EXPERIENCE

April, 2009 – present

Senior Hydrologist, HydroFocus Inc. *Davis, CA*

Evaluates groundwater conditions at local and basinwide scales using modeling and statistical techniques; leads stakeholder processes to develop groundwater and watershed management plans that are grounded in technical understanding of the hydrologic system; applies operations models to optimize project design and quantify environmental impacts; applies training and experience in CEQA, NEPA, water-quality regulations, water rights, group facilitation, and litigation.

January, 1999 - March, 2009

Consulting Hydrologist in Private Practice *Berkeley, CA*

- Groundwater flow and transport model, San Benito County, CA – Developed a regional groundwater flow and salinity model with MODFLOW and MT3DMS.
- Groundwater flow model, Laguna Seca subarea, Monterey County, CA – Developed and jointly calibrated a soil-moisture-recharge model and groundwater flow model to evaluate safe yield in a small, structurally complex coastal basin.
- Southeast Chico drainage study – Applied MODFLOW and HEC-RAS models to determine the cause of periodic shallow flooding in a new suburb.
- Groundwater flow model, Yuba goldfields wet-pit gravel quarry, Yuba County, CA – Developed a local-scale MODFLOW model to estimate the impacts of a proposed gravel quarry that would penetrate a regional confining layer.
- Seaside Basin update on groundwater conditions, Seaside, CA – Updated and improved prior estimates of pumping, recharge, aquifer characteristics and yield to help resolve a water-rights dispute.
- Cambria Community Services District water-supply master plan – Quantified the frequency and duration of drought-related water shortages and evaluated feasibility of water supply alternatives.
- Fish habitat improvements, Yolo Bypass, CA -- Applied HEC-RAS stream hydraulics model with input from landowners and biologist to design creek modifications that would improve anadromous fish passage and create localized inundation for splittail spawning and rearing.

- Integrated water resources management plan, Yolo County, CA -- Provided technical expertise and local knowledge as coauthor of a countywide water management with state and local agencies.
- Groundwater management plan, Soquel Creek Water District, Santa Cruz County, CA -- Served as technical advisor and coauthor for GMP update to meet SB1938 requirements and focus monitoring and management actions on emerging key issues.

1991-1999

Environmental Scientist, Jones & Stokes Associates *Sacramento, CA*

- Willow Slough watershed management plan, Yolo County, CA – Facilitated stakeholder process; documented groundwater, flooding and habitat conditions; and developed BMPs for agriculture.
- Groundwater management plan, northern San Benito County, CA – Served as facilitator, technical advisor and author for a multi-party planning process to identify issues and realistic solutions in a heavily-used groundwater basin.
- Subsidence impacts of groundwater pumping, Mendota, CA – Developed regression equations based on extensive USGS data to predict subsidence from groundwater transfers.
- Nitrate contamination from septic systems, Los Osos, CA – Served as expert advisor for field investigation of nitrate contamination from septic systems in a sandy coastal aquifer.
- Operations model for conjunctive use of desal plant and groundwater, Cambria, CA – Developed a probabilistic, real-time operations model to guide the conjunctive use of a desalination plant with existing water-supply wells.
- Instream flow litigation, Putah Creek, Yolo and Solano Counties, CA – Expert witness in a trial challenging the adequacy of instream flows below Monticello Dam.

1982-1990

Hydrologist, U.S. Geological Survey *Sacramento, CA*

- Groundwater model of Salinas Valley groundwater basin, Monterey County, CA – Developed one of the earliest models of the Salinas Valley groundwater basin and applied optimization theory to conjuncitve use operations.
- Groundwater flow model, Los Osos, CA – Created a groundwater flow model to evaluate 3-D interactions of Los Osos Creek, the Pacific Ocean and groundwater flow in a layered coastal groundwater basin. Subsequently added solute transport module to estimate long-term nitrate impacts of a wastewater project.
- Groundwater flow and quality, Santa Rosa and San Simeon Creek basins, Cambria, CA – Managed a comprehensive investigation of groundwater conditions in two coastal stream valleys, and developed finite-element models to integrate data and explore management options.

ACADEMIC BACKGROUND

Master of Science, 1985, Water Science, University of California at Davis
Bachelor of Arts, 1979, Geology, Harvard University, Cambridge, MA

PROFESSIONAL AFFILIATIONS

American Institute of Hydrology – certified professional hydrogeologist
Groundwater Resources Association of California

DECLARATION OF
Mike Conway

I, Mike Conway, declare as follows:

1. I am presently employed by the California Energy Commission in the Siting, Transmission and Environmental Protection Division, as an Engineering Geologist.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on the **Soil and Water Resources and Transmission System Engineering – Appendix A** for the **Abengoa Mojave Solar** project (09-AFC-5) based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: ___May 5, 2010_ Signed: _Original signed by M. Conway

At: Sacramento, California

Resume For: Mike Conway

Education: Bachelor of Science in Geology, University of California, Davis, August 2003.
Master of Science in Geology, California State University, Sacramento, expected 2011

Certifications: Certified Professional in Erosion and Sediment Control (CPESC)
Certified Erosion, Sediment and Storm Water Inspector (CESSWI)
Leadership in Energy and Environmental Design Accredited Professional (LEED AP)

Experience:

Engineering Geologist: California Energy Commission, Sacramento, CA ***2009***

- Conduct analyses of soil and water resource reports submitted to Commission
- Assess impacts to soil and water resources from construction and operation of energy producing facilities
- Perform onsite evaluations of soil and water resources pre and post-project
- Implement a CEQA-like review of proposed energy projects to evaluate environmental impacts

Environmental Scientist: Central Valley Water Board, Rancho Cordova, CA ***2009***

- Wrote municipal storm water permits for Phase I communities in the Central Valley
- Reviewed storm water annual reports for Phase I and II municipalities
- Conducted audits of industrial sites for compliance with storm water permits
- Conducted audits of municipalities for compliance with municipal permits
- Help communities better understand how to effectively implement storm water programs
- Represented Water Board in large technical workshops and other public forums

Environmental Consultant: Wood Rodgers, Inc., Sacramento, CA ***2006-2009***

- Consulted clients on how to comply with Federal, State and local storm water quality and environmental regulations
- Helped public and private sector clients gain State Water Resources Control Board (SWRCB) permit coverage under Large and Small MS4 General Permits, NPDES Permits, CWA Section 401 Permits
- Consulted clients on Army Corps of Engineers, 404 Permitting
- Developed a storm water quality manual for Yolo County
- Prepared Caltrans environmental documentation and design for all project phases
- Prepared Storm Water Management Plans (SWMP) and Storm Water Pollution Prevention Plans (SWPPP)
- Drafted water pollution control exhibits using both AutoCAD and MicroStation
- Prepared Caltrans Storm Water Data Reports including cost estimates
- Designed landscaping plans for Caltrans' Modesto Ramp Rehabilitation Project
- Prepared Spill Prevention Control and Countermeasure (SPCC) plans
- Created Hazardous Materials Business Plan for City of Fort Bragg, California
- Prepared proposals for outgoing environmental quality project bids
- Performed field visits to evaluate Best Management Practice (BMP) effectiveness in reducing erosion and sedimentation
- Facilitated multiple storm water quality training workshops for groups up to 20 plus

Storm Water Quality Consultant: Envirosafety Services, Elk Grove, CA ***2004-2006***

- Wrote site specific SWPPPs to include guidance specific to city, county, and geographical constraints
- Designed BMP exhibits using AutoCAD
- Conducted inspections at construction sites throughout the Central Valley for (SWPPP) compliance
- Resolved storm water compliance issues in cooperation with site superintendents, county and city inspectors
- Researched current storm water protection regulations to best protect clients

Post-Graduate Researcher: Dept. of Land, Air, and Water Resources, U.C. Davis, CA ***2003***

- Studied the effects of irrigation practices on wetland ecology and water quality
- Independently organized monthly analyses and data processing of selenium contaminated invertebrate, algae, and water samples from the Tulare Lake Drainage District
- Managed concentrated acids, carcinogenic solutions, and final fluorescence measurements
- Compiled research data and presented findings to a team of eight colleagues

Lab Technician: Raney Geotechnical Laboratory, West Sacramento, CA ***2001***

- Conducted moisture density, unconfined compression tests, Atterburg Limit, curve, plasticity tests, and basic calculations for soil samples
- Administered load tests on concrete cylinders and mortar samples
- Performed percolation tests and Dynamic Cone Penetrator (DCP) tests in the field and gathered water samples for environmental analysis

DECLARATION OF
Ajoy Guha

I, **Ajoy Guha**, declare as follows:

1. I am presently employed by the California Energy Commission in the Siting, Transmission and Environmental Protection Division, as an Associate Electrical Engineer.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on the **Transmission System Engineering and Transmission System Engineering – Appendix A** for the **Abengoa Mojave Solar** project (09-AFC-5) based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 5/6/2010 Signed: Original signed by A. Guha

At: Sacramento, California

RESUME

AJOY GUHA
Associate Electrical Engineer
California Energy Commission
1516 Ninth Street, MS 46
Sacramento, CA 95814

EDUCATION:
MSEE, POWER SYSTEMS ENGINEERING, PURDUE UNIVERSITY, INDIANA
BSEE, ELECTRICAL ENGINEERING, CALCUTTA UNIVERSITY, INDIA

CERTIFICATIONS:
REGISTERED PROFESSIONAL ENGINEER, CALIFORNIA, INDIANA & ILLIINOIS
MEMBER OF IEEE; MEMBER OF THE INSTITUTION OF ENGINEERS OF INDIA

SUMMARY OF PROFESSIONAL BACKGROUND:

Ajoy Guha, P. E. has 34 years of electric utility experience with an extensive background in evaluating and determining current and potential transmission system reliability problems and their cost effective solutions. He has a good understanding of the transmission issues and concerns. He is proficient in utilizing computer models of electrical systems in performing power flow, dynamic stability and short circuit studies, and provide system evaluations and solutions, and had performed generator interconnection studies, area transfer and interconnected transmission studies, and prepared five year transmission alternate plans and annual operating plans. He is also experienced in utilizing Integrated Resource Planning computer models for generation production costing and long term resource plans, and had worked as an Executive in electric utilities and experienced in construction, operation, maintenance and standardization of transmission and distribution lines.

WORK EXPERIENCE:

CALIFORNIA ENERGY COMMISSION, ENERGY FACLITIES SITING AND ENVIRONMENTAL DIVISION, SACRAMENTO, CA, 11/2000-Present.
Working as Associate Electrical Engineer in the Transmission System Engineering unit on licensing generation projects. Work involves evaluating generation interconnection studies and their impacts on transmission system, and providing staff assessments and testimony to the commission, and coordination with utilities and other agencies.

ALLIANT ENERGY, DELIVERY SYSTEM PLANNING, MADISON, WI, 4/2000-9/2000.
Worked as Transmission Services Engineer, performed Generator Interconnection studies and system planning studies.

IMPERIAL IRRIGATION DISTRICT, POWER DEPT., Imperial, California, 1985-1998.
Worked as Senior Planning Engineer in a supervisory position and in Transmission, Distribution and Integrated Resource planning areas. Performed interconnection studies for 500 MW geothermal plants and developed plan for a collector system, developed methodologies for transmission service charges , scheduling fees and losses. Worked as the Project Leader in the 1992 Electricity Report (ER 92) process of the California Energy Commission. Worked as the Project Leader for installation of an engineering computer system and softwares. Assumed the Project Lead in the standardization of construction and materials, and published construction standards.

CITY LIGHT & POWER, Frankfort, Indiana, 1980 – 1985.
Worked as Assistant Superintendent and managed engineering, construction and operation depts.

WESTERN ILLINOIS POWER CO-OP., Jacksonville, Illinois, 1978 – 1980.
Worked as Planning Engineer and was involved in transmission system planning.

THE CALCUTTA ELECTRIC SUPPLY CORPORATION LTD. (CESC), Calcutta, India, 1964 –1978.
Worked as District Engineer and was responsible for managing customer relations, purchasing and stores, system planning, construction, operation and maintenance departments of the most industrialized Transmission and Distribution division of the Utility. Worked as PROJECT MANAGER for construction of a 30 mile Double Circuit 132 kV gas-filled Underground Cable urban project. During 1961-63, worked as Factory Engineer for design, manufacturing and testing of transformers, motor starters and worked in a coal-fired generating plant.

DECLARATION OF
Mark Hesters

I, Mark Hesters, declare as follows:

1. I am presently employed by the California Energy Commission in the Siting, Transmission and Environmental Protection Division, as a Senior Electrical Engineer.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on the **Transmission System Engineering** and **Transmission System Engineering – Appendix A** for the **Abengoa Mojave Solar** project (09-AFC-5) based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 5/5/2010 Signed: Original signed by M. Hesters

At: Sacramento, California

Mark Hesters

916-654-5049
mark.hesters@energy.state.ca.us

Qualifications

- Analyzed the reliability impacts of electric power plants for nine years.
- As an expert witness, produced written and oral testimony in numerous California Energy Commission proceedings on power plant licensing.
- Expertise in power flow models (GE PSLF and PowerWorld), production cost models (GE MAPS), Microsoft word-processing, spreadsheet and database programs.
- Contributing author to many California Energy Commission reports.
- Represented the Energy Commission in the development of electric reliability and planning standards for California.

Experience

Senior Electrical Engineer

2005-Present California Energy Commission, Sacramento, CA

- Program manager of the transmission system engineering analysis for new generator Applications of Certification.
- Lead the development of transmission data collection regulations.
- Overhauled the transmission data adequacy regulations for the Energy Commission's power plant certification process.
- Participated in the analysis of regional transmission projects.
- Technical lead for Commission in regional planning groups.
- Energy Commission representative to the Western Electric Coordinating Council Operations Committee.

Associate Electrical Engineer

1998–2005 California Energy Commission, Sacramento, CA

- Lead transmission systems analyst for power plant licensing under 12-month, 6-month and 21-day licensing processes.
- Provided expert witness testimony on the potential transmission impacts of new power plants in California Energy Commission licensing hearings.
- Authored chapters for California Energy Commission staff reports on regional transmission issues.
- Studied the economics of transmission projects using electricity production simulation tools.
- Analyzed transmission systems using the GE PSLF and PowerWorld load flow models.
- Collected and evaluated transmission data for California and the Western United States

Electric Generation Systems Specialist

1990–1998 California Energy Commission, Sacramento, CA

- Lead generation planner for southern California utilities.
- Analyzed electric generation systems using complex simulation tools.
- Provided analysis on the impact of resource plans on air quality and electricity costs for California Energy Commission reports.
- Developed modeling characteristics for emerging technologies.
- Evaluated resource plans.

Education 1985–1989 University of California at Davis Davis, CA

- B.S., Environmental Policy Analysis and Planning

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA
1516 NINTH STREET, SACRAMENTO, CA 95814
1-800-822-6228 – WWW.ENERGY.CA.GOV

APPLICATION FOR CERTIFICATION
FOR THE *ABENGOA MOJAVE SOLAR POWER PLANT*

Docket No. 09-AFC-5
PROOF OF SERVICE
(Revised 5/17/2010)

APPLICANT
Emiliano Garcia Sanz
General Manager
Abengoa Solar Inc.
11500 West 13th Avenue
Lakewood, CO 80215
emiliano.garcia@solar.abengoa.com

Scott D. Frier
Chief Operating Officer
Abengoa Solar Inc.
13911 Park Ave., Ste. 206
Victorville, CA 92392
scott.Frier@solar.abengoa.com

Tandy McMannes
2030 Addison Street, Suite 420
Berkeley, CA 94704
tandy.mcmannes@solar.abengoa.com

APPLICANT'S CONSULTANTS
Frederick H. Redell, PE
Engineering Manager
Abengoa Solar, Inc.
11500 West 13th Avenue
Lakewood, CO 80215
frederick.redell@solar.abengoa.com

COUNSEL FOR APPLICANT
Christopher T. Ellison
Ellison, Schneider & Harris
2600 Capitol Ave.
Sacramento, CA 95816
cte@eslawfirm.com

INTERESTED AGENCIES
California ISO
E-mail Preferred
e-recipient@caiso.com

INTERVENORS
California Unions for Reliable Energy ("CURE")
Tanya A. Gulesserian
Marc D. Joseph
Elizabeth Klebaner
Adams Broadwell Joseph & Cardozo
601 Gateway Boulevard, Suite 1000
South San Francisco, CA 94080
E-mail Preferred
tgulesserian@adamsbroadwell.com
eklebaner@adamsbroadwell.com

Luz Solar Partners Ltd., VIII
Luz Solar Partners Ltd., IX
Jennifer Schwartz
700 Universe Blvd
Juno Beach, FL 33408
jennifer.schwartz@nexteraenergy.com

ENERGY COMMISSION
ANTHONY EGGERT
Commissioner and Presiding Member
aeggert@energy.state.ca.us

JAMES D.BOYD
Vice Chairman and Associate Member
jboyd@energy.state.ca.us

*Kourtney Vaccaro
Hearing Officer
kvaccaro@energy.state.ca.us

Craig Hoffman
Project Manager
choffman@energy.state.ca.us

Christine Hammond
Staff Counsel
chammond@energy.state.ca.us

Jennifer Jennings
Public Adviser's Office
publicadviser@energy.state.ca.us

*indicates change

DECLARATION OF SERVICE

I, April Albright, declare that on May 25, 2010, I served and filed copies of the attached Supplemental Staff Assessment Part B. The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at:
[http://www.energy.ca.gov/sitingcases/abengoa/index.html].

The document has been sent to both the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit, in the following manner:

(*Check all that Apply*)

For service to all other parties:

__✓__ sent electronically to all email addresses on the Proof of Service list;

______ by personal delivery;

__✓__ CD copies delivered on this date, for mailing with the United States Postal Service with first-class postage thereon fully prepaid, to the name and address of the person served, for mailing that same day in the ordinary course of business; that the envelope was sealed and placed for collection and mailed. Hard copies are available upon request.

AND

For filing with the Energy Commission:

__✓__ sending an original paper copy and one electronic copy, mailed and emailed respectively, to the address below (preferred method);

OR

______ depositing in the mail an original and 12 paper copies, as follows:

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 09-AFC-5
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512
docket@energy.state.ca.us

I declare under penalty of perjury that the foregoing is true and correct, that I am employed in the county where this mailing occurred, and that I am over the age of 18 years and not a party to the proceeding.

Original signed by: ______________
April Albright